107th Indian Science Congress
Science & Technology: Rural Development
3-7 January, 2020 | University of Agricultural Sciences, Bangalore

Public & Plenary Lectures

University of Agricultural Science, Bangalore
Public Lecture : 1
Venue : Cluster I – Main Program Area : ICC
Title : ULTRASHARP FLUORESCENCE MICROSCOPY
Chairperson : Prof.K.S.Rangappa
Co-Chairperson : Dr.Vijay Laxmi Saxena

<table>
<thead>
<tr>
<th>#</th>
<th>Name of the Speaker</th>
<th>Affiliation</th>
<th>Time</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Professor Stefan Hell</td>
<td>Nobel Laureate Max Planck Institute for Biophysical Chemistry, Department of Nano Biophotonics, Am Fassberg 11 37077 Gottingen, Germany Email: <a href="mailto:hell-office@mpibpc.mpg.de">hell-office@mpibpc.mpg.de</a></td>
<td>03:00 PM to 04:00 PM</td>
<td>1-2</td>
</tr>
</tbody>
</table>

Public Lecture : 2
Venue : Cluster I – Main Program Area : ICC
Title : SCIENCE ACROSS DISCIPLINES AND SOME CONSEQUENCES FOR INDUSTRY 4.0
Chairperson : Prof. Eileen White
Co-Chairperson : Prof.K.Byrappa

<table>
<thead>
<tr>
<th>#</th>
<th>Name of the Speaker</th>
<th>Affiliation</th>
<th>Time</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Professor Subra Suresh</td>
<td>President, Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798 Email: <a href="mailto:chowdari@ntu.edu.sg">chowdari@ntu.edu.sg</a></td>
<td>04:00 PM to 05:00 PM</td>
<td>3</td>
</tr>
</tbody>
</table>
January 3rd 2020

ISCA – Endowment Lectures

Venue : Cluster I – Main Program Area : ICC

Time : 5:00 PM to 6.00 PM

Chairperson : Prof.K.S.Rangappa, General President

Co-Chairperson : Dr. S Ramakrishna, General Secretary

<table>
<thead>
<tr>
<th>#</th>
<th>Lecture / Award</th>
<th>Name</th>
</tr>
</thead>
</table>
| 1  | B.C. Guha Memorial Lecture     | Dr. Somenath Roy  
Former Professor,  
Immunology and Microbiology Lab,  
Dept. of Human Physiology with Community Health  
Vidyasagar University, Midnapore |
| 2  | Raj Kristo Dutt Memorial Award | Dr. Sandipan Ganguli  
Scientist (E) & Head Division of Parasitology,  
National Institute of Cholera & Enteric Diseases (ICMR), P-33, C.I.T Road, Scheme XM, Beliaghata, Kolkata |
| 3  | G.P. Chatterjee Memorial Award | Dr. Raghavendra S Kulkarni  
Professor & Chairman( Retd)  
Dept. of studies in Zoology  
Gulbarga University, Gulbarga |
### January 4th 2020

**Public Lecture**: 3  
**Venue**: Cluster I – Main Program Area : ICC  
**Title**: FROM BASIC SCIENCE TO AN ACUTE PROBLEM OF MODERN MEDICINE  
**Chairperson**: Dr. Ashok Kumar Saxena  
**Co-Chairperson**: Prof. M. K. Chakrabarti

<table>
<thead>
<tr>
<th>#</th>
<th>Name of the Speaker</th>
<th>Affiliation</th>
<th>Time</th>
<th>Page No.</th>
</tr>
</thead>
</table>
| 1. | Professor Ada E. Yonath | Nobel Laureate  
The Weizmann Institute of Science, The Department of structural biology, Rehovot, 7610001, Israel.  
Email: ada.yonath@weizmann.ac.il | 9:30 AM to 10:30 PM | 4-5 |
Public Lecture : 4  
Venue : Cluster I – Main Program Area : ICC  
Title : LIFE STYLE DISEASES AND RECENT ADVANCES IN CARDIAC SCIENCES  
Chairperson : Prof. Susan L. Mooberry  
Co-Chairperson : Prof. James David Winkler

<table>
<thead>
<tr>
<th>#</th>
<th>Name of the Speaker</th>
<th>Affiliation</th>
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<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Dr. C.N. Manjunath</td>
<td>Professor &amp; Head of Cardiology Director, Sri Jayadeva Institute of Cardiovascular Sciences &amp; Research, 9th Block Jayanagar, Bannerghatta Road, Bangalore – 560069. E-mail: <a href="mailto:drcnmanjunath@gmail.com">drcnmanjunath@gmail.com</a></td>
<td>10:30 AM to 11:30 AM</td>
<td>6</td>
</tr>
</tbody>
</table>
## Public & Plenary Lectures

**January 4th 2020**

**Plenary Session (PS)**

**Time**: 11.45 am to 1.00 pm (20 minutes for each speaker)

**Venue**: Cluster I – Main Program Area: Hall – 7

**Title**: CHALLENGES AND OPPORTUNITIES IN CANCER DRUG DISCOVERY

**Chairperson**: Prof. Mewa Singh

**Co-Chairperson**: Dr. Shobith

<table>
<thead>
<tr>
<th>#</th>
<th>Name of the Speaker</th>
<th>Department</th>
<th>Title of the talk</th>
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<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Professor Anna-Kathrin Hell</td>
<td>Head of Pediatric Orthopaedics, Department of Trauma, Orthopaedic and Plastic Surgery, Affiliate Professor for Clinical Surgery, Florida Atlantic University, USA Email: <a href="mailto:anna.hell@med.uni-goettingen.de">anna.hell@med.uni-goettingen.de</a></td>
<td>Growth-friendly implants in the treatment of Early Onset Scoliosis – new trends and developments</td>
<td>USA</td>
<td>9-10</td>
</tr>
<tr>
<td>2.</td>
<td>Professor Peter J Houghton</td>
<td>Greehey Children Cancer Research Institute University of Texas Health Sciences Center San Antonio, USA Email: <a href="mailto:houghtonp@uthscsa.edu">houghtonp@uthscsa.edu</a></td>
<td>Challenges and Opportunities for Childhood Cancer Preclinical Drug Development</td>
<td>USA</td>
<td>11</td>
</tr>
<tr>
<td>3.</td>
<td>Professor Mary-Ann Bjornsti</td>
<td>Department of Pharmacology and Toxicology, School of Medicine, University of Alabama, Birmingham, USA Email: <a href="mailto:bjornsti@uab.edu">bjornsti@uab.edu</a></td>
<td>DNA topoisomerase I: opportunities for drug development</td>
<td>USA</td>
<td>12-13</td>
</tr>
<tr>
<td>4.</td>
<td>Professor Eileen White</td>
<td>Deputy Director, Rutgers Cancer Institution of New Jersey, USA Email: <a href="mailto:epwhite@cinj.rutgers.edu">epwhite@cinj.rutgers.edu</a></td>
<td>Control of Cancer Metabolism and the Anti-cancer Immune Response by Autophagy</td>
<td>USA</td>
<td>14-15</td>
</tr>
</tbody>
</table>
### Plenary Session (PS)

**Name of the Speaker:**
- Professor Susan L. Mooberry
- Professor Heggere Ranganath
- Professor Sajjan G Shiva

**Department:**
- Greehey Distinguished Chair in Targeted Molecule Therapeutics, UT Health San Antonio USA
- 301 Sparkman Drive Olin B. King Technology Hall N300B Huntsville, AL 35899
- Chair Computer Science Department, University of Memphis, TN 38152

**Title of the talk:**
- Discovery of New Leads for Triple-Negative Breast Cancer from Nature
- Artificial Intelligence and Data Driven Planned Agriculture – A must, not an option for India
- Building Intelligent Systems and Machines: Opportunities and Challenges

**From:** USA

**Page No.:**
- 16-17
- 18-19
- 20

**Time:** 11.45 am to 1.00 pm (20 minutes for each speaker)

**Venue:** Cluster I – Main Program Area: Hall – 8

**Title:** ARTIFICIAL INTELLIGENCE AND MEDICAL TECHNOLOGY

**Chairperson:** Dr. Ashok Kumar Saxena

**Co-Chairperson:** Prof. Hemanth Kumar

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**January 4th 2020**
<table>
<thead>
<tr>
<th>No.</th>
<th>Presenter</th>
<th>Institution</th>
<th>Topic</th>
<th>Location</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>Professor James David Winkler</td>
<td>Consulting Service in Drug and Development Various company, USA</td>
<td>Tackling the Next Wave - Using New Technology to Go After ‘Undruggable’ Targets</td>
<td>USA</td>
<td>21-22</td>
</tr>
<tr>
<td>5.</td>
<td>Dr. Ajit Sapre</td>
<td>Group President (R&amp;D) Reliance Technology Group Reliance Corporate Park, 7B-Gr.Floor, Thane Belapur Road, Ghansoli, Navi Mumbai-400701</td>
<td>Empowering rural India: One perspective</td>
<td>Mumbai</td>
<td>23-24</td>
</tr>
</tbody>
</table>
## January 5th 2020

**Plenary Session (PS)** : 3  
**Time** : 9.30 am to 10.30 am (20 minutes for each speaker)  
**Venue** : Cluster I – Main Program Area : Hall – 7  
**Title** : ADVANCES IN BASIC MEDICAL AND CLINICAL INTERACTIONS  
**Chairperson** : Prof. Surendra S Parmar  
**Co-Chairperson** : Prof. Hanumanthappa

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Speaker</th>
<th>Department</th>
<th>Title of the talk</th>
<th>From</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dr. Daniel R Wilson</td>
<td>President and University Professor, Western University of Health Sciences, 309 East Second Street, Pomona, CA 91766, USA</td>
<td>Inter professional Clinical and Translational Research: Opportunities and Challenges</td>
<td>USA</td>
<td>25-26</td>
</tr>
<tr>
<td>2.</td>
<td>Dr. Michal J Toborek</td>
<td>Professor of Biochemistry, University of Miami Miller School of Medicine, Department of Biochemistry and Molecular Biology, 1011 NW 15th Street, Miami, FL 33136, USA. Email: <a href="mailto:mtoborek@med.miami.edu">mtoborek@med.miami.edu</a></td>
<td>Targeting the HIV-infected brain to improve ischemic stroke outcome</td>
<td>USA</td>
<td>27-28</td>
</tr>
<tr>
<td>3.</td>
<td>Dr. Andrew J Greenshaw</td>
<td>Professor of Psychiatry and Neuroscience, University of Alberta Email : <a href="mailto:andy.greenshaw@ualberta.ca">andy.greenshaw@ualberta.ca</a></td>
<td>The coming impact for India of artificial intelligence and machine learning in human health systems</td>
<td>USA</td>
<td>29-30</td>
</tr>
</tbody>
</table>
### January 5th 2020

**Plenary Session (PS):** 4  
**Time:** 10.30 to 11.30am (20 minutes for each speaker)  
**Venue:** Cluster I – Main Program Area: Hall – 7  
**Title:** ADVANCES IN BASIC MEDICAL AND CLINICAL INTERACTIONS  
**Chairperson:** Dr. Vijay Laxmi Saxena  
**Co-Chairperson:** Prof. S.P. Trivedi

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Speaker</th>
<th>Department</th>
<th>Title of the talk</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dr. Surendra Varma</td>
<td>Executive Associate Dean for Graduate Medical Education and Resident Affairs, Texas Tech University School of Medicine, Lubbock, Texas, USA Email: <a href="mailto:pedskv@gmail.com">pedskv@gmail.com</a></td>
<td>Global Perspective of Newborn Hypothyroid Screening</td>
<td>USA</td>
<td>31-32</td>
</tr>
<tr>
<td>2.</td>
<td>Dr. Shilpa Buch</td>
<td>Professor &amp; Vice Chair for Research and the Director of the Nebraska Center for Substance Abuse research, University of Nebraska Email: <a href="mailto:sbuch@unmc.edu">sbuch@unmc.edu</a></td>
<td>HIV and opiates: Blaming the messengers</td>
<td>USA</td>
<td>33-35</td>
</tr>
<tr>
<td>3.</td>
<td>Dr. Devendra K Agrawal</td>
<td>Senior Vice President for Research Professor of Translational Research Western University of Health Sciences, 309 E. Second Street Pomona, CA 91766, USA Email: <a href="mailto:DAGrawal@WesternU.edu">DAGrawal@WesternU.edu</a></td>
<td>Novel approach to prevent vein graft failure following coronary artery bypass graft</td>
<td>USA</td>
<td>36-37</td>
</tr>
</tbody>
</table>
January 5th 2020

**Plenary Session (PS)** : 5

**Time** : 11.45am to 1.00 pm (20 minutes for each speaker)

**Venue** : Cluster I – Main Program Area : Hall – 7

**Title** : NON-COMMUNICABLE DISEASES IN RURAL POPULATION

**Chairperson** : Dr. Manoj Kumar Chakrabarthi

**Co-Chairperson** : Dr. K.M. Mahadevan

<table>
<thead>
<tr>
<th>Sl. No.</th>
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<th>Department</th>
<th>Title of the talk</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dr. Shekar M. A</td>
<td>No.466, 13th Main, Saraswathipuram, Mysuru-570009, Karnataka</td>
<td>Current status and perceived risk factors of NCDs in rural population</td>
<td>Mysuru</td>
<td>38-39</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Email: <a href="mailto:drsheki@gmail.com">drsheki@gmail.com</a></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2.</td>
<td>Dr. Aravind S R</td>
<td>#360, 19th Main, 1st Block, Rajajinagar, Bangalore India – 560010</td>
<td>Therapeutic approach for better care of Diabetes in Rural population</td>
<td>Bangalore</td>
<td>40-41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Email: <a href="mailto:draravind@hotmail.com">draravind@hotmail.com</a></td>
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</tr>
<tr>
<td>3.</td>
<td>Dr. Balasubramanyam R</td>
<td>Apt 102, Sankalp Gardenia, Gokulam Main Road Mysuru 570 002 Email: <a href="mailto:email@rbalu.com">email@rbalu.com</a></td>
<td>NCDs in Rural populations- Framing a pragmatic policy prescription</td>
<td>Mysuru</td>
<td>42-43</td>
</tr>
<tr>
<td>4.</td>
<td>Dr. Prashanth Mathur</td>
<td>Director, National Centre for Disease Informatics and Research, Indian Council of Medical Research Nirmal Bhawan-ICMR Complex (II Floor), Poojanahalli, Kannamangala Post Bengaluru – 562 110 Email: <a href="mailto:ncdir@ncdirindia.org">ncdir@ncdirindia.org</a></td>
<td>Health systems challenges and opportunities in tackling NCDs in rural areas</td>
<td>Bangalore</td>
<td>44-45</td>
</tr>
</tbody>
</table>
# January 5th 2020

## Plenary Session (PS) : 6

### Time : 9.30 am to 10.30am (20 minutes for each speaker)

### Venue : Cluster I – Main Program Area : Hall – 8

### Title : HUMAN MICROBIOTA-IS IT A POTENTIAL CONTROLLER OF HEALTH AND DISEASE

### Chairperson : Prof. B.P. Chatterji

### Co-Chairperson : Dr. M.G. Raghunathan

<table>
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<tr>
<th>#</th>
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<th>Department</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Prof. Surinder Rana</td>
<td>Dept of Gastroenterology, P.G. I.M.E.R, Chandigarh Sector 12, Pin 160012</td>
<td>Gut Microbiome in Pancreatic Diseases: Hype or Hope!</td>
<td>Chandigarh</td>
<td>46-47</td>
</tr>
<tr>
<td>2.</td>
<td>Prof. Asim K Duttaroy</td>
<td>Dept of Clinical Nutrition Faculty of Medicine, University of Oslo, POB 1046</td>
<td>Preventing heart Disease in rural population: Nutrition for gut microbiome</td>
<td>Norway</td>
<td>48-49</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blindern 0316 Oslo, Norway</td>
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<tr>
<td></td>
<td></td>
<td>Email: <a href="mailto:a.k.duttaroy@medisin.uio.no">a.k.duttaroy@medisin.uio.no</a></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Dr. Pallab Ray</td>
<td>Faculty of Department of Medical Microbiology, PGIMER, Chandigarh</td>
<td>The human microbiome in health and disease</td>
<td>Chandigarh</td>
<td>50-51</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Email: <a href="mailto:ray.pallab@pgimer.edu.in">ray.pallab@pgimer.edu.in</a></td>
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</tr>
<tr>
<td>4.</td>
<td>Dr. Trilochan Mohapatra</td>
<td>Secretary, Department of Agricultural Research and Education &amp; Director</td>
<td>Agricultural Innovation Pathway for Rural Transformation</td>
<td>New Delhi</td>
<td>52-53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>General, Indian Council of Agricultural Research, New Delhi</td>
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</tr>
<tr>
<td>5.</td>
<td>Dr. Ramesh Kaliaperumal</td>
<td>Principal Biologist, Rice Insecticide &amp; Nematicide-South Asia Corteva</td>
<td>Reklemel™ active: a new molecule for the control of plant-parasitic nematodes</td>
<td>Hyderabad</td>
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<td>Agriscience, Hyderabad</td>
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<tr>
<td></td>
<td></td>
<td>Email: <a href="mailto:Ramesh.kaliaperumal@corteva.com">Ramesh.kaliaperumal@corteva.com</a></td>
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</tbody>
</table>
### January 5th 2020

**Plenary Session (PS)**: 7  
**Time**: 10.30 am to 11.30 am (20 minutes for each speaker)  
**Venue**: Cluster I – Main Program Area: Hall – 8  
**Title**: CANCER RESEARCH - THERAPEUTIC APPLICATIONS  
**Chairperson**: Prof. P.P. Mathur  
**Co-Chairperson**: Prof. Basappa

<table>
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<tr>
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<th>Department</th>
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</tr>
</thead>
</table>
| 1. | Dr. Uri Barash      | Rappaport Faculty of Medicine (Technion)  
1 Efron St., Haifa, 31096, Israel  
Email: ubarash@yahoo.com | Heparanase: from basic cancer research to therapeutic applications | Israel | 54-55    |
| 2. | Dr. Nagaraj Nagathihalli | Department of Surgery, University of Miami Miller School of Medicine, Sylvester Comprehensive Cancer Center, Miami, Florida.  
Email: nnagathihalli@med.miami.edu | Molecular aspects of tobacco smoking, alcohol use and risk of pancreatic cancer | USA   | 56-57    |
| 3. | Prof. Sathees Raghavan | Professor, Department of Biochemistry, Biological Sciences Building, IISc Banglore-560012  
Email: sathees@iisc.ac.in | The two faces of G-quadruplex DNA: Role in chromosomal fragility and radioprotection | Bangalore | 58       |
## January 5th 2020

**Plenary Session (PS)** : 8  
**Time** : 11.45 am to 1.00 pm (20 minutes for each speaker)  
**Venue** : Cluster I – Main Program Area : Hall – 8  
**Title** : NANO MATERIALS FOR ENERGY, ENVIRONMENT AND HEALTH CARE  
**Chairperson** : Dr. D. Narayana Rao  
**Co-Chairperson** : Prof. Kasmir Raja

<table>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Professor Ajayan Vinu</td>
<td>Global Innovation Chair Professor and Director, The University of Newcastle (UON) University Drive, Callaghan NSW 2308 Australia Email: <a href="mailto:vinu.ajayan@gmail.com">vinu.ajayan@gmail.com</a></td>
<td>Functionalized Nanoporous Carbon Based Materials for Energy and Environmental Applications</td>
<td>Australia</td>
<td>59-60</td>
</tr>
<tr>
<td>2.</td>
<td>Dr. Zhubing He</td>
<td>Associate Professor, Materials Science and Engineering, Southern University of Science and Technology, Shenzhen 518055, P.R. China Email: <a href="mailto:hezb@sustech.edu.cn">hezb@sustech.edu.cn</a></td>
<td>Interface Engineering for NiO based Inverted Planar Perovskite Solar Cells</td>
<td>China</td>
<td>61</td>
</tr>
<tr>
<td>3.</td>
<td>Dr. B. N. Chandrashekar</td>
<td>Research Assistant Professor Materials Science and Engineering Southern University of Science and Technology 1088 Xueyuan Avenue, Shenzhen 518055, P.R. China Email: <a href="mailto:chandrashekar@sustech.edu.cn">chandrashekar@sustech.edu.cn</a></td>
<td>Green Transfer Method of CVD grown Graphene for Transparent and Flexible Electrodes</td>
<td>China</td>
<td>62</td>
</tr>
<tr>
<td>4.</td>
<td>Prof. Dinesh Rangappa</td>
<td>Professor &amp; Chairman, Department of Nanotechnology Visvesvaraya Technological University, Bangalore Region, Muddenahalli, Chikkaballapur – 562 Email: <a href="mailto:dinesh.rangappa@vtu.ac.in">dinesh.rangappa@vtu.ac.in</a></td>
<td>“Recent Progress in Nanostructure Electrode Materials for Energy Generation and Storage Applications”</td>
<td>Chikkaballapur</td>
<td>63-64</td>
</tr>
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</table>
January 5th 2020

Plenary Session (PS): 9

Time: 9.30 am to 10.30 am (20 minutes for each speaker)

Venue: Cluster I – Main Program Area: Hall – 9

Title: INFERTILITY IN RURAL WOMEN OF INDIA - CAUSES, PREVENTION AND TREATMENT

Chairperson: Dr. Paramashivan

Co-Chairperson: Dr. K.T.Chandrashekar

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<thead>
<tr>
<th>Sl. No.</th>
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<th>Department</th>
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<th>From</th>
<th>Page No.</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dr. Suresh Kattera</td>
<td>Director, Asia Pacific Advanced Fertility Centre, Bangalore Email: <a href="mailto:katteras@gmail.com">katteras@gmail.com</a></td>
<td>Low cost IUI for infertile women in rural India</td>
<td>Singapore</td>
<td>65</td>
</tr>
<tr>
<td>2.</td>
<td>Dr. Hrishikesh</td>
<td>Medical director, Bloom IVF Group, Bangalore Email: <a href="mailto:hdpai@hotmail.com">hdpai@hotmail.com</a></td>
<td>Infertility and Education for Rural India</td>
<td>Bangalore</td>
<td>66-67</td>
</tr>
<tr>
<td>3.</td>
<td>Dr. Kamini Rao</td>
<td>Obstetrician &amp; gynecologist, Milann, No 7, East Park Road, Kumarapark East, Bangalore – 560001 Email: <a href="mailto:drkaminirao@gmail.com">drkaminirao@gmail.com</a></td>
<td>Overcoming gender biases in rural India</td>
<td>Bangalore</td>
<td>68-69</td>
</tr>
<tr>
<td>4.</td>
<td>Dr. Prashant Nadkarni</td>
<td>KL fertility center, lg 30 dmall, 6 Jalan Damanlela, 50490 Kualalumpur, Malaysia Email: <a href="mailto:prashant@klfertility.com">prashant@klfertility.com</a></td>
<td>Infertility in Asia- Failing the masses.</td>
<td>Malaysia</td>
<td>70</td>
</tr>
</tbody>
</table>
**January 5th 2020**

**Plenary Session (PS): 10**

**Time:** 10.30 to 11.30am (20 minutes for each speaker)

**Venue:** Cluster I – Main Program Area : Hall – 9

**Title:** MATERIALS SCIENCE AND TECHNOLOGY FOR RURAL DEVELOPMENT

**Chairperson:** Prof. B. Satyanarayana

**Co-Chairperson:** Prof. N.K. Lokanath

<table>
<thead>
<tr>
<th>#</th>
<th>Name of the Speaker</th>
<th>Department</th>
<th>Title of the talk</th>
<th>From</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dr. Pulickel Ajayan</td>
<td>Benjamin M. and Mary Greenwood Anderson Professor of Engineering Department of Materials Science and NanoEngineering MEB 219 Rice University 6100 Main Street Houston, Texas 77005 Email: <a href="mailto:ajayan@rice.edu">ajayan@rice.edu</a></td>
<td>Nano Engineered Materials</td>
<td>USA</td>
<td>71-72</td>
</tr>
<tr>
<td>2.</td>
<td>Prof. Byrappa</td>
<td>University of Mysore, Center for Materials Science and Technology, Vijnan Bhavan, Manasagangothri, Mysore Email: <a href="mailto:kbyrappa@gmail.com">kbyrappa@gmail.com</a></td>
<td>Molecular Engineering of Direct Z-Scheme Multi-Functional Metal Oxides Heterostructures</td>
<td>Mysuru</td>
<td>73-74</td>
</tr>
<tr>
<td>3.</td>
<td>Professor Chowdari</td>
<td>Senior Executive Director, President's Office, Nanyang Technological University, Singapore Email: <a href="mailto:chowdari@ntu.edu.sg">chowdari@ntu.edu.sg</a></td>
<td>Advanced Materials for Sustainable Development</td>
<td>Singapore</td>
<td>75-76</td>
</tr>
</tbody>
</table>
January 5th 2020

**Plenary Session (PS)** : 11

**Time** : 11.45 am to 1.00 pm (20 minutes for each speaker)

**Venue** : Cluster I – Main Program Area : Hall – 9

**Title** : MATERIALS SCIENCE AND TECHNOLOGY FOR RURAL DEVELOPMENT

**Chairperson** : Dr. Aravind Kumar Saxena

**Co-Chairperson** : Dr. Srikantaswamy

<table>
<thead>
<tr>
<th>#</th>
<th>Name of the Speaker</th>
<th>Department</th>
<th>Title of the talk</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Prof. Martin Hartmann</td>
<td>Director of Erlangen Catalysis Resource Center, Friedrich-Alexander Universität Erlangen-Nürnberg, Egerlandstr, Germany Email: <a href="mailto:martin.hartmann@ecrc.uni-erlangen.de">martin.hartmann@ecrc.uni-erlangen.de</a></td>
<td>Tailored Design of Nanoporous Functional Materials</td>
<td>Germany</td>
<td>77-78</td>
</tr>
<tr>
<td>2.</td>
<td>Prof. Kesturu S Girish</td>
<td>Dr. Kesturu S Girish, Professor, DOSR in Biochemistry, Tumkur University, Tumkur- 572103 Email: <a href="mailto:ksgbaboo@gmail.com">ksgbaboo@gmail.com</a></td>
<td>Hemin-Induced Ferroptosis Mediates Platelet Activation and Formation of Neutrophil Extracellular Traps</td>
<td>Tumkur</td>
<td>79</td>
</tr>
<tr>
<td>3.</td>
<td>Prof. Ravindra Pandey</td>
<td>Distinguished Professor, PDT Center, Director, Pharmaceutical Chemistry, Roswell Park Comprehensive Cancer Center (RPCCC), Buffalo, NY 14263 Email: <a href="mailto:ravindra.pandey@roswellpark.org">ravindra.pandey@roswellpark.org</a></td>
<td>Photo- and Ultrasound Triggered Multifunctional Nanoparticles For the Treatment of Glioblastoma</td>
<td>USA</td>
<td>80-81</td>
</tr>
</tbody>
</table>
# January 6th 2020

**Plenary Session (PS)** : 12  
**Time** : 9.30 am to 10.30 am (20 minutes for each speaker)  
**Venue** : Cluster I – Main Program Area : Hall – 7  
**Title** : EMERGING DRUG DEVELOPMENT AND APPROACH TO NOVEL THERAPEUTICS  
**Chairperson** : Prof. Dhyanendra Kumar  
**Co-Chairperson** : Prof. Nibedita Chakrabarthi

<table>
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<tr>
<th>#</th>
<th>Name of the Speaker</th>
<th>Department</th>
<th>Title of the talk</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prof. Peter Lobie</td>
<td>Tsinghua-Berkeley Shenzhen Institute, Tsinghua University, Shenzhen, Guangdong Province, China. Email: <a href="mailto:elobie@sz.tsinghua.edu.cn">elobie@sz.tsinghua.edu.cn</a></td>
<td>Novel Therapeutics in Oncology</td>
<td>China</td>
<td>82-83</td>
</tr>
<tr>
<td>2</td>
<td>Prof. Larry S. Sherman</td>
<td>Division of Neuroscience Oregon National Primate Research Center 505 NW 185th Ave., Beaverton, OR 97006 USA Email: <a href="mailto:shermanl@ohsu.edu">shermanl@ohsu.edu</a></td>
<td>Novel flavonoids for the treatment of neurodegenerative disease</td>
<td>USA</td>
<td>84-85</td>
</tr>
<tr>
<td>3</td>
<td>Prof. Govindaraju</td>
<td>Associate Professor Bioorganic Chemistry Laboratory New Chemistry Unit Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) Jakkur P.O., Bengaluru 560064 Email: <a href="mailto:tgraju.jnc@gmail.com">tgraju.jnc@gmail.com</a></td>
<td>Diagnostic and Therapeutic Strategies for Multifactorial Alzheimer’s Disease</td>
<td>Bangalore</td>
<td>86-87</td>
</tr>
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</table>
January 6th 2020

**Plenary Session (PS)** : 13

**Time** : 10.30 am to 11.30 am (20 minutes for each speaker)

**Venue** : Cluster I – Main Program Area : Hall – 7

**Title** : MEDICINAL CHEMISTRY- DRUG DISCOVERY & DRUG DELIVERY

**Chairperson** : Prof. R.K. Verma

**Co-Chairperson** : Dr. Sheo Satya Prakash

<table>
<thead>
<tr>
<th>#</th>
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<tbody>
<tr>
<td>1.</td>
<td>Dr.Alexey Yu Sukhorukov</td>
<td>Russian Academy of Science Zelinsky Institution of Organic Chemistry Russia Email: <a href="mailto:a.yu.sukhorukov@gmail.com">a.yu.sukhorukov@gmail.com</a></td>
<td>Strategic applications of nitro compounds in organic synthesis: recent progress</td>
<td>Russia</td>
<td>88-89</td>
</tr>
<tr>
<td>2.</td>
<td>Prof.Hiroshi Kitagawa</td>
<td>Professor and Trustee at Kobe Pharmaceutical Univ.- Japan Email: <a href="mailto:kitagawa@kobepharma-u.ac.jp">kitagawa@kobepharma-u.ac.jp</a></td>
<td>Deciphering roles of chondroitin sulfate by sugar-remodeling</td>
<td>Japan</td>
<td>90</td>
</tr>
<tr>
<td>3.</td>
<td>Prof.Mugesh G</td>
<td>IPC Department, Indian Institute of Science Bangalore 560 012, INDIA Email : <a href="mailto:mugesh@iisc.ac.in">mugesh@iisc.ac.in</a></td>
<td>Halogen Bonding in Thyroid Hormone Action and Membrane Transport</td>
<td>Bangalore</td>
<td>91-92</td>
</tr>
<tr>
<td>4.</td>
<td>Dr.Yulia Volkova</td>
<td>N. D. Zelinsky Institute of Organic Chemistry, Russian Academy of Sciences, 47 Leninsky prosp., 119991 Moscow, Russia. Email: <a href="mailto:yavolkova@gmail.com">yavolkova@gmail.com</a></td>
<td>Development of Novel Positive Allosteric Modulators of GABA&lt;sub&gt;A&lt;/sub&gt; Receptors</td>
<td>Russia</td>
<td>93</td>
</tr>
</tbody>
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January 6th 2020

**Plenary Session (PS) :** 14

**Time :** 11.45 am to 1.00 pm (20 minutes for each speaker)

**Venue :** Cluster I – Main Program Area : Hall – 7

**Title :** HEMOSTASIS AND THROMBOSIS-BIOCHEMISTRY AND PHYSIOLOGY

**Chairperson :** Dr. Asis Datta

**Co-Chairperson :** Prof. Vijay Kumar K

<table>
<thead>
<tr>
<th>#</th>
<th>Name of the Speaker</th>
<th>Department</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Prof. Satya P Kunapuli</td>
<td>Director, Sol Sherry Thrombosis Research Center, Professor of Physiology and Pharmacology, Lewis Katz School of Medicine, Temple University, 3420 North Broad Street, Philadelphia. Email: <a href="mailto:spk@temple.edu">spk@temple.edu</a></td>
<td>Novel Concepts in ITAM signaling in platelets</td>
<td>Philadelphia</td>
<td>94-95</td>
</tr>
<tr>
<td>2.</td>
<td>Dr. Sidney Whiteheart</td>
<td>Department of Molecular and Cellular Biochemistry, University of Kentucky College of Medicine, 741 South Limestone Street, Lexington, KY 40536. Email: <a href="mailto:whitehe@uky.edu">whitehe@uky.edu</a></td>
<td>The Ins and Outs of Platelet “Cell” Biology in Hemostasis and Beyond</td>
<td>USA</td>
<td>96-97</td>
</tr>
<tr>
<td>3.</td>
<td>Dr. Mortimer Poncz</td>
<td>Children’s Hospital of Philadelphia Abramson Research Center, 3615 Civic Center Blvd Rm 317, Philadelphia, PA 19104 USA. Email:</td>
<td>Curing sepsis using a pathogenic HIT antibody</td>
<td>USA</td>
<td>98-99</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:poncz@email.chop.edu">poncz@email.chop.edu</a></td>
<td>Knockout of von Willebrand Factor in Zebrafish by CRISPR/Cas9 Mutagenesis: A beginning of a novel screen to identify modifier genes.</td>
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<tr>
<td>4.</td>
<td>Prof. Pudur Jagadeeswaran</td>
<td>Department of Biological Sciences, University of North Texas, Denton TX 76203 Email: <a href="mailto:jag@unt.edu">jag@unt.edu</a></td>
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<td></td>
<td>USA</td>
<td>100-101</td>
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</table>
**January 6th 2020**

**Plenary Session (PS)**: 15

**Time**: 9.30 am to 10.30 am (20 minutes for each speaker)

**Venue**: Cluster I – Main Program Area: Hall – 8

**Title**: NOVEL SOLUTIONS FOR OIL AND GAS INDUSTRY PROBLEMS

**Chairperson**: Dr. Muthamizhchelvan

**Co-Chairperson**: Dr. Arun Kumar

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dr. Dhulipala Prasad</td>
<td>Team leader, Baker Hughes, a GE Company</td>
<td>Environmentally Preferable Smart Chemistries for the Oil and Gas Industry</td>
<td>USA</td>
<td>102-103</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12645 W. Airport Blvd. Sugarland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Email: <a href="mailto:Prasad.dhulipala@bakerhughes.com">Prasad.dhulipala@bakerhughes.com</a></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2.</td>
<td>Dr. Raghu Chunduru</td>
<td>Technical Advisor, GOM Exploration</td>
<td>Pore Pressure Prediction for Drilling High Pressure and High Temperature Wells - Implications on Health, Safety, Security and Environment</td>
<td>USA</td>
<td>104</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shell Technology Center 3333 Hwy 6, Houston, TX 77082</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Email: <a href="mailto:Raghu.Chunduru@shell.com">Raghu.Chunduru@shell.com</a></td>
<td></td>
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</tr>
<tr>
<td>3.</td>
<td>Dr. Akhil Agrawal</td>
<td>Assistant Professor Energy and Environment Research Laboratory- Group Leader Department of Microbiology</td>
<td>Challenges and Prospects of Microbiology in Oil and Gas Industry</td>
<td>Ajmer</td>
<td>105-106</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Central University of Rajasthan Kishangarh, Ajmer, India 305817</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>Email: <a href="mailto:akhilagrawal@curaj.ac.in">akhilagrawal@curaj.ac.in</a></td>
<td></td>
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</table>
January 6th 2020

Plenary Session (PS) : 16
Time : 10.30 am to 11.30 am (20 minutes for each speaker)
Venue : Cluster I – Main Program Area : Hall – 8
Title : NOVEL SOLUTIONS FOR OIL AND GAS INDUSTRY PROBLEMS

Chairperson : Dr. Nilangshu Bhusan Basu
Co-Chairperson : Prof. M.Bhupathi Naidu

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. Sunder Ramachandran</td>
<td>Technical Advisor, Global Chemicals, Baker Hughes, a GE company, Sugar Land, Texas Email: <a href="mailto:sunder.ramachandran@bakerhughes.com">sunder.ramachandran@bakerhughes.com</a></td>
<td>Mitigation of Corrosion of Mild Steel by Acid Gases in the Oil and Gas Industry in Challenging Environments using Production Chemicals</td>
<td>USA</td>
<td>107-108</td>
</tr>
<tr>
<td>2</td>
<td>Dr. D.V. Satya Gupta</td>
<td>Technology Fellow, Baker Hughes, a GE company, 11211 FM 2920 Rd Tomball, Texas, 77375 USA Email: <a href="mailto:Satya.Gupta@bakerhughes.com">Satya.Gupta@bakerhughes.com</a></td>
<td>Exploiting Nano and Biomimetic technologies for Efficient Oil and Gas Exploration and Recovery</td>
<td>USA</td>
<td>109</td>
</tr>
<tr>
<td>3</td>
<td>Prof. K N Thimmaiah</td>
<td>Chairman, Natural Science Division, Northwest Mississippi Community College, University of Mississippi, Southaven USA Email: <a href="mailto:knthimmaiah@northwestms.edu">knthimmaiah@northwestms.edu</a></td>
<td>Targeting of PI3-kinase/AKT/mTOR Signaling in Cancer by Lipophilic Phenoxazines</td>
<td>USA</td>
<td>110-111</td>
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</table>
**January 6th 2020**

**Plenary Session (PS) : 17**

**Time :** 11.45 am to 1.00 pm (20 minutes for each speaker)

**Venue :** Cluster I – Main Program Area : Hall – 8

**Title :** NEW DEVELOPMENTS IN THE FIELD OF NEUROSCIENCE

**Chairperson :** Dr. Geethabali

**Co-Chairperson :** Prof. A.M. Saxena

<table>
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<tr>
<th>#</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dr. N.K. Venkataramana</td>
<td>Founder Chairman &amp; Chief Neurosurgeon of BRAINS, Bhargavi clinic, No. 560, 9th A Main Road, Next to Indiranagar Metro station, Bangalore – 560038 Email: <a href="mailto:drnkvr@gmail.com">drnkvr@gmail.com</a></td>
<td>Pathophysiological basis of management of Parkinson’s Disease</td>
<td>Bangalore</td>
<td>112-113</td>
</tr>
<tr>
<td>2.</td>
<td>Dr. E.V. Joshy</td>
<td>Senior Consultant Neurologist, SSNMC-Brains Hospital, Bangalore Email: <a href="mailto:joshyev@gmail.com">joshyev@gmail.com</a></td>
<td>Evolving concepts of Autoimmunity in Parkinsons Disease</td>
<td>Bangalore</td>
<td>114-115</td>
</tr>
<tr>
<td>3.</td>
<td>Dr. Sudheendra Rao N.R</td>
<td>Chief Scientific Officer, ONNSA Research Innovations Private Limited,560, 1st Floor, 9th A Main Road, Indiranagar Bangalore-560038 Email: <a href="mailto:sudheendra.r@onnsa.com">sudheendra.r@onnsa.com</a></td>
<td>Advanced Therapy Strategies for Parkinson’s Disease in Clinical Setting</td>
<td>Bangalore</td>
<td>116-117</td>
</tr>
<tr>
<td>4.</td>
<td>Dr. Kavina Ganapathy</td>
<td>Lead Scientist ,ONNSA Research Innovations Private Limited 560, 1st Floor, 9th “A” Main Road, Indiranagar,Bengaluru-560038, Karnataka Email: <a href="mailto:kavina.g@onnsa.com">kavina.g@onnsa.com</a></td>
<td>Regenerative strategies for Parkinson’s disease: challenges and promises</td>
<td>Bangalore</td>
<td>118-119</td>
</tr>
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## January 6th 2020

**Plenary Session (PS)**: 18

**Time**: 9.30 am to 10.30 am (20 minutes for each speaker)

**Venue**: Cluster I – Main Program Area: Hall – 9

**Title**: NOVEL HETEROCYCLES AND THEIR BIOLOGICAL APPLICATIONS

**Chairperson**: Prof. S.P. Singh

**Co-Chairperson**: Dr. S. Ramakrishna

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Professor Hiroshi Hinou</td>
<td>Faculty of Advanced Life Science, Hokkaido University Japan Email: <a href="mailto:hinou@sci.hokudai.ac.jp">hinou@sci.hokudai.ac.jp</a></td>
<td>Chemical Glycobiology (Starting from Glycoconjugate Syntheses).</td>
<td>Japan</td>
<td>120</td>
</tr>
<tr>
<td>2.</td>
<td>Prof. Ila</td>
<td>Senior Scientist, JNCASR, Jakkur PO, Bangalore -560064 Email: <a href="mailto:hila@jncasr.ac.in">hila@jncasr.ac.in</a></td>
<td>Design and Development of New Efficient and Greener Strategies for the Synthesis of Biologically Important Heterocycles</td>
<td>Bangalore</td>
<td>121-122</td>
</tr>
<tr>
<td>3.</td>
<td>Prof. B. S. Vishwanath</td>
<td>Department of Studies in Biochemistry University of Mysore, Manasagangotri, Mysore: 570006 Email:<a href="mailto:vishmy@biochemistry.unimysore.ac.in">vishmy@biochemistry.unimysore.ac.in</a></td>
<td>Neutralization of ‘Big Four’ Indian snake venom-induced systemic and local toxicities</td>
<td>Mysuru</td>
<td>123-124</td>
</tr>
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January 6th 2020

Plenary Session (PS) : 19

Time : 10.30 am to 11.30 am (20 minutes for each speaker)

Venue : Cluster I – Main Program Area : Hall – 9

Title : BIOLOGICAL STUDY ON ANIMAL DISORDERS AND MEDICINAL DEVELOPMENT

Chairperson : Prof. Gangadhar

Co-Chairperson : Prof. Usha Anandhi

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</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. Gurushankara H.P.</td>
<td>Assistant Professor Department of Zoology Central University of Kerala, Tejaswini Hills, Periya, Kasaragod – 671 320 Email: <a href="mailto:gurushankara@cukerala.ac.in">gurushankara@cukerala.ac.in</a></td>
<td>Malathion Induced Leukemia: Molecular Mechanisms</td>
<td>Kasaragodu</td>
<td>125-126</td>
</tr>
<tr>
<td>2</td>
<td>Prof. Vellayan Subramanian</td>
<td>Associate Professor Faculty of Pharmacy, Universiti Teknologi MARA Selangor, 42300 Puncak Alam, Selangor, Malaysia. Email: <a href="mailto:vellayans@yahoo.com">vellayans@yahoo.com</a></td>
<td>The Current Status of Zoo Medicine in Malaysia: A 57 years History</td>
<td>Malaysia</td>
<td>127-128</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Shilpa, B.M.</td>
<td>Assistant Professor, School of Basic and Applied Sciences, Dayananda Sagar University Bengaluru-78 Email: <a href="mailto:shilpa.siddi@gmail.com">shilpa.siddi@gmail.com</a></td>
<td>An overview on various approaches employed in understanding and treating chronic stress-induced depression in animal models</td>
<td>Bangalore</td>
<td>129-130</td>
</tr>
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January 6th 2020

Plenary Session (PS) : 20

Time : 11.45 am to 1.00 pm (20 minutes for each speaker)

Venue : Cluster I – Main Program Area : Hall – 9

Title : INSIGHT INTO THE STRUCTURE AND FUNCTIONAL STUDIES OF PATHOGENIC PHYSIOLOGICAL DISEASES

Chairperson : Prof. R.C. Sobti
Co-Chairperson : Prof. K.C. Narayanaswamy

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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Prof. T.P. Singh,</td>
<td>Senior Scientist, Department of Biophysics, AIIMS, India Email: <a href="mailto:tpsingh.aiims@gmail.com">tpsingh.aiims@gmail.com</a></td>
<td>Introduction of innate immunity proteins as resistance-free antibiotics</td>
<td>New Delhi</td>
<td>131-132</td>
</tr>
<tr>
<td>2.</td>
<td>Prof. Tapas Kundu</td>
<td>Director, CSIR-Central Drug Research Institute, Lucknow –226 031 Email: <a href="mailto:tapas.jnc@gmail.com">tapas.jnc@gmail.com</a></td>
<td>Epigenetics, life beyond gene sequence: Implications in health and disease</td>
<td>Lucknow</td>
<td>133-134</td>
</tr>
<tr>
<td>3.</td>
<td>Prof. Ganesh Nagaraju</td>
<td>Associate Professor, Department of Biochemistry, Biological Sciences Building, Indian Institute of Science, Bangalore- 560012 Email: <a href="mailto:nganesh@iisc.ac.in">nganesh@iisc.ac.in</a></td>
<td>RAD51 paralogs: unraveling the new roles in genome stability and tumor suppression</td>
<td>Bangalore</td>
<td>135-136</td>
</tr>
</tbody>
</table>
January 7th 2020

**Plenary Session (PS)**: 21

**Time**: 9.30 am to 10.30 am (20 minutes for each speaker)

**Venue**: Cluster I – Main Program Area: Hall – 7

**Title**: CLIMATE SMART AGRICULTURE FOR FOOD SECURITY

**Chairperson**: Prof. Y.G. Shadakshari

**Co-Chairperson**: Prof. K. Manjunath

<table>
<thead>
<tr>
<th>#</th>
<th>Name of the Speaker</th>
<th>Department</th>
<th>Title of the talk</th>
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<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dr. C. Tara Satyavathi</td>
<td>Project Coordinator (Pearl Millet) All India Coordinated Research Project on Pearl Millet Mandor, Jodhpur- 342304 Email: <a href="mailto:aicpmip@gmail.com">aicpmip@gmail.com</a></td>
<td>Pearl millet for Nutritional Security and Rural Development</td>
<td>Jodhpur</td>
<td>137-138</td>
</tr>
<tr>
<td>2.</td>
<td>Dr. Ch. Shrinivas Rao</td>
<td>Director, National Academy of Agricultural Research Management, Rajendranagar, Hyderabad- 500030 Email: chsr <a href="mailto:Rao_director@naarm.org.in">Rao_director@naarm.org.in</a></td>
<td>Building Climate Change Preparedness for Sustainable Agriculture in India</td>
<td>Hyderabad</td>
<td>139-140</td>
</tr>
<tr>
<td>3.</td>
<td>Prof. A. Arunachalam</td>
<td>Principal Scientist in DG Office and Assistant Director General, Indian Council of Agricultural Research, Room No. 101, Krishi Bhavan, New Delhi 110001 Email: <a href="mailto:arun.icar@nic.in">arun.icar@nic.in</a></td>
<td>Agriculture and food policies in India</td>
<td>New Delhi</td>
<td>141-142</td>
</tr>
<tr>
<td>4.</td>
<td>Prof. Chandra Nayak</td>
<td>Co-ordinator, Vignan Bhavan, University of Mysore, Mysuru Email: <a href="mailto:moonnayak@gmail.com">moonnayak@gmail.com</a></td>
<td>Current Status of Pearl Millet Diseases and its Management Approaches</td>
<td>Mysuru</td>
<td>143-144</td>
</tr>
</tbody>
</table>
January 7th 2020

Plenary Session (PS) : 22

Time : 9.30 am to 10.30 am (20 minutes for each speaker)

Venue : Cluster I – Main Program Area : Hall – 8

Title : USE OF INDIAN MEDICINAL PLANT BASED DRUGS IN CONTEXT OF RURAL HEALTHCARE

Chairperson : Dr.S.R.Niranjan

Co-Chairperson : Dr.Kavyashree

<table>
<thead>
<tr>
<th>#</th>
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<th>Department</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Prof. Avijith Banerji</td>
<td>Former Head of Department and Programme Coordinator - Centre for Advanced Studies, Department of Chemistry, University of Calcutta. Email: <a href="mailto:ablabcu@yahoo.co.uk">ablabcu@yahoo.co.uk</a></td>
<td>Investigations of Indian Medicinal Plants</td>
<td>Calcutta</td>
<td>145-146</td>
</tr>
<tr>
<td>2.</td>
<td>Prof. Chandra Shekhar Mathela</td>
<td>2-659 Mathela Sadan Polysheet, Tusinagar Kathgodam Distt. : Nainital uttarakhand 263126 Email: <a href="mailto:mathelacs@gmail.com">mathelacs@gmail.com</a></td>
<td>Himalayan Valerian: Exploiting chemical diversity as potential contributor in rural healthcare and improving economy of hill region”</td>
<td>Nainital</td>
<td>147-148</td>
</tr>
<tr>
<td>3.</td>
<td>Dr. Jayram Hazra,</td>
<td>Director, Central Ayurveda Research Institute for Drug Development (CCRAS) Kolkata. Email: <a href="mailto:nriadd-kolkata@gov.in">nriadd-kolkata@gov.in</a></td>
<td>Drugs from Indian Medicinal Plants: Traditional Approach to Modern Usage; Relevance to Rural Healthcare</td>
<td>Kolkata</td>
<td>149</td>
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## January 7th 2020

**Plenary Session (PS) : 23**

**Time** : 10.30 am to 11.30 am (20 minutes for each speaker)

**Venue** : Cluster I – Main Program Area : Hall – 7

**Title** : TECHNOLOGY IN SERICULTURE AND CLIMATE CHANGES FOR RURAL DEVELOPMENT

**Chairperson** : Dr. K. Narayana Gowda

**Co-Chairperson** : Dr. P.Narasegowda

<table>
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<tr>
<th>#</th>
<th>Name of the Speaker</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. P. J. Raju</td>
<td>Director, Andhra Pradesh State Sericulture Research and Development, Hindupur – 515 211, Anantapur District, Andhra Pradesh State Email: <a href="mailto:directorresearch.seri@gmail.com">directorresearch.seri@gmail.com</a></td>
<td>BmNPV Resistant Transgenic Silkworm – An Epoch making technology</td>
<td>Andra Pradesh</td>
<td>150-151</td>
</tr>
<tr>
<td>2</td>
<td>Dr. Gautham Goswami</td>
<td>Dr Gautam Goswami, Head, Technology Vision 2035 and Climate Change Programme Technology Information, Vishwakarma Bhavan, Saheed Jeet Singh Marg New Delhi – 110016 Email: <a href="mailto:goswamig@hotmail.com">goswamig@hotmail.com</a></td>
<td>Technology vision 2035: A Technology Perspective for India’s Development</td>
<td>New Delhi</td>
<td>152-153</td>
</tr>
<tr>
<td>3</td>
<td>Smt. Mugda Sinha</td>
<td>Secretary –Science &amp; Technology, Govt. of Rajasthan Email: <a href="mailto:Psdstgor@gmail.com">Psdstgor@gmail.com</a></td>
<td>Putting science in service of society through policy design</td>
<td>Rajasthan</td>
<td>154-155</td>
</tr>
<tr>
<td>4</td>
<td>Prof. N.B. Ramachandra</td>
<td>Professor, Chairman – Department of Studies in Genetics and Genomics, University of Mysore, Manasagangotri, Mysuru – 570 006 Email: <a href="mailto:nallurbr@gmail.com">nallurbr@gmail.com</a></td>
<td>Genomic variations and Human health</td>
<td>Mysuru</td>
<td>156-157</td>
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January 7th 2020

Plenary Session (PS) : 24
Time : 10.30 am to 11.30 am (20 minutes for each speaker)
Venue : Cluster I – Main Program Area : Hall – 8
Title : NEW PARADIGM IN HEALTH CARE SYSTEM OF INDIA UNDER AYUSHMAN BHARAT YOJANA

Chairperson : Dr. Bhojya Nayak
Co-Chairperson : Dr. Dhananjaya

<table>
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<tr>
<th>#</th>
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<tbody>
<tr>
<td>1.</td>
<td>Dr. Sathyamurthy</td>
<td>Former Director, ISRO &amp; President Telemedicine Society OF India, Jayanagar, Bangalore Email: <a href="mailto:satynew@gmail.com">satynew@gmail.com</a></td>
<td>Ayushman Bharat &amp; Medical Education by Using Recent Technology</td>
<td>Bangalore</td>
<td>158-159</td>
</tr>
<tr>
<td>2.</td>
<td>Dr. B. S. Ratta</td>
<td>Chairman &amp; Founder, Narayana Health, Hosur Road, Bangalore, Email: <a href="mailto:devishetty@hridayalaya.com">devishetty@hridayalaya.com</a></td>
<td>Ayushman Bharat. ...An Opportunity or a Challenge to Transform India</td>
<td>Bangalore</td>
<td>160</td>
</tr>
<tr>
<td>3.</td>
<td>Prof. K. Selvakumar</td>
<td>Neurosurgeon, Sri Ramachandra Institute of Higher Education and Research, Chennai. Email: <a href="mailto:selvaneuro@yahoo.com">selvaneuro@yahoo.com</a></td>
<td>Ayushman Bharat &amp; Medical Education by Using Recent Technology</td>
<td>Chennai</td>
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**Plenary Session (PS) :** 25

**Time :** 11.45 am to 1.00 pm (20 minutes for each speaker)

**Venue :** Cluster I – Main Program Area : Hall – 7

**Title :** WELLNESS FOR RURAL PEOPLE – THE SCIENTIFIC HEALTH CARE FOR MODERN WORLD

**Chairperson :** Dr. B.K. Das

**Co-Chairperson :** Dr. Shreyas

<table>
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<tbody>
<tr>
<td>1.</td>
<td>Dr. A. Sreekumar</td>
<td>Nandanam, Eroor south Tripunithura, Kochi 682304 Email : <a href="mailto:wellnesssolutions9@gmail.com">wellnesssolutions9@gmail.com</a></td>
<td>Wellness of the people by the people for the people</td>
<td>Kochi</td>
<td>163</td>
</tr>
<tr>
<td>2.</td>
<td>Prof. Ushy Mohandas</td>
<td>A Garden Homes 27 Aga Abbas Ali Road, Bangalore. 560042 Email – <a href="mailto:mohandasushy@gmail.com">mohandasushy@gmail.com</a></td>
<td>Challenges that affect access and the provision of mental health services in rural areas</td>
<td>Bangalore</td>
<td>164-165</td>
</tr>
<tr>
<td>3.</td>
<td>Prof.P.K. Sasidharan</td>
<td>Prof. Dr. P.K. Sasidharan Emeritus professor, Govt. Medical College, Kozhikkode Pipe Line Rd, Kottooli, Kozhikode, Kerala 673016 Email: <a href="mailto:sasidharanpk@gmail.com">sasidharanpk@gmail.com</a></td>
<td>Uplifting community health through natural and economical means in scientific way</td>
<td>Kozhikode</td>
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**January 7th 2020**

**Plenary Session (PS) :** 26

**Time :** 11.45 am to 1.00 pm (20 minutes for each speaker)

**Venue :** Cluster I – Main Program Area : Hall – 8

**Title :** CROP IMPROVEMENT TOWARDS FOOD & NUTRITION SECURITY

**Chairperson :** Dr. N.K Krishna Kumar

**Co-Chairperson :** Dr. K.G.Raghothama

<table>
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<tr>
<th>#</th>
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<th>Department</th>
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<tbody>
<tr>
<td>1</td>
<td>Dr.S.B.Dandin</td>
<td>Bioversity International Southern Centre of Sub-Regional Office for South Asia College of Horticulture, UHS Campus, GKV, Post Bangalore – 560 065 Email: <a href="mailto:dandinbnm@gmail.com">dandinbnm@gmail.com</a></td>
<td>Agro biodiversity for Food and Health Security: A concept note</td>
<td>Bangalore</td>
<td>168-169</td>
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<tr>
<td>2</td>
<td>Prof.D.Raj Gopal</td>
<td>Directorate of Post Graduation Studies College of Agriculture UAS, GKV, Bangalore-560 065 <a href="mailto:drajagopal2002@yahoo.com">drajagopal2002@yahoo.com</a></td>
<td>Soil Biodiversity of Western Ghats</td>
<td>Bangalore</td>
<td>170-172</td>
</tr>
<tr>
<td>3</td>
<td>Dr.Uma Shaanker</td>
<td>Dept. of Crop Physiology College of Agriculture, UAS, GKV, Bangalore – 560 065 Email: <a href="mailto:umashaanker@gmail.com">umashaanker@gmail.com</a></td>
<td>Endophytes: Exciting approach towards crop improvement</td>
<td>Bangalore</td>
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<td>4</td>
<td>Dr.T.R.Sharma</td>
<td>National Agri-Food Biotechnology Institute</td>
<td>Molecular dissection of simple and complex traits</td>
<td>Mohali</td>
<td>174-175</td>
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<td>No.</td>
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<tr>
<td>5.</td>
<td>Dr. Utpal Nath</td>
<td>NABI, Mohali, Punjab, Email: <a href="mailto:utpalnath@iisc.ac.in">utpalnath@iisc.ac.in</a></td>
<td>Integration of developmental and environmental signals in plant growth plasticity</td>
<td>Bangalore</td>
<td>176</td>
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<tr>
<td>6.</td>
<td>Dr. Kiran Mysore</td>
<td>Noble Research Institute, LLC, Ardmore, OK 73401 USA</td>
<td>A Functional Genomics Approach Identifies Novel Genes Involved in Plant Innate Immunity and Abiotic Stress</td>
<td>USA</td>
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<td>Venue</td>
<td>Cluster I – Main Program Area: Hall – 9</td>
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<tr>
<td>Title</td>
<td>CROP IMPROVEMENT TOWARDS FOOD &amp; NUTRITION SECURITY</td>
</tr>
<tr>
<td>Chairperson</td>
<td>Dr. D. Narayan Rao</td>
</tr>
<tr>
<td>Co-Chairperson</td>
<td>Dr. Naveen S</td>
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<tbody>
<tr>
<td>1.</td>
<td>Shri. Manish Saxena</td>
<td>SATNAV, ISRO Hq, Bangalore</td>
<td>Earth Observation for Societal Development</td>
<td>Bangalore</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Email: <a href="mailto:msaxena@isro.gov.in">msaxena@isro.gov.in</a></td>
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<tr>
<td>2.</td>
<td>Shri. John Mathew</td>
<td>EDPO, ISRO Hq, Bangalore</td>
<td>Satellite Communication for Societal Development</td>
<td>Bangalore</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Email: <a href="mailto:john_mathew@isro.gov.in">john_mathew@isro.gov.in</a></td>
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<tr>
<td>3.</td>
<td>Shri Hanumantharayappa</td>
<td>SATCOM, ISRO Hq, Bangalore</td>
<td>NavIC for Societal Development</td>
<td>Bangalore</td>
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<td></td>
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<td>Email: <a href="mailto:rayappa@isro.gov.in">rayappa@isro.gov.in</a></td>
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January 7th 2020

Plenary Session (PS) : 28
Time : 10.30 am to 11.30 am (20 minutes for each speaker)
Venue : Cluster I – Main Program Area : Hall – 9
Title : ROLE OF INDUSTRIES IN RURAL DEVELOPMENT
Chairperson : Prof. N.S. Rame Gowda
Convenor : Dr. Rangaswamy

<table>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Prof. K Narayana Gowda</td>
<td>Former VC, UAS, Bengaluru</td>
<td>Bangalore</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>Dr.K.Manjunath</td>
<td>Professor and Head, Dept. of Biotechnology, Bangalore University, Bangalore</td>
<td>Bangalore</td>
<td>-</td>
</tr>
<tr>
<td>3.</td>
<td>Dr. Nirmal K. Bhardwaj</td>
<td>Founder/CEO RMZ Ecoworld, Coworks The Bay, Adarsh Palm Retreat Bangalore 560103 Email: nirmal <a href="mailto:bhardwaj94@gmail.com">bhardwaj94@gmail.com</a></td>
<td>Bangalore</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Dr.K.K.Narayanan</td>
<td>Ex Managing Director Metahelix Life Sciences Ltd. Bangalore</td>
<td>Bangalore</td>
<td>-</td>
</tr>
<tr>
<td>5.</td>
<td>Dr. Jagadish Mittur</td>
<td>Ex- Principal Consultant K Tech,GoK Ex Vice- President Avesthagen Pvt.Ltd Email: <a href="mailto:mittur_jagadish@yahoo.co.in">mittur_jagadish@yahoo.co.in</a></td>
<td>Bangalore</td>
<td>179</td>
</tr>
<tr>
<td>6.</td>
<td>Dr. S. Chandrashekaran</td>
<td>Founding Chairman Vipragen Biosciences Pvt Ltd</td>
<td>Bangalore</td>
<td>-</td>
</tr>
<tr>
<td>7.</td>
<td>Dr.Shrikumar Suryanarayanan</td>
<td>Sea6 Energy Ex CEO President, ABLE, Bangalore</td>
<td>Bangalore</td>
<td>-</td>
</tr>
<tr>
<td>8.</td>
<td>Mr.Vageesh Patil</td>
<td>Director, Global Head, GE</td>
<td>Bangalore</td>
<td>-</td>
</tr>
<tr>
<td>9.</td>
<td>Prof. C Naganna</td>
<td>#3195, 21/C Main ,Vijayanagar 2nd Stage, Mysuru-570017 Email: <a href="mailto:cnaganna25@gmail.com">cnaganna25@gmail.com</a></td>
<td>Mysuru</td>
<td>-</td>
</tr>
</tbody>
</table>
Public Lectures
I. PROF. STEFAN HELL

Title of the talk: Ultrasharp Fluorescence Microscopy

Biosketch:
Stefan Walter Hell Hon. FRMS (born 23 December 1962) is a German physicist and one of the directors of the Max Planck Institute for Biophysical Chemistry in Göttingen, Germany. He received the Nobel Prize in Chemistry in 2014 for “the development of super-resolved fluorescence microscopy”, together with Eric Betzig and William Moerner.

Stefan W. Hell (born in 1962) received his doctorate in physics from the University of Heidelberg in 1990, followed by a research stay at the European Molecular Biology Laboratory in Heidelberg. From 1993 to 1996, he worked as a senior researcher at the University of Turku, Finland, where he developed the principle of STED microscopy. In 1997, he moved to the Max Planck Institute (MPI) for Biophysical Chemistry in Göttingen (Germany), where he set up his research group dedicated to sub-diffraction-resolution microscopy. He was appointed as Max Planck Director there and was elected as scientific member of the Max Planck Society in 2002. Hell currently heads the Department of NanoBiophotonics at the MPI for Biophysical Chemistry in Göttingen. At the same time, he is Director at the MPI for Medical Research in Heidelberg (Germany) where he heads the Department of Optical Nanoscopy.

Stefan Hell has received numerous national and international awards, including the Prize of the International Commission for Optics (2000), the Carl Zeiss Research Award (2002), the Innovation Award of the German Federal President (2006), the Julius Springer Award for Applied Physics (2007), the Gottfried Wilhelm Leibniz Prize (2008), the Lower Saxony State Award (2008), the Otto Hahn Prize for Physics (2009), the Ernst Hellmut Vits Prize (2010). In 2014, he was awarded with the Kavli Prize for Nanosciences and with the Nobel Prize for Chemistry. In the same year, he was elected into the Hall of Fame der deutschen Forschung. Stefan Hell holds honorary doctorates from the Universities of Turku (Finland), Vasile Goldis (Romania), the University Polytechnica of Bucharest (Romania), the KTH Royal Institute of Technology Stockholm (Sweden), the
King’s College London (United Kingdom), the University of Babeș-Bolyai Cluj-Napoca (Romania) as well as the ETH Zurich (Switzerland). He was elected as Lifetime Member of the Optical Society of America (USA) in 2014 and appointed Honorary Member by the European Physical Society, in the same year. Since 2015, he is also Honorary Member of the German Bunsen Society for Physical Chemistry. He received the Order of Merit of the State of Baden-Württemberg in 2015 and the Federal Cross of Merit in 2016.

**Communication address:**
**Prof. Stefan Hell**
Max Planck Institute for Biophysical Chemistry
Dept. of Nano Biophotonics
Am Fassberg 11
37077 Göttingen
Germany
Phone: +49-(0)551-201 2500
Fax: +49-(0)551-201 2505
Email: hell-office@gwdg.de
shell@gwdg.de
2. DR. SUBRA SUresh

Title of the talk: “Science Across Disciplines and Some Consequences for Industry 4.0”

Biosketch:
Subra Suresh is President and Distinguished University Professor at Nanyang Technological University, Singapore. He has previously served as: Dean of MIT’s School of Engineering and Vannevar Bush Professor of Engineering; Director of the National Science Foundation, a position to which he was nominated by the President of the United States and unanimously confirmed by the US Senate; and President of Carnegie Mellon University.

Prof Suresh has authored three books, more than 300 research articles and 30 patent applications, and has co-founded a technology startup. He has been widely recognized for his research into the properties of engineered and biological materials and their implications for human diseases.

Prof Suresh is an elected member of all three branches of the US National Academies – Engineering, Sciences, and Medicine – as well as American Academy of Arts and Sciences, and US National Academy of Inventors, and major academies in China, France, Germany, India, Spain and Sweden. He has been awarded 18 honorary doctorate degrees.

Prof Suresh’s recent honors include: election in 2018 as an Honorary Fellow of St. Hugh’s College at Oxford University; the 2015 Industrial Research Institute Medal; the 2013 Benjamin Franklin Medal in Mechanical Engineering and Materials Science; the 2012 Timoshenko Medal and the 2011 Nadai Medal of the American Society of Mechanical Engineers; the 2011 Padma Shri award, from the President of India; and the 2007 Gold Medal of the Federation of European Materials Societies.

Communication address:
Dr. Subra Suresh
Room 4-140
M.I.T., 77 Massachusetts Avenue
Cambridge, MA 02139
Phone: (617) 253-3320
Fax: (617) 253-0868
E-mail: ssuresh@mit.edu
3. PROF. ADA E. YONATH

Title of the talk: From basic science to an acute problem of modern medicine

Biosketch:
Ada Yonath, (born June 22, 1939, Jerusalem), Israeli protein crystallographer who was awarded the 2009 Nobel Prize for Chemistry, along with Indian-born American physicist and molecular biologist Venkatraman Ramakrishnan and American biophysicist and biochemist Thomas Steitz, for her research into the atomic structure and function of cellular particles called ribosomes. (Ribosomes are tiny particles made up of RNA and proteins that specialize in protein synthesis and are found free or bound to the endoplasmic reticulum within cells.)

Yonath received a bachelor’s degree in chemistry in 1962 and a master’s degree in biochemistry in 1964 from Hebrew University in Jerusalem. She then attended the Weizmann Institute of Science in Israel as a graduate student, studying X-ray crystallography and receiving a Ph.D. in 1968. After a brief stint as a postdoctoral researcher at Carnegie Mellon University in Pittsburgh, Pa., Yonath joined the department of chemistry at the Massachusetts Institute of Technology (MIT) as a postdoctoral fellow. There she began investigating the structure of ribosomes using X-ray crystallography and pioneered the development of new approaches to the study of structural characteristics of large, complex molecules.

From 1970 to 1974 Yonath worked as a scientist in the department of chemistry at the Weizmann Institute. She later became senior scientist (1974–83), Associate Professor (1984–88), and Director of the Mazer Center for Structural Biology (1988–2004). She was also the Director of the Kimmelman Center for Biomolecular Structure and Assembly at the Weizmann Institute (1989– ) and served as head of the Max Planck Research Unit for Ribosomal Structure in Germany (1986–2004). In 1980 Yonath became the first person to determine the three-dimensional atomic arrangement of a large ribosomal subunit (ribosomes consist of two distinct subunits, one large and one small). She conducted these early studies using ribosomes from the bacterium Bacillus stearothermophilus. Her subsequent research revealed the complex architecture of ribosomes, and she identified structures resembling tunnels, through which newly synthesized polypeptide chains were passed during protein synthesis. Her later research was concerned with determining the atomic structures of antibiotics, focusing especially on how the atomic structures of these agents influence their activities and interactions with cellular machinery.
Yonath was elected a member of the Israel Academy of Sciences and Humanities in 2000 and the U.S. National Academy of Sciences in 2003. In addition to the 2009 Nobel Prize, she received numerous other honours and awards throughout her career, including the Louisa Gross Horwitz Prize for Biology or Biochemistry in 2005, the Paul Ehrlich and Ludwig Darmstaedter Prize in 2007, and the Albert Einstein World Award of Science in 2008.

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4. DR. C. N. MANJUNATH

Title of the talk: Life style diseases and recent advances in cardiac sciences

Biosketch:
Dr. Cholenahally Nanjappa Manjunath is an Indian cardiologist and the director of the Sri Jayadeva Institute of Cardiovascular Sciences and Research. He is reported to have developed a new protocol in balloon mitral valvuloplasty and is credited with the performance of the highest number of such procedures using Accura balloon catheter in India. The Government of India awarded him the fourth highest civilian honour of the Padma Shri, in 2007, for his contributions to Indian medicine.

Born on 20 July 1957 to Chamaraje Gowda in the Hassan district of the south Indian state of Karnataka, Dr. Manjunath graduated in medicine from Mysore Medical College, secured his MD from the Bangalore Medical College and Research Institute and a DM in Cardiology from Kasturba Medical College, Mangalore, he started his career as an intern at Bangalore Medical College in 1982 and moved to Kasturba Medical College, Mangalore in 1985 as a senior registrar at the department of cardiology, staying there for three years. In 1988, he joined Sri Jayadeva Institute of Cardiovascular Sciences and Research as a member of faculty and worked there in various capacities such as Assistant Professor and the Professor of Cardiology till he was appointed as the director of the institution in 2006.

Dr. Manjunath is reported to have been the innovator of a new method of balloon mitral valvuloplasty, his researches have been published in several articles and scientific papers published in peer reviewed national and international journals; PubMed, an online repository of medical data has listed 73 of his articles, he is known to have performed over 26,000 interventional procedures and is credited with the highest number of balloon mitral valvuloplasties using Accura balloon catheter in India. He is associated with Mallige Medical Centre, Bangalore as a consultant and is a member of the Indian Medical Association, he has also served as the president of the Indian College of Cardiology. The Government of Karnataka awarded him the Rajyotsava Prashasti in 1998 and he received the fourth highest Indian civilian honoue of the Padma Shri in 2007. Rajiv Gandhi University of Health Sciences (RGUHS) honoured him in 2012 with the degree of Doctor of Science (Honoris causa).

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Plenary Sessions
PLENARY SESSION I

Title: Challenges and Opportunities in Cancer Drug Discovery

I. PROF. ANNA K. HELL

Title of the talk: Growth-friendly implants in the treatment of Early Onset Scoliosis – new trends and developments

Abstract: Early onset scoliosis (EOS) with curve progression is a severe problem in young children often leading to disability, thoracic insufficiency syndrome, lung failure and possible death. Therefore early and repetitive surgery may be necessary. In the last decades, several growth-friendly implants such as vertical expandable prosthetic titanium rib (VEPTR) devices, growing rods and other rib, pelvis or spine based systems have been introduced. However, most of these systems require repeated surgical procedures with reported risks of implant infection or colonization, ossifications and possible anesthesia complications especially in children with neuromuscular scoliosis (e.g. spinal muscular atrophy, SMA). To avoid repetitive surgical interventions, research has focused on externally controllable devices for children. In 2009, the first magnetically controlled devices were implanted in pediatric patients with scoliosis. Since then, magnetically controlled implants for treating spinal deformity have been widely used especially after FDA approval in the US in 2014. Currently, most studies report on preliminary results of heterogeneous patient groups treated with magnetically controlled implants which limits analysis of results due to a variety of influencing factors such as different diagnosis, patient mobility, thoracic insufficiency syndrome or weight development.

Since 2011, we have evaluated a prospective, nonrandomized cohort of 17 children with SMA and spinal deformity, which was treated by a new surgical method using magnetic implants parallel to the spine. Within a follow-up period of at least four years we experienced significant and persistent curve reduction as well as improvement of pelvic obliquity without a diminishing effect over time. Final results at definite spinal fusion were more favorable for these children in comparison to untreated patients.
**Biosketch:**
Anna K. Hell, MD, was born and raised in Germany. Both her parents are medical doctors. She studied medicine at Hanover Medical School and did several electives abroad. In 1993, she was invited by Dr. Pushpa (former head of Pediatric Hematology and Oncology) to the Institute of Child Health and Hospital for Children, Madras (Chennai). She graduated in 1996 and passed the US boards as well as finished her doctoral thesis about a WHO project in Senegal. Between 1997 and 2003 she was trained as an Orthopaedic and Trauma Surgeon at the Universities of Hanover, Goettingen (both Germany), Basel (Switzerland) and San Antonio (Texas, USA). During her training she started doing research in Pediatric Orthopaedics and received a stipend for a six months US fellowship in Pediatric Spine in the USA in 2000. In 2005 she finished her habilitation and became a professor. Since 2008 she is head of Pediatric Orthopaedics at the Medical University of Goettingen, Germany. Since 2018 she is also an Affiliate Professor of Surgery at the Florida Atlantic University, Florida, USA. Dr. Hell published more than 60 papers mainly in the field of Pediatric Spine, wrote a book and several book chapters and presented more than 200 papers on national and international conferences. So far she received two medical stipends and five scientific prizes. Anna Hell is married to Stefan Hell (Nobel Prize Winner in Chemistry 2014) and they have four children.

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2. PROF. PETER HOUGHTON

Title of the talk: Challenges and Opportunities for Childhood Cancer Preclinical Drug Development

Abstract: Cancer in children is rare with approximately 15,700 new cases diagnosed in the U.S. annually. Through use of multimodality therapy (surgery, radiation therapy and aggressive chemotherapy), 70% of patients will be ‘cured’ of their disease, and 5-year Event-Free Survival (EFS) exceeds 80%. However, for patients surviving their malignancy, therapy-related long-term adverse effects are severe with an estimated 50% having chronic life-threatening toxicities related to therapy in their fourth or fifth decade of life. While overall intensive therapy with cytotoxic agents continues to reduce cancer-related mortality, new understanding of the molecular etiology of many childhood cancers offers an opportunity to redirect efforts to develop effective less genotoxic therapeutic options, including agents that target oncogenic drivers directly, and the potential for use of agents that target the tumor microenvironment and immune-directed therapies. However, for many high-risk cancers significant challenges remain. Here we will consider changes in FDA regulations that will alter how we develop novel agents for testing in pediatric clinical trials.

Biosketch: Prof. Peter Houghton is the Director of the Greehey Children’s Cancer Research Institute in San Antonio. Prior to that, He was Director of the Center for Childhood Cancer and Blood Diseases at Nationwide Children’s Hospital in Columbus, OH (2009-2014); and Leader of the Solid Malignancies Program and Chairman of Molecular Pharmacology at St. Jude’s Children’s Research Hospital, Memphis, TN (1992-2009). He is a expert in developmental therapeutics and animal models of pediatric solid malignancies. In particular, his laboratory has: 1) studied the role of insulin-like growth factors in the genesis of pediatric sarcomas, and the development of approaches to inhibiting these signaling pathways; and 2) developed the camptothecin drugs, topotecan and irinotecan that are now standard components of many pediatric clinical protocols. This work formed the basis for developing the Pediatric Preclinical Testing Program (PPTP) that he directed (2005-2015) and the subsequent PPTC of which they are a member site. He also have experience working in multi-site grants (PPTP, PPTC) and directed ‘Studies of Childhood Solid Tumors’ (PO1CA23099) at St. Jude from 1988-2008 and PO1CA165995 ‘Studies of Childhood Sarcomas’ that is between UTHSA/OSU/Nationwide Children’s Hospital/Tufts University. In this application he will co-lead Core A (Admin, PK, Biostat) with Dr. Rao, and co-lead Project 3 with Dr. Vaseva.

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3. PROF. MARY-ANN BJORNSTI

Title of the talk: DNA topoisomerase I: opportunities for drug development

Abstract: In eukaryotes, DNA topoisomerase I (Top1) plays a critical role in DNA replication, transcription and recombination, by catalyzing changes in DNA topology through a mechanism of transient DNA strand breakage and rejoining. Top1 is also the cellular target of camptothecin (CPT), analogs of which are effective agents in the treatment of human cancers. CPT poisons Top1 by reversibly stabilizing a covalent Top1-DNA reaction intermediate. During S-phase, collision of replication forks with these Top1-DNA adducts produces lesions that signal cell cycle arrest and cell death. Although we understand the physical interaction of CPT with Top1-DNA at the atomic level, we still lack a clear understanding of the cytotoxic mechanisms of CPT. To address this, we exploit yeast genetics and unique structural elements of Top1 to explore cell killing by drugs that target this enzyme. The budding yeast is invaluable as a genetic model organism to define the mechanics and regulation of cell cycle progression and cellular responses to DNA damage. We have recently engineered a repressor disables expression of drug transporters in in ~6,000 haploid yeast strains. Using this “drug-permeable” strain collection and a robotics platform to image the growth of individual strains exposed to increasing concentrations of CPT, we carried out genome-wide phenomics analyses of cell sensitivity to CPT. A surprising number of novel pathway interactions were identified that selectively enhance drug sensitivity and resistance. The potential significance of these findings in the development of novel drug regimens for the more effective treatment of human cancer will be discussed.

Biosketch:
Dr. Bjornstl earned her Bachelor’s Degree in biology from New York State University College at Cortland and her doctorate in genetics from the University of Minnesota. She completed a Fogarty Postdoctoral Research Fellowship at the University of Basel in Switzerland before moving to Harvard University for a postdoctoral research fellowship. She has been on the faculty at Jefferson Medical School in Philadelphia and at St. Jude Children’s Research Hospital in Memphis. Since 2009, she has served as the Chair of the Department of Pharmacology and Toxicology in the School of Medicine at UAB. She is a member of executive committee of the UAB National Clinical Trial Network Lead Academic Participating Site program, has served on various editorial boards and NIH study sections. She is also on the External Advisory Boards for the University of Minnesota Comprehensive Cancer Center and the University of Arizona Cancer Center.
and on the FASEB science policy committee, and is Treasurer-elect for the American Society of Pharmacology and Experimental Therapeutics. Her research interests are in defining the mechanisms of anti-cancer drug action and the pathways that regulate tumor cell growth and cellular responses to replicative stress. Her lab pioneered the use of the genetically tractable yeast model system, coupled with biochemistry and structural studies, to investigate the mechanism of action of DNA topoisomerase I, and the camptothecin class of chemotherapeutics that target this enzyme. Current programs include: (1) investigating the role of mTOR-dependent mRNA translation in promoting the survival and chemoresistance of cells exposed to replicative DNA damage, and targeting mRNA translation pathways in breast and ovarian cancer; (2) the role of SUMO (small ubiquitin-like modifier) conjugation in modulating cell resistance to DNA damage, and (3) the development of inhibitors of the SUMO conjugation pathway for the treatment of ras- and myc-dependent cancer.

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4. PROF. EILEEN WHITE

Title of the talk: Control of Cancer Metabolism and the Anti-cancer Immune Response by Autophagy

Abstract: Autophagy captures intracellular components and delivers them to lysosomes where they are degraded and recycled to sustain metabolism and enable survival in starvation. Acute, whole-body deletion of the essential autophagy gene Atg7 in adult mice causes a systemic metabolic defect manifested by starvation intolerance and gradual loss of white adipose tissue, liver glycogen, and muscle mass. Cancer cells benefit from autophagy as deletion of essential autophagy genes impairs spontaneous tumor growth in autochthonous cancer models. Tumor cell autonomous autophagy is required to recycle macromolecules to sustain mitochondrial substrate supply and thereby energy and nucleotide pools essential for survival during nutrient limitation. In addition to promoting tumor cell survival, autophagy in the host also promotes tumorigenesis. Host-specific Atg7 or Atg5 deletion impairs growth of multiple different allografted tumors, by preventing the release of Arginase 1 from hepatocytes. Arginase 1 degrades circulating arginine that essential for the growth of tumors, most of which are auxotrophic for arginine. Thus, autophagy sustains both tumor cell and host metabolism to enable tumor growth. In tumors with a high neoantigen load that can be recognized and killed by T cells, autophagy suppresses an anti-tumor T-cell response. Autophagy prevents tumor killing by T cells by suppressing production of interferon gamma in a T-cell dependent manner. Thus, autophagy promotes tumorigenesis by promoting intrinsic and extrinsic tumor metabolism and by suppressing the ability of the immune system to eliminate tumors. This suggests that autophagy inhibitors may be especially useful for cancer therapy when combined with immunotherapy.

Biosketch:
Eileen White, Ph.D., received her Bachelor of Science degree from Rensselaer Polytechnic Institute followed by a Ph.D. in Biology from SUNY Stony Brook. She was a Damon Runyon Postdoctoral fellow in the laboratory of Dr. Bruce Stillman and then a Staff Investigator at Cold Spring Harbor Laboratory where she identified a viral oncogene and homolog of BCL-2 that functions in cancer to inhibit apoptosis. Dr. White Bdefined mechanisms regulating apoptosis in cancer at Rutgers University where she is currently the Deputy Director, Chief Scientific Officer, and Associate Director for Basic Research at the Rutgers Cancer Institute of New Jersey, an NCI-designated Comprehensive Cancer Center. Current research focuses on the role of autophagy and metabolism in cancer. Dr. White has served on the Board of
Scientific Counselors of the National Cancer Institute and other review panels for the National Institutes of Health. She is the recipient of numerous awards including a MERIT award from the National Cancer Institute, the Red Smith award from the Damon Runyon Cancer Research Foundation, a Howard Hughes Medical Institute Investigatorship, an Achievement Award from the International Cell Death Society, a Career Award for the European Cell Death Organization, and is an elected Fellow of the American Society of Microbiology (ASM) and the American Association for the Advancement of Science (AAAS). Dr. White has also served as a member of the Board of Directors of the American Association for Cancer Research (AACR), the Scientific Review Boards for the Starr Cancer Consortium, the Damon Runyon Cancer Research Foundation, and the Cancer Prevention Research Institute of Texas (CPRIT). She is on the External Advisory Boards of the Stanford, Yale, MD Anderson, Hollings, Case, and MGH Comprehensive Cancer Centers.

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Title: Artificial Intelligence and Medical Technology

1. SUSAN L. MOOBERY

Title of the talk: Discovery of New Leads for Triple-Negative Breast Cancer from Nature

Abstract: Our research is focused on identifying therapeutic lead compounds and discovering new therapeutic targets for subtypes of triple-negative breast cancer (TNBC). TNBC is noted for its aggressive phenotype and high mortality and effective therapies are urgently needed. Genomic analyses show that TNBCs are heterogeneous and a single strategy with a “one target - one drug” will not suffice. Fortunately, molecularly distinct subtypes of TNBC have been identified allowing the possibility of discovering new targeted therapies for TNBC subtypes. Natural products remain an unmatched source for new drug leads. We screen diverse collections of natural product extracts using cell-based, mechanism-blind screens to identify extracts that have selective cytotoxic effects in cell lines representing defined TNBC subtypes. Strict bioassay-guided fractionation is used to isolate the active compound(s) with selective cytotoxicity. This approach has been successful and multiple classes of compounds with selective effects against defined subtypes of TNBC have been identified and a few of these will be discussed. Additionally one plant-derived compound helped us identify a new subgroup of TNBC cells that are highly sensitive to cardiac glycosides. The biological activities and mechanisms of action of each of the compound classes were defined to potentially uncover new therapeutic targets for these challenging cancers. A CRISPR/Cas9 genome-wide screen was used to identify a mechanism of the selectivity for one compound class, showing the utility of this approach for target identification. Our long-term goal is to ultimately provide more effective therapies for these challenging cancers.
Biosketch:
Dr. Mooberry received her B.S in Biology from St. Lawrence University and her PhD in pharmacology at the Medical University of South Carolina. She conducted postdoctoral studies at the University of Hawaii Cancer Center where she then moved into a faculty position. In Hawaii she identified new classes of microtubule targeting compounds, including one class that advanced to clinical trials. In 2000 she moved to Texas and she is now a Professor of Pharmacology at the University of Texas Health Science Center at San Antonio where she holds the Greehey Distinguished Chair in Molecular Therapeutics. Her research remains focused on the discovery of more effective therapies for the treatment of challenging cancers, including triple negative breast cancers and pediatric solid tumors. Her laboratory has expertise in the discovery and mechanisms of action of diverse microtubule targeting agents and more recently new natural product derived compounds with activity against specific subtypes of breast and pediatric cancers. She has published over 130 peer reviewed articles, reviews and book chapters and holds 8 patents on new classes of drug leads and has 3 patents pending. Dr. Mooberry has served on scientific review panels for national and international organizations. She is the immediate past president of the American Society for Pharmacognosy (ASP) and was elected as a fellow of that society in 2019. She is currently the Principal Investigator of NIH and industry grants.

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2. HEGGERE S RANGANATH

Title of the talk: Artificial Intelligence and Data Driven Planned Agriculture – A must, not an option for India

Abstract: Feeding a population of 1.6 billion citizens by year 2050 is undoubtedly the single most important moral responsibility and challenge India is facing. Today, more than 50% of the land is cultivated, and more than 40% of working age adults work directly for agriculture. In spite of such immense investment, average monthly income of a farmer is less than 100 dollars, and agriculture contributes less than 20% to the nation’s three trillion-dollar economy. Growing population, shrinking agricultural land, lack or poor management of resources, excessive and frequent price fluctuations, ancient farming practices, climate change, aging and demoralized farmers, and never ending migration to cities are serious threats for the nation’s food production. Developed countries have embraced AI and data driven agriculture to increase crop yield, conserve resources, reduce adverse impact on land and water, and increase farmers’ income. The Government of India, working with many leading technology companies, has launched several AI initiatives. However, simply copying what has worked in other countries may not be the best solution for India. There is a need for a totally planned agriculture, specifically designed for Indian conditions and Indian farmers, empowered by AI and Big Data. Using Big Data Analytics, for every acre of land, India should determine appropriate crops to grow based on soil, resources, and local conditions. What to grow, how much to grow, and where to grow should be planned and executed from the top like any profitable business. Planned and smart agriculture in India is a must, not an option.

Biosketch:
Dr. Heggere S. Ranganath received BE from Bangalore University in 1972, and ME degree from the Birla Institute of Technology & Science, Pilani, in 1974. He worked for Indian Telephone Industries as a design engineer for two years before going to US for higher studies. He received his Ph.D. degree from Auburn University in 1980. All his degrees are in electrical engineering. After graduation, he began his academic career as an assistant professor of electrical engineering at Auburn University. He joined the computer science department of the University of Alabama in Huntsville in 1982. Since October 2003, he is serving as the chair of the computer science department. His teaching and research interests include pattern recognition, image processing, machine learning, deep learning, and data science. He has directed 12 Ph.D. dissertations, received over 6 million dollars in
research grants, and published over 75 technical papers. He is well recognized in his field for the contributions he has made to pulse coupled neural networks, self-partitioning neural networks, and recursively partitioning neural networks areas.

Dr. Ranganath has been a consultant to several technology companies in Huntsville, and has been instrumental in establishing three US subsidiaries in India.

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3. PROF. SAJJAN G. SHIVA

Title of the talk: Building Intelligent Systems and Machines: Opportunities and Challenges

Abstract: Artificial Intelligence (AI) is the science and engineering of making intelligent machines and systems. We have strived to build systems that mimic human brain over the last 40+ years. AI is an important multi-disciplinary field which is now an essential part of technology industry, providing the heavy lifting for many of the most challenging problems in computational science. Current main manifestations of AI are Machine Learning, Deep Learning and R Learning. The main aspect that drives this technology is Big Data, a prerequisite that enables building these systems. This talk will highlight issues with Big Data. While there have been spectacular successes in building intelligent systems, the field is still rich with opportunities to improve them, challenges in adopting them and pose ethical and human consequences due to their use. This talk provides an overview of the state of the art and enumerates the challenges and risks and addresses the ethical and societal aspects of this technology.

Biosketch:
Dr. Sajjan Shiva is Professor of Computer Science and Director of Game Theory and Cyber Security laboratory at the University of Memphis, Tennessee, USA. He served as the founding chairman of the Computer Science Department from 2002 to 2015. He is an Emeritus Professor of Computer Science at the University of Alabama in Huntsville. He was Software Quality Assurance Manager at Teledyne Brown Engineering and Executive Technical Manager at Intergraph Corporation. He has been a Consultant to Industry and Government since 1975.
Dr. Shiva received his MEE and PhD degrees from Auburn University and B.E (Electrical) degree from Bangalore University. He is a Life Fellow of IEEE and an ABET/CAC commissioner.
His current research spans Machine Learning and Game Theory applications to cyber security, cloud security, secure software development and software engineering methodologies. His work has been supported by NASA, NSF, DoD and ONR. He is the author 150+ papers and four books (10 editions) on computer architecture used by more than 120 universities around the world.

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4. PROF. JAMES WINKLER

**Title of the talk:** Tackling the Next Wave - Using New Technology to Go After ‘Undruggable’ Targets

**Abstract:** In order to create the next generation of drugs, we need to be able to target pathological proteins that were once thought to be undruggable. In general, targets are thought to be undruggable if the ligands are not good enough, the binding pocket is too small, and/or if the protein has an activity that is not functional, such as a structural/scaffold role. In the talk, I will discuss two approaches that are emerging to create drugs for difficult targets, covalent ligands and targeted degraders. Not too long ago, many thought that covalent drugs, ones making covalent bonds with their target, would never be drugs, that they would always be too non-selective and too toxic. We now have several examples of drugs on the market that disprove this fear, such as the BTK inhibitor ibrutinib and the EGFR afatinib. There are now several companies, such as Vividion and Frontier Medicines, who’s core technology is based on covalent chemo-proteomic approaches to drug discovery. I will give several examples of the use of this new technology and highlight the advantages and challenges. Using targeted chimeric degraders is a new approach to disease-causing targets. Rather than inhibiting the activity of the protein, degraders remove the protein. This is possible because cells use well-regulated, active disposal systems to degrade cellular material, and it is now possible to co-op these systems to direct the degradation process. I will give several examples of this new technology and highlight the advantages and challenges of degraders, as well as summarize the current status of novel efforts in this area.

**Biosketch:**
James (Jim) Winkler is Head, Degrader Technology at Frontier Medicines, working with the Frontier Team and its collaborators to develop novel degrader technology. Jim has spent close to 40 years in the field of drug discovery and development, working at companies of varying size: Johnson & Johnson, SmithKline Beecham, GlaxoSmithKline, Array BioPharma, Arvinas and FORMA Therapeutics. While working for these companies, he gained extensive experience building and leading teams, working from target validation and early drug discovery through to translational medicine and clinical development.

Jim joined Arvinas as a new company focused on a novel technology, targeted protein degradation. Jim and the team helped build the company, validate and further advance this technology, and built a growing preclinical pipeline of
degraders. In his work at Array, Jim was part of a discovery organization with an impressive record of accomplishment, moving over 16 drugs into development. These drugs have gone on to Phase 2 and Phase 3 clinical trials and registration, which speaks to the quality of these molecules. In addition, Array developed a capability and culture that resulted in numerous collaborations with other Pharmaceutical companies, large and small.

Dr. Winkler has significant experience in Oncology and Inflammatory diseases, as well as proficiency in supervision, business development and collaboration management. He did his postdoctoral training with Sr. Stanley Crooke at SmithKline Beecham and received his Ph.D. in Pharmacology at the Medical College of Pennsylvania.

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5. **DR. AJIT SAPRE**

**Title of the talk:** Empowering rural India: One perspective

**Abstract:** The economic, political and technological environment is rapidly changing world-wide. This offers an opportunity to improve well-being, by providing clean energy, food, water and improving efficiency and productivity of Indians without environmental degradation, and providing equality of access to rural population.

As India marches toward a $5 trillion economy, there is a need for greater participation in manufacturing and high end services, and by making agriculture more efficient and less sensitive to climate change. Moreover, the problem of waste management (~ 65 million tonnes/year of solid waste) needs to be addressed in a sustainable manner for holistic development in a circular economy. Our RCAT-HTL technology converts organic waste (municipal solid waste, agri-residue, etc.) to renewable oil. Additionally, our catalytic technology converts waste plastic to stable oil for circular economy. We have developed several technologies for the agricultural sector such as sulphur based fertilizers that improves yields of existing crops and makes uncultivable sodic soil cultivable. We are pioneers in algae technology for sustainable fuel, food, feed, nutraceuticals, proteins, etc. Our Jio platform has allowed farmers to access many services in real time. It is being extended to provide science based technology solutions for precision agriculture. The above emerging areas offer India a unique opportunity to leap frog the world, by helping build a more robust national ecosystem for implementing innovations with societal impact. We stand on the brink of the fourth industrial revolution that will witness an amalgamation of physical, digital and biological worlds.

Advances in artificial intelligence, robotics, IOT, nano- and bio-technology, synthetic biology, clean renewable energy, etc. will be transformative for human society. We have a unique opportunity to pole vault India by strong engagement of academia, national labs and industry in being at the cutting edge of these emerging areas and develop translational R&D capability for rapid commercialization to propel India to a five trillion economy and uplift rural economy.
**Biosketch:** Dr. Ajit Sapre received his PhD from the University of Delaware and MBA from Cornell University, USA. He has more than 40 years of experience in the petroleum refining and petrochemicals business and technology development and management. His experience includes technical and managerial assignments in research, engineering, business, manufacturing units and corporate planning. Ajit has strong management and technical background in refining, petrochemicals processes, development, catalyst development, chemical reaction engineering, optimization technologies, computer integrated manufacturing and intellectual asset management. He has experience in upstream, downstream (refining, petrochemicals, polyester) and renewable energy sectors and has published more than 100 technical papers, one book and has more than 45 U.S. patents to his credit.

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PLENARY SESSION 3

Title: Advances in Basic Medical and Clinical Interactions

I. PROF. DANIEL R. WILSON

Title of the talk: Interprofessional Clinical and Translational Research: Opportunities and Challenges

Abstract: Global health challenges continue to defy solutions derived from single research domains. Significant increased global prevalence of many diseases persists despite control of key risk factors such as smoking, blood pressure, cholesterol levels, and diet. Notably on rise are addictions, cancers, endocrinopathies, infections and cardiovascular, musculoskeletal as well as pulmonary diseases. Advances in knowledge, diagnosis, and therapy are urgently needed in all these pathologies and many more. Though major progress accrues in understanding fundamental biopathology, translation of discoveries into safe and effective clinical application occursly at a slow pace. Research clusters comprised of multidisciplinary, coordinated teams of investigators are needed to develop innovative designs and processes that accelerate pace of discovery and expedite transformation of these into modes to better management – indeed, prevent – disease. A key element for enhanced patient care is a holistic approach entailing multi- and inter-disciplinary collaborative efforts that draw together expertise across the health sciences, including medicine, nursing, podiatry, optometry, dentistry, physical therapy, veterinary medicine, and pharmaceutical sciences. This is most effective in environs that align all such disciplines in close proximity and with regular interaction. However, in most settings a lack of such specialty range and effective infrastructure limits opportunities for basic investigators to conduct clinical and translation research. Other challenges include socio-cultural differences between basic and clinical investigators, regulatory concerns, the pressure to “publish or perish”, teaching responsibilities, funding competition, and the “valley of death” in preclinical research and clinical trials. Still, experimental findings that reduce disease burdens – ideally, preserve wellness – may bring about clinical impact of significant discoveries, innovations, and breakthroughs driven by consequential efforts in translational research.
Biosketch:
Daniel R. Wilson completed his Yale (BA Anthropology), Iowa (MD), McLean Hospital & Harvard Medical School (Internship, Residency & Fellowships), Case Western (Diploma Leadership), and Cambridge (PhD Biological Anthropology).

Some 350 formal scholarly communications and Principle Investigator on more than 40 grants and Co-I or Consultant on some 40 other studies.

Directed Neuropsychiatry at McLean Hospital & Harvard Medical School from 1987-92. From 1994 to 2000, served as Medical Director of the largest state hospital in Ohio. University of Cincinnati Professor of Psychiatry and Medical Director of the University Institute for Medicine & Law. Creighton University Chairman of Psychiatry and Professor of Psychiatry, Neurology, and Anthropology 2000-2012.

Pioneer in Evolutionary Neuroscience as President of the American Neuropsychiatric Association and Founding Chair of the World Psychiatric Association Section on Evolutionary Psychiatry.

From 2012 to 2016 Vice President for Health Affairs & Dean of the University of Florida Health Science Center-Jacksonville. Supervised academic, clinical, and research activities in the Schools of Medicine, Nursing, and Pharmacy based at a 700 bed hospital with a combined budget of $800M and some 6,000 employees, including a 750 faculty and resident practice spanning 51 sites in Florida and Georgia.

Now President of Western University of Health Sciences with graduate colleges of Medicine, Nursing, Pharmacy, Veterinary Medicine, Dentistry, Podiatry, Optometry, Health Professions and Biomedical— the most comprehensive health sciences university in the United States. Sciences

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2. PROF. MICHAL TOBOREK

Title of the talk: Targeting the HIV-infected brain to improve ischemic stroke outcome

Abstract: HIV-associated cerebrovascular events remain highly prevalent even in the current era of antiretroviral therapy (ART). We hypothesize that low-level HIV replication and associated inflammation endure despite antiretroviral treatment and affect ischemic stroke severity and outcomes. Using the EcoHIV infection model and the middle cerebral artery occlusion as the ischemic stroke model in mice, we present in vivo analysis of the relationship between HIV and stroke outcome. EcoHIV infection increases infarct size and negatively impacts tissue and functional recovery. Ischemic stroke also results in an increase in EcoHIV presence in the affected regions, suggesting post-stroke reactivation that magnifies pro-inflammatory status. Importantly, ART with a high CNS penetration effectiveness (CPE) is more beneficial than low CPE treatment in limiting tissue injury and accelerating post-stroke recovery. These results provide potential insight for treatment of HIV-infected patients that are at risk of developing cerebrovascular disease, such as ischemic stroke. Supported by the NIH (MH098891, MH072567, HL126559, DA039576, DA044579, and DA040537).

Biosketch:
Michal Toborek is a Leonard M. Miller Professor of Biochemistry and Molecular Biology and Vice-Chair for Research in the Department of Biochemistry and Molecular Biology at the University of Miami. Prior to getting a PhD (1989) in Biochemistry from the Silesian School of Medicine in Katowice, Poland, he obtained an MD degree in 1985 from the same institution. After completion of his PhD degree, he moved to the University of Kentucky for his post-doctoral work and gradually rose to the ranks. In 2011, we moved to the University of Miami Miller School of Medicine. The main research interest his my laboratory is focused on the involvement of the blood-brain barrier (BBB) in the pathomechanisms of cerebrovascular and neurodegenerative disorders. He extensively published on the role of the BBB in HIV trafficking into the brain. Other projects in his laboratory have also been focused to study the interactions between drugs of abuse, exercise, and BBB integrity. His research is supported by several NIH grants. Dr. Toborek is a founding member of the International Brain Barriers Society and serves on the Editorial Boards of journals which are dedicated to the BBB research: Fluids and...
Barriers of the CNS and Tissue Barriers. He is also a member of the Scientific Council for the International Symposia on Signaling at the Blood-Brain Barriers. Dr. Toborek served on numerous NIH study sections and is the past President of the Society on Neuroimmune Pharmacology (SNIP). In 2014, he received the Wybran Award from SNIP, the highest honor bestowed by SNIP in recognition of the very best scientific contributions that have resulted in the preservation and expansion of the field of Neuroimmune Pharmacology. His most recent recognitions include the Doctor honoris causa, Academy of Physical Education, Katowice, Poland and Honorary Membership in the Romanian Academy of Medical Sciences.

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3. PROF. ANDREW JAMES GREENSHAW

**Title of the talk:** The coming impact for India of artificial intelligence and machine learning in human health systems

**Abstract:** Artificial intelligence (AI) is increasingly important for regulation of human systems through data gathering and appropriate feedback in a dynamic multi-modal environment. Major economies have suffered, historically, from the reactive nature of health system management with large health demands from patient populations in the context of limited health resources. This has led to system developments that have not been proactively well-planned and are consequently inefficient and expensive. In many large highly-developed economies health system costs are becoming unsustainable as a disproportionate amount of total budget spending is consumed by health system needs. In LMIC economies with diverse populations there are inherent problems of developing health system accessibility and efficiency in attempting to serve urban, rural and remote areas. Recent developments in distance health delivery through e-health including incorporation of AI functions promise innovative affordable solutions that may increase accessibility and efficiency despite restricted face to face access to health specialists. Several key innovations will be discussed in terms of licensed AI technology and consideration of future developments. The possible advantages for further sustainable development of the Indian health system will be discussed in this context.

**Biosketch:**
Andrew James Greenshaw is a Fellow of the Canadian College of Neuropsychopharmacology (CCNP), for which he served as President from 2000-2002, and a Fellow of the Internationale Neuropsychopharmacologicum (CINP). Andy has served as University of Alberta Associate Vice President (Research) and has served on national and international boards including the Canadian Psychiatric Research Foundation, the Institute of Health Economics and The University of the Arctic. From 2006 until 2015 he served as founding Co-Chair of the Alberta Addictions and Mental Health Research Partnership Committee. He is part of a collaborative computational psychiatry group that includes researchers from the Alberta Machine Intelligence Institute and the IBM Centre for Advanced Study at UAlberta, the IBM TJ Watson Centre in New York, West Sichuan Hospital in Chengdu and NIMHANS in Bangalore. Andy is the Research Director for
the APEC Digital Hub for Best Practices in Mental Health, a digital hub that will serve the combined APEC population of 2.7 Billion people in the Pacific Rim, including indigenous stakeholders.

With extensive experience on Canadian Medical Research Council and Canadian Institutes of Health Research (CIHR) grant panels since 1989, Andy was a member of the Scientific Advisory Board of the CIHR Institute of Neuroscience Mental Health & Addiction from 2012-2016. He is the director of the Alberta-based node of the national Canadian Depression & Research Intervention Network (CDRIN), which focusses on engagement of people with lived experience of mental disorders as partners in patient-oriented research, he is also Chair of the CDRIN Depression Hubs National Advisory Panel and a member of the CDRIN Board. Andy is also a member of the Scientific Advisory Board of The Royal’s Institute of Mental Health Research in Ottawa and of the Research Advisory Board for Little Warriors, a national organization committed to the awareness, prevention and treatment of child sexual abuse. Andy is interested in community engagement for improved mental wellness and to reduce stigma and support people living with mental health challenges. He is currently a Professor of Psychiatry and Neuroscience at the University of Alberta and a Fellow of the Royal Society of Arts, Dr. Andy Greenshaw trained in Europe and Canada. He joined the University of Alberta in 1986 as a Heritage Medical Research Scholar.

**Communication address:**
Professor Andrew J. Greenshaw FRSA
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PLENARY SESSION 4

Title : Advances in Basic Medical and Clinical Interactions

1. PROF. SURENDRA VARMA

Title of the talk: Global Perspective of Newborn Hypothyroid Screening

Abstract: Congenital Hypothyroidism is a preventable cause of mental retardation. Clinical features are subtle and non-specific which could delay diagnosis until at least three months of age or older. By the time the side effects are discovered, the thyroid hormone deficiency on the developing brain may be irreversible. Early detection and treatment became possible in the mid 1970’s. There are two methods of Newborn Hypothyroid Screening (NBS): Primary T4-Reflex method which will detect both primary as well as secondary (central) hypothyroidism. The other method is Primary TSH screening which will not detect central hypothyroidism. With increasing accuracy of TSH measurements, many programs have switched to TSH screening instead of the primary T4-Reflex TSH strategy. Most newborn screening systems have switched to primary TSH except in some programs in the USA, Israel and the Netherlands. Texas and some programs in Japan still maintain the primary T4-Reflex TSH strategy while other parts of Japan have free T4-TSH screening programs. There have been many changes during the four decades of Newborn Screening (NBS). Prior to the onset of the NBS programs, incidences were reportedly between 1:7,000 to 1:10,000. With screening programs, incidences have become much more apparent between 1:3,000 to 1:4,000. The epidemiology for the U.S in 1978 was 1:3,985. The epidemiology for New York in 1978 was 1:3,373 and in 2005 it was 1:1,415. The epidemiology for California is as follows: Non-Hispanic White 1:3,533; Non-Hispanic Black 1:11,000; Asian (Chinese and Vietnamese) 1:2,380; Hispanic 1:1,600; Asian Indian 1:1,200. Worldwide incidences seem to be increasing due to the more sensitive screening methods. Lowering of the TSH cutoff in NBS leads to detection of mild cases of Hypothyroidism. Treatments for Hypothyroidism include: Levothyroxine which is the treatment of choice, a dose of 10-15 mcg/kg a day, or in milder cases 6-10 mcg/kg a day. It is important to monitor newborns after administering treatment. One should begin monitoring two weeks after receiving treatment of the free T4 and TSH, 1 to 2 months intervals up to six months of age, and 2 to 4 month intervals up to 3 years of age. The goal for the free T4 is to be normal or in the upper half. The goal for the TSH is to be less than 5 mU/L but preferably 0.5-2.0 mU/L. It is important to monitor newborns after administering treatment. One should begin monitoring two weeks after receiving treatment of the free T4 and TSH, 1
to 2 months intervals up to six months of age, and 2 to 4 month intervals up to 3 years of age. The goal for the free T4 is to be normal or in the upper half. The goal for the TSH is to be less than 5 mU/L but preferably 0.5-2.0 mU/L. Eleven studies were composed and the neuro-development outcome showed that infants started early (12-30 days of age) had an IQ score of 15.7 higher than infants started later (more than 30 days of age). Early onset of treatment results in the best neuro-developmental outcome. It is estimated that approximately 30,000 babies with congenital hypothyroidism worldwide are born outside of the NBS programs.

**Biosketch:**

Prof. Surendra Varma is Executive Associate Dean for Graduate Medical Education and Resident Affairs He served as the Director, Pediatric Residency Program, Department of Pediatrics, Texas Tech University HSC School of Medicine, Lubbock, Texas. He is also a University Distinguished Professor and Vice Chair of Pediatrics, Program Director Emeritus, Pediatrics. He is the Professor of Physiology and Health Organization Management.

Prof. Surendra Varma received his MBBS and MD degrees from King George's Medical College, Lucknow, India. He is the Member, Governing Council, Section on Medical Schools, American Medical Association. His current research is on Growth Charts for Hispanic Children, Growth Disorders, Thyroid and Medical Education. He is Honoured with Golden Orchidometer Award from TTUHSC, Pediatric Residents, Distinguished Service Award in May 2018.

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2. PROF. SHILPA BUCH

**Title of the talk:** HIV and opiates: Blaming the messengers

**Abstract:** Although combination antiretroviral therapy (cART) has improved the health of millions of those living with HIV, the penetration into the CNS of many such therapies is limited, thereby resulting in residual neurocognitive impairment commonly referred to as NeuroHIV. While cART has successfully suppressed peripheral viremia, cytotoxicity associated with the presence of viral Transactivator of transcription (Tat) protein in tissues such as the brain, remains a significant concern. Adding fuel to the fire is the co-morbidity of drug abuse in those infected with HIV-1, specifically abuse of opioids. The prevalence of NeuroHIV is reported to be approximately 20-60% among cART-treated populations with almost 30% of those afflicted with this condition exhibiting a co-morbidity of substance abuse. The interplay of HIV & opiates thus raises concerns regarding the combinatorial effects of both on HIV disease progression.

Extracellular vesicles (EVs) are important conduits in HIV and drug of abuse-mediated synaptodendritic injury and neuroinflammation through transfer the viral proteins, Tat, Nef and Gag, and viral RNA, TAR as well as host miRNAs. Findings from our group have demonstrated that astrocyte-derived EV (ADEV)-miR-29b mediates HIV Tat and opiate-induced neuronal injury, thus underscoring the importance of such interactions in NeuroHIV. Herein, we also found that 1) ADEV-miR-29b mediates HIV and opiate-induced neuronal injury; 2) HIV Tat mediated induction and release of miR-9 in ADEVs, which upon uptake by the microglia, resulted in enhanced migration of these latter cells; 3) exposure of astrocytes to HIV Tat resulted in increased expression & release of several miRNAs in the EV cargo, specifically the brain-enriched miR-7, which upon uptake by the hippocampal neurons, resulted in loss of inhibitory synapses via miR-7-mediated downregulation of its target neuroligin 2 (NLGN2) -a known key regulator of inhibitory synapses; 4) morphine stimulated ADEVs can be taken up by microglial cells leading, in turn, to impaired microglial phagocytosis via the TLR7-NF-kB-lincRNA-Cox2 axis; 5) exposure of astrocytes in culture to morphine resulted in increased induction and release of miR-138 in the ADEVs which in turn, were taken up the microglia, resulting in microglial activation, via binding to endosomal TLR7; 6) exposure of astrocytes to morphine induced the expression and secretion of miR-23 in the EVs, which, upon uptake by pericytes, resulted in induction of pericyte migration.

EVs via their ability to deliver specific cargo are critical for cellular communication and physiology. This property of exosomes can also be exploited as a treatment strategy to deliver specific therapeutic molecules to the diseased tissues. Intranasal administration of EVs is considered as a noninvasive method for...
rapid delivery of exosome-encapsulated drug(s) to the brain with selective uptake by microglial cells. Our in vivo study also demonstrates that intranasal delivery of lincRNA-Cox2 siRNA restored microglial phagocytic activity of morphine-administered mice. In conclusion, our studies demonstrate that miRNA cargo of HIV Tat and morphine-ADEVs can be taken up by neurons and microglia, which in turn downregulates their targets in the recipient cells and ultimately leads to neuronal injury and impairment microglial function.

**Biosketch:** Prof. Shilpa Buch is currently a Professor & Vice Chair for Research and the Director of the Nebraska Center for Substance Abuse research at the University of Nebraska. She received her PhD in 1982 in Microbiology from Maharaja Sayajirao Univ in Baroda, India and moved to Canada for postdoctoral training. She began her independent research career as an Assistant Professor at the Hospital for Sick Kids, Toronto, following which, she moved to Kansas University and embarked on a research area focused on understanding how addictive drugs co-operate with HIV-1 to exacerbate neurological complications. She rose through the ranks at Kansas and in 2007, made a move as a full Professor to University of Nebraska in Omaha. Research approaches used in her lab involve a multipronged approach comprising of a variety of complementary model systems ranging from cell cultures to rodent models to the higher more relevant macaque model of SIV pathogenesis. More recently, her research interest is centered on exploring how exosomes act as conduits to transport key signaling mediators (small noncoding RNAs/microRNAs) to distant recipient cells as a means to regulate gene expression and cellular cross talk. She lead an active research program involving collaborations both nationally and internationally, with over 160 peer-reviewed publications. She have consistently held NIH funding throughout my career and continue to serve on NIH study sections. During her career, she have had the good fortune of being recognized by various national and International societies with the Wybran (2012) and the Distinguished service (2013) Awards, both of which hold a special meaning for her. She have also been awarded the UNMC Scientist laureate award (2016) in addition to the Kansas City scientist award. She has played an active role as a Secretary of the Society on Neuroimmune
Pharmacology and have been invited as a speaker & as a Chair at various meetings and have also organized several symposia.

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3. PROF. DEVENDRA K. AGRAWAL

**Title of the talk:** Novel Approach to Prevent Vein Graft Failure Following Coronary Artery Bypass Graft

**Abstract:** Saphenous vein (SV) graft failure is a common clinical problem in patients undergoing coronary artery bypass graft (CABG) surgery. Underlying mechanisms are still unclear. We performed CABG using superficial epigastric vein (SEV) isolated with “no touch technique” in atherosclerotic swine. H&E and pentachrome staining of these graft after euthanasia revealed a significant development of neointima in the proximal anastomosis site in all the treatment groups but in the control group, the entire lumen was obliterated with collagen and smooth muscle cells. The middle part of the graft in the control group was more densely packed with smooth muscle cells. The morphological distinction between cell layers was lost during the process of arterialization of the vein graft. No new Q wave were detected in the EKG tracing after 4-6 month from CABG surgery. In the echocardiography, the basal-lateral segment of the septum’s thickness was reduced comparing to the rest part of the septum at the same level, and the movement of the infarcted segment was restricted. But, the ejection fraction was like preoperative stage. This suggests that there was no negative effect on the heart pumping function even infarction happened segmentally. Also, there were no systolic heart failure or myocardial infarction due to technical complications or thrombosis of the graft following the CABG surgery, although there was some sign of infarction in few animals. The immunostaining demonstrated an increase in the number of cells expressing PLK1 and pPLK1 in the neointima of saphenous vein grafts compared to their uninjured counterparts. VSMCs in the neointima showed an increased expression of phospho-histone, synthetic and contractile SMC markers, IFN-γ and phosphorylated STAT-3. However, VSMCs of uninjured coronaries and SEV had no significant expression of the proteins. These data suggest that PLK1 might play a critical role in VSMC mitosis in hyperplastic intima of the grafted vessels. Also, we observed increased protein expression and phosphorylation of PLK1, as well as increased mRNA transcripts of PLK1 in PDGF-stimulated SV and internal mammary artery (IMA) smooth muscle cells compared to their respective controls. We also found greater expression of PLK1 and pPLK1 in saphenous vein than internal mammary artery VSMCs. The PLK1 inhibitor, BI2536, attenuated PDGF-BB-induced proliferation but had no effect on the migration of IMA or SV-SMCs. BI2536 blocked PDGF-induced CDK1 phosphorylation. Silencing the PLK1 gene by siRNA transfection in SV and IMA SMCs attenuated the expression of p-Histone H3 and VSMC proliferation. These findings identified a target site to develop inhibitors of PLK1 that could be a viable therapeutic strategy to prevent and manage vein-graft disease following CABG.
Biosketch:
Dr. Devendra K. Agrawal earned M.Sc.(Chemistry) in 1973 and Ph.D. (Biochemistry) in 1978 from Lucknow University, India. Following his tenure as a Clinical Biochemist at King George’s Medical College, Lucknow, India, Dr. Agrawal moved to Canada and earned Ph.D. (Medical Sciences) in 1984 from McMaster University, Canada followed by a Postdoctoral Fellowship at the University of British Columbia, Vancouver, Canada. In 2009, Dr. Agrawal founded the Center for Clinical & Translational Research at Creighton University, which later developed into an independent Department. Dr. Agrawal was the Founding Chairman of this Department.
Dr. Agrawal has been elected to the membership of the Alpha Omega Alpha Honor Medical Society and is a Fellow of the American Academy of Allergy, Asthma and Immunology, Fellow of the American Heart Association, Fellow of the American Physiological Society, and Fellow of the International Academy of Cardiovascular Sciences. Creighton University recognized and honored Dr. Agrawal with many awards, including Young Investigator Award, Distinguished Research Career Award, Distinguished Professor Award, Distinguished Faculty Service Award, University Research Award. In collaboration with clinical scientists, Dr. Agrawal has developed active and productive research projects in many fields, including maturation failure of arteriovenous fistula, carotid and coronary artery diseases, vein-graft failure, plaque instability, shoulder rotator cuff injury, gene and stem cell therapy, bariatric surgery, and esophageal diseases. He has trained about 62 postdoctoral fellows and 70 MD-PhD/PhD/M.S. students in cellular, molecular, and immunobiology of clinical diseases. At Western University of Health Sciences, Dr. Agrawal is developing research projects with multidisciplinary approaches and new perspectives in the advancement of Clinical & Translational Science, bringing the expertise of various health science colleges, including osteopathic medicine, dentistry, podiatry, pharmacy, optometry, veterinary medicine, and mentoring and training new generation of translational researchers.

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Title: Non-Communicable Diseases in Rural Population

I. DR. M. A. SHEKAR

Title of the talk: Current status and perceived risk factors of NCDs in rural population

Abstract: Non communicable diseases (NCD) have emerged as major threat to global human health. NCDs encompass a group of diseases such as cardiovascular diseases, cancer, diabetes and chronic respiratory diseases. For many decades, the focus in India was on communicable diseases. Targeted efforts have led to a significant reduction in morbidity and mortality from communicable diseases. Unfortunately, the burden of NCDs mainly four- cardiovascular diseases, chronic respiratory disease, cancers and diabetes, are increasing both globally and in India and have reached alarming proportions. NCDs contribute to around 38 million (68%) of all the deaths globally and to about 5.87 million (60%) of all deaths in India.

Many studies have shown that genetic predisposition, unhealthy diets, sedentary lifestyles, urbanisation, westernisation, and affluence with rising prevalence of behavioural and anthropometric (obesity) risk factors play a significant role in the huge explosion of NCDs in India.

Intuitively, one would expect a lower prevalence of NCD in a rural population who traditionally lead a more active lifestyle compared to their urban counterparts. However, physical activity may be only one cog in the wheel of explosion of metabolic and cardiovascular diseases in India. Many novel factors are implicated and two of them, foetal origin of adult diseases (FOAD) (Barker’s hypothesis) and Environmental/endocrinal disrupters are the focus of research.

Now NCDs are as much an issue in rural India as in urban areas. Rural India, a population where the triple burden of lack of awareness, costs, and poor healthcare facilities add to the woes of complications and delayed treatment.

Biosketch:

Dr. M. A. Shekar did his MBBS and MD (Med) from Government medical college, Mysore popularly called as Mysore Medical College and received both degrees fro University of Mysore. He has received awards and honors. To name a few, Dr. B. C. Roy award- IMA Mysore Branch and MMC alumni association, Mysore., Oration lectures- KRSSDI Karnataka, API Karnataka, IMA Karnataka. Invited
guest lectures at various CMEs at State, National conferences. “Best Teacher” in Faculty of medicine, Rajiv Gandhi University of Health Sciences...He has had experience as Principle Investigator, Clinical trials (Phase 2,3,4) and RGUHS funded clinical research. Institutional Chair (Karnataka Institute of Endocrinology & Research) for collaborative research with Indian Institute of Science, and Center for Human Research, Bengaluru. Regional Faculty, Certificate Course in Evidence Based Diabetes Management (CCEBDM). Has undergone Specialised training in Upper GI Endoscopy, Echocardiography and Stress Testing, Geriatric Medicine and in Research in Diabetes.Has professional membership as life member in API, IMA, IMAMS, CSI, Echocardiography Society of India, RSSDI – India and International Diabetes Federation. Past member of ADA-USA, EASD-Europe. He has Held positions as founder president Mysore Diabetes Federation, founder secretary Diabetes Association of Mysore, Hon. Secretary and later president Mysore Medical College Alumni Association, vice-president University of Mysore Alumni Association (UMAA), medical advisor Shankara Tribal Welfare Centre (Swamy Vivekananda Youth Movement). Presently Hon. Secretary Mysore Medical College Alumni Association Trust.He has Edited and authored four books on diabetes. Published research articles in 14 national, international journals Currently he is the Founder Director & Diabetologist, Apoorva Diabetes Foundation, Mysore.

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2. DR. S. R. ARAVIND

Title of the talk: Therapeutic approach for better care of Diabetes in Rural population

Abstract: Uncontrolled Diabetes & Hypertension is adding to the problem of nearly 1/3rd of the cardiovascular deaths seen in rural population. It is estimated that close to 40% of the population of rural India may have Diabetes or Pre-Diabetes along with Hypertension.

Treating a chronic disease like Diabetes is not expensive. Often the term Physician inertia is used for ‘uncontrolled’ diabetes. The problem is mainly related ‘Lack of Awareness’ about the disease, Lack of access to simple tests to monitor complications & proper protocols to review patients from time to time.

Combing hair without a mirror Vs with the help of a mirror is known to all. Similarly, education bridges the gap between right Vs wrong & helps bridge the gap of ignorance. From the grassroot level education to patients, Para Medical staff & doctors must be provided to manage Diabetes. It’s a lifelong condition that requires care. Highly cost-effective medicines are available for care of all most all the cases of Diabetes in India. It’s a fine balance of Diet, Exercises, Medicines & education that all patients need. Since Diabetes care involves periodic biochemical tests, supportive infrastructure & facilities must be provided in Rural care. There are highly cost-effective methods to evaluate for complications of the eye, Heart & kidney available today in India. My talk will highlight immediate steps needed for better care -Affordable, Accessible & Accountable

Biosketch:
Dr. Aravind R Sosale obtained his MBBS from Bangalore University, India in 1983 and proceeded to certify in internal Medicine (DNB) and hospital administration. Dr. Aravind is the Founder Director of Diacon Hospital, which is the first University recognized center for study of Diabetology in India. Dr. Aravind is currently the founder director of the postgraduate program in “Diabetology” at the Rajiv Gandhi University of Health Sciences and visiting professor of Medicine & Diabetology at PES medical college, Kuppam, AP. Dr. Aravind is currently the “Secretary General” of “DiabetesIndia” & served in the EC of RSSDI for 15 long years before becoming the President of RSSDI in 2015-
2016. Dr. Aravind has a keen interest in biomarkers and foot complications in diabetes. Dr. Aravind is a member of the Editorial board of ‘Practice Impact’, a research-oriented News Letter & has authored many chapters in text books related to Diabetology in India. Dr. Aravind has special interest in clinical Diabetology and Research in India. He has over 100 publications in National & International journals. He holds the Certificate from Guinness Book of World records for the Largest Diabetic Health screening done on 14th Nov, 2013. He was conferred the ‘Life time achievement award in the field of Diabetology’ from KRSSDI (Karnataka Chapter of RSSDI) during 9th Annual conclave in 2013 & by Diabetes India on 1st March 2019 during 9th World congress at Jaipur. Fellow of RSSDI (FRSSDI) was conferred during the 42nd Annual conference held at Lucknow during November 2015. Diacon Hospital was recognized by IDF as center of Excellence in Care & Education during January 2018.

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Title of the talk: NCDs in Rural populations- Framing a pragmatic policy prescription

Abstract: The last decade is seeing enormous transformations in rural India. Whether it is social and economic mobility of people, alterations in health seeking behaviours, improvements in the public health system, new legislations revolving around unqualified practitioners, changing lifestyles or changing family structures – all of these are now impacting the health of people living in rural areas. From transportation to pollution, increasing use of pesticides and chemical intensive farming methods, to access to funding sources, policy has a major role to play in altering the structure of social determinants of health and the response of the health system to people’s demands. The dynamic relationship between the supply and demand sides of health care is significantly different from what it was a few decades ago. It is in this complex perspective does one need to look at the growing burden of NCDs in rural India and various ways in which they can be managed.

The speaker will be deconstructing how these complex and multifarious variables are impacting health care and health seeking behaviours in rural India. He will also bring in his more than 3 decades experience of setting up and operating health facilities in geographically challenging conditions to explain the challenges that a policy maker faces in bringing in policy to manage and contain the growing burden of NCDs in rural India. He will try to outline a blueprint of action on what policies will be required at both the National and State level, what the public agencies need to do and how the private sector can partner and collaborate with public providers in reducing the burden of NCDs. The talk will uniquely combine the perspectives of a practitioner, academician and a policy expert and explain what can be done at an individual, community and a larger societal level to address the NCD challenge in the context of an aging rural population with both geriatric and palliative care needs.

Biosketch:
Dr. R Balasubramaniam (Balu) is a development activist, public policy advocate, leadership trainer, and author who is a physician by qualification. After his MBBS, he earned his MPhil in Hospital Administration & Health Systems Management from BITS, Pilani. He has built this non-profit organization into India’s leading development NGO and the Swami
Vivekananda Youth Movement (SVYM) today runs more than 50 projects reaching out to nearly a million people across the state of Karnataka and also has centers in the USA and UK. He is also the Founder and Chairman of Grassroots Research and Advocacy Movement (www.graam.org.in) a public policy think tank. Dr R Balasubramaniam is also the recipient of numerous other State and National Awards. Apart from lecturing & teaching regularly at many reputed universities around the world on Leadership, he was the distinguished Frank Rhodes Professor at Cornell University, USA where he continues to be a Visiting Professor. He was the Head and Visiting professor of the Vivekananda Chair of the University of Mysore twice. He is a Tata Scholar, a Mason Fellow of the Harvard Kennedy School and a Fellow at the Hauser Center for Civil Society, Harvard University.

He has authored 6 books and he also writes extensively about Swami Vivekananda and on Development Issues in local Kannada and English newspapers and in his blog at rbalu.com. His last two books ‘I, the Citizen’ and ‘Voices from the Grassroots’ have been widely acclaimed around the world.

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4. **DR. PRASHANT MATHUR**

**Title of the talk:** Health systems challenges and opportunities in tackling NCDs in rural areas

**Abstract:** The burden of noncommunicable diseases in India is rapidly escalating to catastrophic proportions. This calls for a strategic effort in strengthening the existing health system and exploring novel programmatic interventions for NCD control. Despite the launch of NCD control program, there exists a wide rural-urban disparity in the quality of health care services. One of the key challenges at the provider level is shortage of human resources and poor referral mechanism. Even with availability of NCD care, accessibility to avail of these services is an important determinant. At the client level, there exist barriers which may influence health care utilization. These include lack of satisfaction with health service, socio-cultural factors such as community perceptions, beliefs and attitudes; faith in traditional healers, fear of loss of work-pay and so forth. Other factors include poor awareness about NCDs’ and adherence to treatment. In controlling NCDs’, health systems in rural areas must address local disease pattern and its correlates, based on which specific interventions could be designed and implemented.

**Biosketch:**
Dr Mathur is a Pediatrician trained at AIIMS, New Delhi with specialization in Paediatric Gastroenterology and, further experience in clinical epidemiology, program evaluation and evidence to policy translation. He coordinated the implementation of first NCD risk factor surveys of ICMR in 2003, Integrated Disease Surveillance Project in 2010 and National NCD monitoring survey 2018. He initiated several major projects of ICMR, worked with WHO and was nodal officer of ICMR international collaborations with the MRC (UK), CIHR and Global Alliance for Chronic Diseases. Dr Prashant Mathur is the Director of ICMR-NCDIR, Bengaluru since May 2016, wherein work involves research on epidemiology, cancer registries (NCRP), stroke, cardiovascular diseases, diabetes and their risk factors: and studies on patterns of care and survival on cancer. The institute utilises IT tools and techniques for data management and analysis. It informs policy and program for NCD prevention and control in India. It houses the Bioethics Unit of ICMR. Dr Mathur has chapters in 18 books, has more than 50 peer reviewed publications and is a reviewer of 21 national and international journals. He serves on several committees; Governing Council of ICMR,
Technical Expert Committee NPCDCS, Standing Committee on MoHFW Tertiary Cancer Care Programme, Karnataka State Cancer Control Committee, Sub group for Health Effects on Electronic Nicotine Delivery System (ENDS), Adjunct Faculty at Institute of Liver and Biliary Sciences, Advisory Committee for M.Sc. in Cancer Biology course at Dr. B.Borooh Cancer Institute, Scientific Advisory Board of M.S. Ramaiah Medical College and Hospitals and other various important committees at different institutions across the country.

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Title: Human Microbiota: Is it A Potential Controller of Health and Disease

I. PROF. SURINDER RANA

Title of the talk: Gut Microbiome in Pancreatic Diseases: Hype or Hope!

Abstract: The gut microbiome is now being increasingly recognized for its role in human health as well as various diseases via its effects on metabolism, modulation of gastrointestinal immune system, facilitation of food digestion, as well as modulation of intestinal architecture and barrier. Dysbiosis has been shown to be associated with several gastrointestinal diseases like inflammatory bowel disease, irritable bowel syndrome as well as various systemic diseases such as obesity, diabetes, and pancreatic diseases including pancreatic cancer. The gut flora has been shown to migrate into otherwise sterile pancreas and could influence pancreatic microenvironment. Alterations in gut microbiome have been found in various pancreatic diseases and it could play a major role in the pathogenesis of various pancreatic diseases like acute pancreatitis, chronic pancreatitis, and pancreatic cancer. However, the evidence linking gut dysbiosis and pancreatic diseases is limited and has come from animal models study. Carefully controlled studies are needed to evaluate the complex relationships between the microbiome and disease. It would be necessary to evaluate the gut microbiome of patients at risk of pancreatic disease in prospective studies to better understand its role in human pancreatic diseases. Microbiota research can also help to identify biomarkers for predicting subsequent pancreatic cancer risk as well as its prognosis. Studies have shown that the microbiome modulate tumor response to chemotherapy and therefore novel probiotics could be used in combination with chemotherapy and this holds immense therapeutic potential.

Biosketch:
Prof. Surinder Rana is professor of Department of Gastroenterology of Postgraduate Institute of Medical Education & Research, Chandigarh. He received his MBBS and MD degrees from Delhi University. He has 402 research publications with 26 chapters. He is the recipient of many significant awards such as Crystal Award (Don Wilson Award 2006) of the American Society of Gastrointestinal Endoscopy (ASGE), National Academy of Sciences India (NASI) Young Scientist Platinum Jubilee Award 2010, “Shakuntala Amir Chand Award 2006” by Indian Council of Medical Research.
(ICMR) for significant contribution in biomedical research. He is also a member of Editorial Board-Journal of Gastroenterology and Hepatology, Endoscopic Ultrasound, Indian Journal of Gastroenterology, World Journal of Gastrointestinal Endoscopy

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2. PROF. ASIM K. DUTTAROY

Title of the talk: Preventing heart Disease in rural population: Nutrition for gut microbiome

Abstract: The human gut microbiota is an enormous and diverse ecosystem with known functions in nutrition, intestinal epithelial cell health, cognitive function, and innate immunity. Gut microbiota comprised of trillions of typically non-pathogenic commensal organisms, serve as a filter for our most significant environmental exposure - what we eat. Changes in the composition of gut microbiota associated with the disease referred to as dysbiosis, have been linked to pathologies such as atherosclerosis, hypertension, heart failure, chronic kidney disease, obesity, and type 2 diabetes mellitus. In addition to alterations in gut microbiota composition, the metabolic potential of gut microbiota has been identified as a contributing factor in the development of diseases. Recent studies revealed that gut microbiota could elicit a variety of effects on the host. Indeed, the gut microbiome functions like an endocrine organ, generating bioactive metabolites, that can impact host physiology. Microbiota interacts with the host through many pathways, including the trimethylamine/trimethylamine N-oxide (TMA/TMAO) pathway, short-chain fatty acids pathway, and primary and secondary bile acids pathways. In addition to these metabolism-dependent pathways, metabolism-independent processes are also suggested potentially to contribute to cardiovascular disease pathogenesis.

TMAO is a gut microbiota-derived metabolite that enhances both platelet hyperactivity and thrombosis potential in animal models, and TMAO plasma levels predict incident atherothrombotic event risks in human clinical studies. Abnormal plasma lipids also contribute to CVD. Normal platelet activity is the key to the maintenance of hemostasis and normal blood flow. Hyperactive platelets interact with vessel walls by shedding macro-particles, secreting several adhesive growth factors, and inflammatory agents interrupt the blood flow and produce a pro-thrombotic state. TMAO is formed by a gut microbe-dependent metabolism of trimethylamine moiety-containing nutrients, which are abundant in the diet. When gut bacteria break down choline, lecithin, and carnitine-compounds found in particularly high levels in high-fat dairy products, egg yolk, liver, and red meat - the process produces TMAO. However, the production of TMAO can be altered by probiotic and prebiotic administration. Intake of healthy and varied food is important in order to maintain favourable gut flora. The lifestyle and the consumption of an unhealthy food can cause gut flora to become imbalanced through a reduction in the diversity of bacteria. Evidence is increasingly showing that this imbalance in the gut flora may lead to diseases such as CVD, cancer, diabetes, allergies and bowel inflammation. It is particularly food that is rich in fibre such as fruits and vegetables that provides nutrition to the gut bacteria. The different fibres stimulate different bacteria in the gut with
different properties for fibre decomposition and contribute to the creation of favourable metabolites in the gut. Through research into various foods, food components and meals available to rural population, we can help raise awareness of how these foods can contribute to healthy gut flora and good cardiovascular health.

**Biosketch:**

Asim K Duttaroy’s scientific work has been published in over 250 original contributions, reviews, and editorials and 6 books. He has successfully supervised 35 PhD/MD students so far. His research program focuses on the roles of food components such as prebiotic on growth, development, as well as in prevention of diseases such as diabetes, and coronary heart disease. Another area of his research has been the investigation of the fatty acid transport system in human placenta and its roles in placental preferential transfer of critically important nutrients such as docosahexaenoic acid,22:6n-3 (DHA) and arachidonic acid,20:4n-6 (ARA) from the mother to the fetus. DHA and ARA also potently influence the early placentation process by stimulating angiogenesis and this effect is mediated in part via VEGF in first trimester trophoblast cells.

He have several international patents on cardioprotective compounds, that led to the establishment of two international companies Provexis Ltd. UK, IDIA AS, Norway and Genimen Pharmacon, India.

He is the Editor-In-Chief of the peer reviewed journal *Food & Nutrition Research* (Previously known as the Scandinavian J of Nutrition) which has an Impact factor of 2.557 (2018).

He serves on the editorial boards of several other journals, including *Prostaglandins Leukotrienes and Essential Fatty Acids*, *Nutrients*, and *European Journal of Lipid Science and Technology*.

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3. DR. PALLAB RAY

**Title of the talk:** The human microbiome in health and disease

**Abstract:** Human microbiota has been called a black box because of lack of understanding of its composition and role in human health and disease. Post-1995, molecular studies, metagenomics and the Human Genome Project by the NIH revealed that the healthy human microbiome is composed of bacteria, archaea, viruses and eukaryotic microbes whose number exceeds that of human cells. Anaerobes outnumber aerobes by 2-3 logs and hardly 10% of the more than 1000 species have been successfully characterized by culture in vitro. Only six phyla (of >50) comprise 99.99%, of which the Bacteroidetes and Firmicutes dominate. They are unevenly distributed: per gram 10-103 in stomach and duodenum, 104-107 in small intestine and 1011-1012 in large intestine.

Recent knowledge has revealed vital information about the essential functions of gut microbiota in physiology and metabolism in human health. Consequently, it is now known that the gut microbiota performs essential role in metabolism and nutrition, salvage of energy, vitamin synthesis, lipid and micronutrient absorption, amino acid homeostasis, protection, barrier function and immunity, prevention of allergies and the gut-brain axis.

The microbiome has been linked to various physiological and pathological conditions. Scientific experiments have indicated the vital role of the microbiome in systemic metabolic diseases like obesity and type 2 diabetes. The cutaneous microbiome has been linked to psoriasis, atopic dermatitis, acne and chronic skin ulcers. The gastric microbiome has important links to acid peptic disease, MALT tumors, adenocarcinoma, GERD and childhood asthma. The colonic microbiome has been the key factor in irritable bowel syndrome, inflammatory bowel diseases, colonic cancer and Clostridium difficile associated diarrhea (CDAD). The GI microbiota has been linked to non-alcoholic fatty liver disease. Immune anomalies like rheumatoid arthritis has been shown to be controlled by microbes in mice. The microbiome has recently been associated with atherosclerotic cardiovascular diseases.

The recent revelations of dysbiosis and the associated disorders question the universal validity of the age-old Koch’s postulates linking one organism to one disease. This is particularly true in inflammatory bowel diseases and bacterial vaginosis. Life style changes have been found to have potent effect on the human microbiome. Future of healthy microbiome may demand restoration of ancestral microbial ecology as prophylactic and therapeutic interventions. Recent reports of successful management of CDAD by fecal transplant is a classic example of the same.
Biosketch:
Dr Pallab Ray did MBBS in 1980 from Medical College, Calcutta. He did MD (Microbiology) in 1987 from PGIMER, Chandigarh. He was awarded the prestigious Kataria Gold Medal for being the best overall postgraduate of the year. He cleared Diplomate National Board examination in Microbiology in 1989.
He joined Faculty of Department of Medical Microbiology, PGIMER, Chandigarh in 1990 and is presently working as Professor in-Charge, Bacteriology Section. During his academic and research career he has guided more than 150 PhD and MD theses and dissertations. He has 250 publications in indexed journals, mostly international. His special research interest is in antimicrobial chemotherapy, staphylococcal infections, sepsis syndrome, hospital acquired infection and enteric fever. He has special academic interest in medical education and teaching technology.

Dr. Pallab Ray was conferred Dr. SC Agarwal Oration in 2014, the most prestigious award of the Indian Association of Medical Microbiologists. He has been the Principal Investigator of the Nodal Centre for Enterobacteriaceae in the ICMR Antimicrobial Surveillance Network since 2013.

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4. **DR. TRILOCHAN MOHAPATRA**

**Title of the talk:** Agricultural Innovation Pathway for Rural Transformation

**Abstract:** India’s food and nutrition security is under stress due to several inter-related factors that include population growth, urbanization, demographic changes, increased labor costs, high and volatile food prices, natural resource constraints, and climate change. In order to achieve food and nutrition security in the sub-continent, an integrated and more innovative development agenda will have to be adopted in terms of strategies, investments, technologies, institutions, policies and partnerships. One of the pathways that the national agricultural research system in India has is the Krishi Vigyan Kendras (KVKs, the farm science centres) that does frontline extension, also provides agro-advisories to the farmers. Currently all the 713 KVKs have been linked to 3.7 lakhs of Common Service Centres for reaching out to over three crores of farmers. Further, in order to have technological edge towards enhanced productivity and resource use efficiency, the cyber agro-physical systems involving artificial intelligence, block chain technology, and IoT based decision support systems are being explored. The use of Information and Communication Technology (ICT) supports the transmission of localized information and services working towards making farming socially, economically and environmentally sustainable. With a billion plus mobile phone penetration in India, the rise and development of mobile applications (mobile-apps), are not only helping existing government schemes, and other agriculture-based information to reach farmers but also providing solutions to select problems on real-time basis in rural India. This digital change is acting as a game-changer for Indian agricultural conditions. Modern breeding tools for climate resilience and nutritional enhancements, advanced water management practices, use of sensors and automation, innovation-led value addition, ensuring food safety according to global standards coupled with diversified food system, policies for monetizing and supporting ecosystem services, linking farm to fork using new technology, etc are being focused on as important constituents of the proposed pathway. Greater investment, partnership and conducive policy are expected to immensely contribute to this much needed rural transformation.

**Biosketch:**
Dr. Trilochan Mohapatra born on 20th April, 1962 at village Kharibil, Dist. Cuttack, Odisha, India and completed his B.Sc. (Agriculture) from OUAT, Bhubaneswar in 1985, M.Sc. in Genetics from Indian Agricultural Research Institute, New Delhi in 1987 and Ph.D in Genetics from Indian Agricultural Research Institute, New Delhi in the year 1992, is presently holding the position of Secretary, Department of Agricultural Research and Education& Director General, Indian Council of...
Agricultural Research. Prior to this, he worked as the Director of the prestigious Indian Agricultural Research Institute (IARI), New Delhi and the Director of National Rice Research Institute (Formerly CRRI), Cuttack, Odisha and as a researcher & teacher for over 27 years at the National Research Centre on Plant Biotechnology, Indian Agricultural Research Institute (IARI), New Delhi, India. His area of specialization is molecular genetics and genomics.

Dr. Mohapatra has over 170 research papers in national and international journals of repute and several book chapters. His research accomplishments include development of the first high-yielding Basmati rice variety resistant to bacterial leaf blight through molecular marker assisted selection, and physical mapping and genome sequencing of rice and tomato. His contribution to science is reflected from high h-index and i10 index. Dr. Mohapatra’s has been recognized at International level for his professional competence and scientific abilities. He has the distinction of receiving several honours and awards in recognition of his excellent academic and research contributions including the INSA Young Scientist Award, Prof. LSS Kumar Memorial Award, NAAS-Tata Award, IARI-BP Pal Award, DBT Bio-science Award, NASI-Reliance Industries Platinum Jubilee Award, Shri Om Prakash Bhasin Award 2016, IMS Diamond Jubilee Memorial Award 2016, Dr. D. Sundaresan Memorial Oration Award 2017, Prof NG Ranga Memorial Award 2017, ShrikshetraSamman 2018, Parija Award 2018.

He received the Recognition Award of the National Academy of Agricultural Sciences for the biennium 2013-14 for significant contributions in Plant Improvement and also the Lifetime Achievement Award of the Indian Genetics Congress in recognition of outstanding contribution in the field of Plant Genetics and also the Lifetime Achievement Award of the Indian Society of Agricultural Biochemists. Dr. Mohapatra is also the President of Indian Society of Genetics and Plant Breeding, New Delhi (2018-19), Indian Society for Oilseeds Research, Hyderabad (2018-19) and Indian Society of Agricultural Statistics, New Delhi (2018-20).

Dr. Mohapatra is an esteemed Fellow of the Indian National Science Academy, New Delhi, National Academy of Sciences-India, Allahabad and the National Academy of Agricultural Sciences, New Delhi. He has been conferred doctoral degree (honoris causa) by Amity University, Noida; Uttar Pradesh, Orissa University of Agriculture & Technology, Bhubaneswar; Siksha ‘O’ Anusandhan University; YS Parmar University of Horticulture & Forestry, Solan, Himachal Pradesh; Pandit Deen Dayal Upadhyaya Veterinary & Animal Sciences University, Mathura; National Dairy Research Institute (Deemed University), Karnal and Sathyabama Institute of Science and Technology (Deemed University).

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PLENARY SESSION 7

Title: Cancer Research - Therapeutic Applications

I. DR. URI BARASH

Title of the talk: Heparanase: from basic cancer research to therapeutic applications

Abstract: Heparan sulfate proteoglycans (HSPGs) are primary components at the interface between virtually every eukaryotic cell and its extracellular matrix (ECM). HSPGs not only provide a storage depot for heparin-binding molecules (i.e., growth factors, chemokines and enzymes) in the tumor microenvironment but also decisively regulate their accessibility, function, and mode of action. As such, HSPGs are intimately involved in modulating cell invasion and signaling loops that are critical for tumor growth. Heparanase, the sole heparan sulfate degrading endoglycosidase, regulates multiple biological activities that enhance tumor growth, angiogenesis, and metastasis. Much of the impact of heparanase on tumor progression is related to its function in mediating tumor-host crosstalk, priming the tumor micro-environment to better support tumor take and growth. Various studies demonstrate that heparanase expression is enhanced in almost all cancers examined, including various carcinomas, sarcomas, and hematological malignancies. Heparanase stimulates gene expression, autophagy, exosome formation, inflammatory responses, and signal transduction via enzymatic and non-enzymatic activities that dynamically impact multiple regulatory pathways that together promote tumor cell performance and chemoresistance. Numerous clinical association studies have consistently demonstrated that upregulated heparanase expression correlates with increased tumor size, tumor angiogenesis, enhanced metastasis, and poor prognosis. Knockdown of heparanase expression or treatments of tumor-bearing mice with compounds that inhibit heparanase enzyme activity markedly inhibit tumor progression further underscoring the potential of anti-heparanase therapy for multiple types of cancer. Importantly, there is only a single, enzymatically active form of heparanase in humans, it is expressed at very low levels in normal tissues and heparanase knock-out animals exhibit no obvious deficits, implying that inhibition of heparanase will cause minimal side effects in cancer patients, stirring heparanase as an attractive target for anti-cancer therapy. Development of heparanase inhibitors focused on carbohydrate-based, heparin-like compounds of which several are evaluated in
clinical trials for various types of cancer, including myeloma, pancreatic carcinoma, and hepatocellular carcinoma. Heparanase neutralizing monoclonal antibodies inhibit myeloma and lymphoma tumor growth and dissemination in preclinical models. Heparanase-inhibiting small molecules are being developed based on the recently resolved crystal structure of the heparanase protein. By contrast, heparanase-2, a close homolog of heparanase, lacks enzymatic activity, inhibits heparanase activity, and regulates selected genes that promote normal differentiation, endoplasmic reticulum stress, tumor fibrosis, and apoptosis, together resulting in tumor suppression. The emerging premise is that heparanase is a master regulator of the aggressive phenotype of cancer, while heparanase-2 may function as a tumor suppressor.

Biosketch:
Dr. Uri Barash is a senior researcher in the group of Prof. Israel Vlodavsky at the Technion Integrated Cancer Center (TICC). He performed his MSc research under the supervision of Prof. R. Kaempfer (Hebrew University) and Ph.D. thesis under the supervision of Prof. I. Vlodavsky (Technion). Vlodavsky’ lab focuses on heparanase, which is the predominant enzyme degrading heparan sulfate. This enzyme plays important roles in tissue remodeling, cancer metastasis, angiogenesis, inflammation, diabetes, and kidney dysfunction. The main achievement of Dr. Barash PhD research is the identification of a truncated heparanase splice variant (termed T5) lacking enzymatic activity, but still possessing pro-tumorigenic and pro-angiogenic properties, thereby emphasizing the significance of heparanase non-enzymatic activities. Uri also identified novel mechanisms by which heparanase facilitates tumor progression through down regulation of CXCL10 in myeloma and upregulation of CD24 in glioma. Recently, Uri showed that heparanase is an important mediator of mesothelioma progression, and that heparanase inhibitors should be applied as a new therapeutic modality in mesothelioma. His research is published in highly regarded journals including: JNCI, Leukemia, Matrix Biol, FASEB J, PLoS Biol and Cancer Res.

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2. **DR. NAGARAJ NAGATHIHALLI**

**Title of the talk:** Molecular aspects of tobacco smoking, alcohol use and risk of pancreatic cancer

**Abstract:** Pancreatic cancer carries a poor prognosis and is expected to become the second leading cause of cancer mortality by 2030. The dismal outcome in pancreatic cancer is attributed to the inadequate response of tumors to systemic chemotherapy, which offers modest clinical benefits in improving overall survival. The epidemiologic studies have connected several modifiable risk factors to the carcinogenesis of this disease, including smoking, chronic alcohol consumption, and morbid obesity, all of which represent a significant public health burden worldwide. Recent advances into the study of these risk factors have shown that they promote pancreatic tumor growth through modulation of fundamentally distinct cytokine and kinase pathways. Our knowledge of these mechanisms is rudimentary, but is rapidly evolving as the importance of these risk factors in pancreatic cancer becomes more evident. In an attempt to target convergent mediators in these processes, we have identified key driver pathways involved in smoking and/or alcohol-induced tumor development and a potential target for the treatment associated with these risk factor exposures. The association among risk factors exposure on the pancreatic cancer progression is well described; however, our understanding of the molecular drivers that are affected by these pathologic states remains unclear. Our studies have provided fundamental insights into pancreatic cancer development induced by these risk factors and suggest key oncogenic drivers and therapeutic targets in these processes.

**Biosketch:**
Nagaraj Nagathihalli is an Assistant Professor and Scientist at the Sylvester Comprehensive Cancer Center, University of Miami, Miami. He has worked before at Vanderbilt University as a faculty and University of Louisville as a postdoctoral fellow. He was awarded a Ph.D. degree in Biochemistry from the Defence Food Research Laboratory, DRDO, and the University of Mysore, Karnataka, India; following which he moved to the USA in the year 2001. During his scientific career, he has received – Young Investigator Awards; Ed Nelson Research Award; AACR, AICR and APA investigator/travel awards. Mirus Research Award, Society of Gastrointestinal Oncology Educational Award and Stanley Glaser Research Awards.
He was a Managing Editor - Nutrition Journal (for 10 years) and grant reviewer of The Wellcome Trust/ Department of Biotechnology (DBT), India; Leading Fellows Program Office TU Delft, The Netherlands; Catalan biomedical research funding program; Qatar National Research Fund, Qatar; National Natural Science Foundation of China and Research Grants Council, HongKong: Kentucky Science and Engineering Foundation (KSEF), USA. He was awarded NIH and American Cancer Society grants. He published more than 45 peer-reviewed research articles in the journals: Cancer Research, Gastroenterology, Clinical Cancer Research, and Molecular Cancer Therapeutics; more than 100 abstracts were presented in the conferences/symposia.

Pre-clinical work from his work has been instrumental in moving some targets such as Src and EGFR to phase I/II clinical trials and STAT3/MEK with PD-1 to phase 1 clinical trial in pancreatic cancer.

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3. PROF. SATHEES C. RAGHAVAN

Title of the talk: The two faces of G-quadruplex DNA: Role in chromosomal fragility and radioprotection

Abstract: DNA, the fundamental hereditary unit of a human cell, is organized into 23 pairs of chromosomes and exists in Watson-Crick base paired B-DNA form. Recent studies suggest that DNA can also exist in non-B forms, such as four stranded G-quadruplexes (G4), which harbor Hoogsteen-hydrogen bonding between consecutive guanine residues. The number of G4-forming motifs in humans ranges from 350,000 to 700,000 and are found in telomeres, gene promoters, rDNA etc. During my talk, I will explain the dual roles of G-quadruplex DNA structures in chromosomal fragility as well as radioprotection of certain regions of DNA. In the first part, the involvement of G4 DNA during the generation of chromosomal translocations associated with various leukaemias and lymphoma will be discussed. In the second part of my talk, I will emphasize on the natural shielding effect of G4 DNA when a cell is exposed to ionization radiation.

Biosketch:
Prof. Sathees C. Raghavan obtained his PhD from Banaras Hindu University, India and then went on to do his postdoctoral research from the University of Southern California, Los Angeles, USA. His research group at Indian Institute of Science (IISc), Bangalore focuses on deciphering mechanism of genomic instability in leukemia and lymphoma. Besides, his group also explores the role of immune system in the genesis of chromosomal abnormalities, DNA repair and cancer therapeutics. He has published over 130 research articles in internationally peer-reviewed journals, and has obtained several patents. Dr. Raghavan is the recipient of several awards including Shanti Swarup Bhatnagar prize (2013), Leukemia Research Foundation (USA), Kobayashi Foundation Award (KFA), 2016, NASI-Reliance Industries Platinum Jubilee Award (2015). He is also a “Fellow” of National Academy of Sciences, Allahabad and Indian Academy of Sciences, Bangalore. He is currently an Editor of FEBS Journal, UK.

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Title: Nano Materials for Energy, Environment and Health Care

I. PROF. AJAYAN VINU

Title of the talk: Functionalized Nanoporous Carbon Based Materials for Energy and Environmental Applications

Abstract: Innovative approaches to translate basic nanomaterials research into real-world products are critical for our future. Nanotechnologies can deliver successful energy, environment and health solutions - such as converting carbon dioxide into clean fuel with only sunlight and water, developing innovative devices for energy storage and conversion, and designing next-generation drug delivery system for cancer treatment. In this talk, I will present the development, capabilities, and current and future applications of various advanced nanoporous architectures in clean energy generation and carbon capture. Much focus will be given on the design of novel advanced nanoporous architectures for the next generation clean energy storage and conversion system with the easily available resources including sunlight, water and CO₂. I will also present various methods including soft and hard templating approaches coupled with the polymerization of different aromatic and/or aliphatic carbon and high nitrogen containing molecular precursors that have been adopted for the fabrication of advanced nanoporous semiconducting nanostructures with tunable chemical composition and structures. Much focus will be given to the structural determination of these novel materials with unique chemical structure as they play key role in determining the final performance of these nanostructures in various applications. The relation between the structural parameters and the performance of these materials in various applications including catalysis, sensing, and carbon capture and energy storage will be demonstrated. In the second part of the talk, the fabrication of various nanoporous films including carbons, nitrides, semiconducting nanostructures, and biomolecules with tunable macroporosity, thickness, and morphology and their applications in sensing of different toxic molecules will be presented.

Biosketch:
Prof. Vinu is currently working as a Global Innovation Chair Professor and Director of Global Innovative Center for Advanced Nanomaterials at the University of Newcastle and made a significant contribution in the field of nanoporous materials and their application in sensing, energy storage, fuel cells, and catalysis. His contribution has led to ca. 400 papers with 17,900 citations and H-index of 71, and more than 30
patents. The quality of his research has been recognised with several international awards including Medal, Chemical Research Society of India 2018, SPARC award 2019, C.N.R Rao Lectureship award 2019, Medal and KY NIEM CHUONG Award 2018, Scopus Young Researcher Award 2014, Friedrich Wilhelm Bessel award by the Humboldt Society (2010), JSPS Senior Invitational Fellow for the year 2014, Australian Future Fellowship (Professorial Level) for the year 2010, Indian Society for Chemists and Biologists award for excellence for the year 2010, Catalysis Society of India Young Scientist award for the year 2010, Chemical Society of Japan Award for the Young Scientist for the year 2008, Laureate of Khwarizmi International Award 2008, Asian Excellent Lectureship Award, and ICYS fellowship. Prof. Vinu is honoured with the Fellow of Royal Society of Chemistry, FRSC (UK), Fellow of Royal Australian Chemical Institute (FRACI), Fellow of World Academy of Ceramics (FWAC), Fellow of World Academy of Art and Science (FWAAS), Fellow of Asia-Pacific Academy of Materials (FAPAM) and Foreign Fellow of Maharashtra Academy of Sciences, FFMAS. He is the Editor of Science of Advanced Materials and Australian Editor of Journal of Nanoscience and Nanotechnology

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2. **DR. ZHUBING HE**

**Title of the talk:** Interface Engineering for NiO based Inverted Planar Perovskite Solar Cells

**Abstract:** Organic-inorganic lead halide perovskites have been discovered with exceptional optoelectronic properties to play an exciting role in cutting-edge photovoltaics and light emission. Among them, inverted planar perovskite solar cell (PSCs) has attracted increasing attention owing to its simpler device structure and more facile process along with little hysteresis, compared with the normal PSCs with mesoporous structure. NiO acts as a stable and promising hole transport layer (HTL) of the inverted planar PSCs, which shows huge potential in its future commercialization. However, the charge transfer especially at the interfaces always determines the device performance even though it owns high quality perovskite absorber layers. In this talk, we would summarize our recent progress of interface engineering on both HTL and electron-transport layers (ETL) for NiO based inverted planar perovskite solar cells. Basing on those efforts, the conversion efficiency of our champion device has approached 22%, beating the world record of inverted planar PSCs. Our discoveries definitely deepen our understanding of working principles behind the improvement in device performance and pave a new way to commercialize the promising perovskite photovoltaics.

**Biosketch:**
Dr. Zhubing He is currently a tenured associate professor in School of Materials Science & Engineering at Southern University of Science and Technology (SUSTech, China) in Shenzhen City of China. He received his PhD in City University of Hong Kong (CityU) in 2009. After working as a research scientist to develop HIT photovoltaics in industry for 3 years, he joined SUSTech since 2012. He published over 80 peer-reviewed papers on solar energy conversion. His current research focuses on efficient solar energy conversion technology, including perovskite solar cells, high efficient hybrid and heterojunction solar cells, spectrum splitting and accumulation of solar photons via nanophotonics, heat transfer and storage via low-cost and composited phase change materials, full spectral solar electricity by both photovoltaics and solar thermal.

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3. **B.N. CHANDRASHEKAR**

**Title of the talk:** Green Transfer Method of CVD grown Graphene for Transparent and Flexible Electrodes

**Abstract:** Transfer of graphene grown on metal substrate by chemical vapor deposition (CVD) to plastic substrates is significant for its functional application in flexible electronics and optoelectronics. Our work, Green Transfer method is demonstrated to transfer large-area CVD-grown graphene from copper foil onto transparent ethylene-vinyl acetate copolymer/polyethylene terephthalate (EVA/PET) plastic by surface-energy-assisted delamination in hot deionized (DI) water. This technique is based on mechanical separation of graphene and copper by the penetration of water between hydrophobic graphene film and hydrophilic native copper oxide layer without any chemical etchant, leaving the etching-free transfer process clean, fast, and economic. What’s more, the copper foil after transfer can be reused for graphene growth. The graphene/EVA/PET film is directly utilized for the fabrication of arched-shaped transparent and flexible triboelectric nanogenerator. The nanogenerator can be integrated into wrist to accumulate the mechanical energy of body movement as a wearable energy accumulator. The low-cost, high-conformal, clean and roll-to-roll transfer process may accelerate the practical application of graphene in industrial scales.

**Biosketch:**
Bananakere Nanjegowda Chandrashekar is currently working as a Research Assistant Professor at Southern University of Science and Technology, Shenzhen, China. He received his Ph.D. in 2013 from Kuvempu University, Karnataka, India. Then he joined as postdoctoral fellow at Peking University, Beijing in China with Prof. Zhongfan Liu. His research interest includes the fabrication of transparent & flexible electrodes for energy conversion/storage devices, and synthesis of functional electrode active materials and their applications in lithium ion batteries. Now, he has published over 50 SCI papers including Advanced Materials, Nano Letters, ACS Nano, Nano Energy, Colloids and Surfaces B: Biointerfaces, Journal of Colloid and Interface Science, Scientific Reports, which have been cited over 1150 times with H-index 20.

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4. PROF. DINESH RANGAPPA

Title of the talk: Recent Progress in Nanostructure Electrode Materials for Energy Generation and Storage Applications

Abstract: Progress in nanotechnology is stimulating the development of innovative materials with advanced functions. With such advanced functional materials, it is possible to realize extremely efficient nanostructured materials for Energy storage, solar energy convertors and Hydrogen generation systems, which is based on functional atomic or molecular materials that would have great societal impacts. Recently, rapid progress in synthetic approach to design and development of hierarchical functional nanostructures with controlled properties has lead to development of novel process and materials. In the present study we present advancement in sub/supercritical fluid process in developing various functional nanomaterials and their application in energy storage, generation and some environmental application.

Biosketch:
Prof. Dinesh Rangappa received his M.Sc (Environmental Science, 1998), Ph.D (Environmental Science) from University of Mysore and Dr. Engg., (Materials Science and Engineering, 2004) from Tokyo Institute of Technology, Yokohama, Japan. Currently, he is serving as Professor and Program Coordinator, Department of Nanotechnology, Centre for Post Graduate Studies (CPGS), Visvesvaraya Technological University (VTU), Muddenahalli Campus. Prof. Dinesh Rangappa is well known among the National and International Scientific and academic community for his expertise in Nanotechnology, Materials Science and Engineering, Environmental Science, Materials Chemistry and Nanochemistry. He has immensely contributed in novel process development for nanomaterials synthesis and production, design and engineering of functional Nanomaterials for Energy storage, Photocatalysis, Photoluminiscient, Inorganic Pigment, Waste water treatment, and Biomedical applications. He has also extensively worked on Li-ion battery electrode materials and device fabrication, Nano-sensors and Solar cells development. He has spent about 10 years in Japan and has travelled extensively across the world. During his short tenure at VTU, he has established state-of-art research Center for Nanotechnology at VTU, VIAT, Muddenahalli
Campus. He has been closely working with various institutions/colleges across Karnataka, under VTU to spread and establish nanotechnology academic and research centers. He has a vision of establishing world class research facility at VTU to provide opportunity for under creamy layer and under developed region students, and covert them to skilled and qualified human resource to contribute to national need in the area of nanotechnology.

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Title: Infertility in Rural Women of India- Causes, Prevention and Treatment

I. DR. SURESH KATTERA

Title of the talk: Low cost fertility treatments for rural India

Abstract: Infertility affects 10-15% of infertile couples of reproductive ages which translates to >20 million couples in India. Infertility is a social problem in India irrespective of their social and economic status. Advanced fertility treatments like IVF ICSI is too expensive and only a small percentage of them can afford such treatment. Hence a large majority of them remain untreated. It is important to focus on providing affordable basic treatment to these large majority of couples. Currently available treatment requires infrastructure and trained personnel even to perform simple intrauterine inseminations. How basic infertility treatments can be made available to large majority of low socioeconomic background couples in rural India will be discussed during the presentation.

Biosketch:
Suresh Kattera is Director, Asia-Pacific Institute of Embryology (ASPIER offers MSc in Clinical embryology & Pre-implantation Genetics under the University of Mysore). He is also Scientific Director, Pearl-Singapore Fertility Centre & Research Institute. He has got more than 25 years of experience and has several achievements in the field of IVF. He was a team member of the first ever ovarian tissue transplant performed in Singapore and probably in Asia (2011). He is first in the world to show rescue ICSI can be performed after 6 hours. He reported the world’s first birth after enucleation of tri-pronuclear zygotes (removal of extra male pronucleus). He is the first in the world to modify slow freezing method to show frozen embryos have higher success than fresh embryos. He has achieved first vitrification live birth in Singapore and probably in Asia in 2001. He has showed for the first time in the world 4 types of pronuclear orientation in the zygotes. He has achieved highest pregnancy in Singapore among all the Centres in Singapore. He is also a manuscript reviewer for various journals.

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2. DR. HRISHIKESH D. PAI

**Title of the talk:** Infertility and Education for Rural India

**Abstract:** Over 30 million people are facing infertility issues in India and the numbers are rising significantly each year. Various assisted reproductive technologies have made it possible to treat almost all forms of infertility issues, and help such couples to achieve pregnancy. The treatment of infertile couples is crucial due to many factors including the social pressure faced by women, especially in rural areas. The cause for this could be lack of empowerment and self-reliance, however the need for experiencing motherhood remains the same for rural as well as urban women. The talk explores various modalities of treatment beginning from patient selection, pre-ART therapy, ovulation and stimulation protocols and also explains several techniques of ART such as IUI, IVF, ICSI etc. The major breakthrough of PGD/PGS techniques will be discussed along with its implications in our society, more so in rural/tribal areas where sickle cell anaemia, thalassemia etc. are prevalent. We would also discuss the ways and means of trying to reduce the cost of fertility treatments without compromising on quality. The big challenge for the fertility clinics is to be cost effective while providing state-of-the-art technologies to patients to give them their best chance of pregnancy, without jeopardizing patient safety.

**Biosketch:**
DR Hrishikesh Pai, MD, FRCOG (UK), MSc (USA), FCPS, FICOG, is one of the country's leading gynecologists. His preeminence in the field of Gynecology has enabled him to achieve the premier position as the Past Secretary General of the Federation of Obstetric and Gynaecological Societies of India (FOGSI) which is one of the largest organizations of professional doctors in the country consisting of 33,000 Gynaecologists. Previously Dr. Pai was the Senior Vice President of FOGSI in 2006. Dr Pai has been awarded with the esteemed Fellowship ad eundem of the RCOG (Royal College of Obstetricians and Gynaecologists, London UK). He is the first doctor in India to introduce numerous innovations in medical fields such as assisted laser hatching, spindle view, ovarian tissue freezing for cancer patients, oocyte freezing, IMSI and embryoscope. In appreciation of his enormous contributions, the international agency Frost & Sullivan bestowed upon him the best IVF group in India award in 2013. In appreciation of his work Dr Pai got elected as the Member – Board of Directors of the World body of Infertility namely International Federation of Fertility Societies (IFFS) : a first for an Indian. He is now re-elected as Director - Corporate Affairs for IFFS and been on Editorial Board of Global Reproductive Health IFFS Surveillance 2019.
He has had many articles and research papers published in national and international books and journals and have delivered more than 500 guest lectures all over India and abroad. He is also been invited as an expert to suggest changes to the ART Bill 2013 by the ICMR, New Delhi in 2014. In appreciation of the yeoman scientific, medical and community service, Dr Pai has been the recipient of numerous awards such as the Rashtriya Ekta Award, Indian Medical Association (Mumbai West) Best Doctor Award, Navshakti Newspaper Award, Jai Hind College Alumni Award, RK Trust Award, Medscape India National Award, Lions International Gold Award, Ferticon.

Life Time Achievement Award, Dr Kanak Goel National Indian Medical Association Award, Healthcare Leader of the Year 2017 at Pharmaleaders Business Leadership Awards, Mumbai, Doctor of the Year Award by IMA (Indian Medical Association) at Centenary Celebrations of Medical Conferences in India in 2017, Chikitsa Ratan Award by Indian Medical Association South Delhi, Social Entrepreneurship Award for Outstanding Contribution to Saving Mothers by the USAID (United States Government Aid Agency) & MSD for Mothers, MGA (Mahanagar Global Achievers) Award New Delhi for Best IVF Centre 2018.

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3. **DR. KAMINI A RAO**

**Title of the talk:** Overcoming gender biases in rural India

**Abstract:** Gender bias and discrimination against women has been a pervasive and long running phenomenon that India has witnessed over centuries. Though 21st century has witnessed women coming out of the four walls and dominate every field, India’s progress towards gender equality, measured by its position on rankings such as the Gender Development Index has been disappointing, despite a fairly rapid rates of economic growth. So why is the gender bias still persisting? And is it only in rural India? An estimated 239,000 girls under the age of five die in India each year due to neglect linked to gender discrimination. The cultural institutions in India, particularly those of patrilinearity and patrilocality, play a central role in perpetuating gender inequality and ideas of gender appropriate behavior. A culturally ingrained parental preference for sons-emanating from their importance as caregivers for parents in old age- is linked to poorer consequence of daughters. The dowry system is another institution that disempowers women. An affirmative action is required at every level in the society to overcome this taboo so that our daughters and their generations don’t suffer this discrimination. There is clearly a need for policy initiatives to empower women. The unique policy experiment at village level that mandated one third representation for positions in local leadership has shown promising results. Female leaders serve as role models to raise educational and career aspirations for adolescent girls. Equalizing land inheritance between sons and daughters is another way of bringing about a change in the society where sons dominate. Improvements in labour market prospects also have the potential to empower women by educating them the opportunities and options for self sustainability. This can lead to increase in age at marriage and child bearing, drop in desired number of children, increase in school enrolment. It’s not just about educating our women and daughters, it’s also about teaching our sons the importance of gender equality that will go a long way in changing future. Gender equity is not just about rights to education, employment or political representation. It is also about care, nutrition of girls, and ultimately survival. Remember, we cannot all succeed when half of us are held back.

**Biosketch:**
One of India’s foremost obstetricians & gynecologists and a recipient of the Padmashree, Dr. Kamini Rao is a pioneer of the assisted reproduction fraternity in India. She has always been a relentless crusader for the fundamental right to give birth and with this goal founded one of India’s leading fertility chains “Milann”, formerly known as BACC Healthcare, a brand synonymous with high standards of clinical quality,
medical expertise, excellent patient care and success rates comparable with the best in the world. Dr. Kamini Rao being academically oriented has authored nearly 50 medical textbooks and a large number of journal and chapter publications. Dr. Kamini Rao served as President of the All India Federation of Obstetric and Gynaecological Societies (FOGSI) in the year 2000 as well as the President of the Indian Society for Assisted Reproduction between 2006 and 2008. She has the distinction of simultaneously serving as the FOGSI representative to the International Federation of Obstetrics & Gynaecology and the Asia Oceana Federation of Obstetrics & Gynecology.

She has been honoured with the **Lifetime Achievement Award** by the Indian Society for Assisted Reproduction and the Federation of Obstetric & Gynaecological Societies of India and recognized as one of the foremost Women Obstetricians/Gynaecologists by the International Federation of Obstetrics & Gynecology. Dr. Kamini Rao has also been awarded the **Honorary Ph.D.** from Bangalore University by Vice President of India.

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4. **DR. PRASHANT NADKARNI**

**Title of the talk:** Infertility in Asia- Failing the Masses.

**Abstract:** Across the world fertility rates are falling and Asia is no exception. Technology is bringing changes to the way infertility is managed medically but all the solutions are developed by technology and pharmaceutical companies in the West. Patents, currency exchange rates and medical insurance make these treatments affordable to their patients but once translated into local needs these become too expensive for all but the wealthy in most developing Asian countries. It is time for a radical rethink of how we approach this problem. Based on local requirements so that we can make fertility treatment accessible and affordable for all.

**Biosketch:**
Dr. Prashant Nadkarni is Medical Director of KL Fertility which is part of Monash IVF (a large Australian IVF provider). He received his MBBS in 1982, MRCOG in 1989 and FRCOG in 2001. He is IVF Specialist since 1989. He is one of the Monash IVF Group Medical Advisory Committee member, President of MSART (Malaysian Society of ART) and advisor to Ministry of Health Malasia.

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PLenary Session 10

Title: Materials Science and Technology for Rural Development

I. DR. PULICKEL AJAYAN

Title of the talk: Nano Engineered Materials

Abstract: The last two decades in materials science have been dominated by spectacular discoveries in nanotechnology, specifically by the high impact provided by materials such as carbon nanotubes and graphene. This talk will focus on some of these developments and in particular the challenges and opportunities in designing and synthesizing nanoengineered materials. I will use the recent excitement in the development of two-dimensional materials as case in point. There has been tremendous interest in recent years to study two-dimensional (2D) atomic layers which form building blocks of many bulk layered materials. Several aspects that include synthesis, characterization and manipulation will be discussed conveying the objective of achieving 2D functional nanostructures. The concept of nanoscale engineering and the goal of creating new artificially stacked van der Waals solids or 3D constructs will be discussed through a number of examples including graphene and other 2D layer compositions. Some of anticipated applications of these materials will also be discussed.

Biosketch:
Professor Ajayan earned his B. Tech in metallurgical engineering from Banaras Hindu University in 1985 and Ph.D. in materials science and engineering from Northwestern University in 1989. He joined the Mechanical Engineering and Materials Science Department of Rice University, as the Benjamin M. and Mary Greenwood Anderson Professor in Engineering from July 2007. From 2014, he is the Founding Chair of the new department of Materials Science and NanoEngineering at Rice University. Professor Ajayan's research interests include synthesis and structure-property relations of nanostructures and nanocomposites, materials science and applications of nanomaterials, energy storage, and phase stability in nanoscale systems. He has published one book and 850 journal papers with over 170,000 citations and an h-index of 174, based on ISI database. He has delivered more than 375 Plenary,
Keynote and Invited talks and Theme Lectures, at several international conferences. Ajayan has received several awards including the Spiers Memorial Award by the Royal Society of Chemistry (UK), Senior Humboldt Prize, MRS Medal, Scientific American 50 recognition. He has been elected as a fellow of the Royal Society of Chemistry (UK), AAAS, foreign fellow of the Mexican Academy of Sciences and National Academy of Sciences (India), and has been elected honorary member of Materials Research Society of India and the Indian Institute of Metals. He is on the advisory editorial board of several materials science and nanotechnology journals and on the boards of several nanotech companies. He has been part of two Guinness Book of World records, one for the creation of the smallest brush and the other for creating the darkest material.

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2. PROF. K. BYRAPPA

**Title of the talk:** Molecular Engineering of Direct Z-Scheme Multi-Functional Metal Oxides Heterostructures

**Abstract:** In the last one decade, the metal oxides and their heterostructures are being investigated extensively from a different perspective for properties tuning. The author proposes strategies for properties tuning of metal oxides and their binary, ternary and quaternary metal oxide heterostructure nanostructures using a facile hydrothermal method. Also *in situ* surface modification using a variety of surfactants – both organic and natural plant extracts has been employed to obtain desired properties. However, these metal oxides pose a major challenge owing to some serious drawbacks with respect to the application of pure metal oxides due to higher rates of charge carrier–recombination. This facilitates the absorption of only a small percentage of the solar spectrum in the UV region owing to the wide bandgap and restricts their photocatalytic applications under the visible-light illumination. In contrary, metal oxide heterostructure nanocomposites have superior properties for photocatalytic and electrocatalytic applications due to efficient separation of photo-induced electrons and holes of the photocatalysts, caused by the vectorial transfer of electrons and holes. Binary, ternary and quaternary metal oxide heterostructure nanocomposites with tailor made structures and properties have been carefully engineered through an appropriate selection of the process parameters involving several theoretical calculations. MoS$_2$-Bi$_2$S$_3$-TiO$_2$ heterostructure nanocomposites illustrate higher ability to split water into H$_2$ and O$_2$ under simulated sunlight irradiation without any sacrificial agents or co-catalysts of excellent photostability, better photocatalytic activity under sunlight for the degradation of phenol. Similarly Ag-ZnO exhibits higher antimicrobial activity, antioxidant activity with less cytotoxicity and efficient photocatalytic properties.

An attempt has been made to generate oxygen vacancies through self-doping in these metal oxides, which is an innovative concept in metal oxides research. These studies introduce fundamental insights into the *molecular engineering of metal oxides and heterostructure metal oxides through one-step facile solution processing to properties tuning for environment, energy and health applications.*

**Biosketch:**

Prof.K. Byrappa, obtained his Master’s degree from the University of Mysore, India with Ranks and Gold Medals, and then received Ph.D. and Post-Doc experience both from Moscow State University, Russia. He has served as Vice Chancellor of Mangalore University, and currently
working as the Pro-Vice Chancellor of Adichunchanagiri University, India. He is specialized in Materials Science, Nanotechnology, Chemistry of Materials and Crystallography. He has successfully guided 22 students for their Ph.D. degrees. He has some of the most highly cited papers to his credit. He was the founder Coordinator of the M.Tech. course in Materials Science, Centre for Materials Science and Technology. Prof. Byrappa has worked in several international laboratories abroad. A renowned academician and researcher Prof. Byrappa has over 7500 citations and 423 research publications in international peer reviewed journals and is one of the renowned authorities in the world on hydrothermal technology. He has over 34 book chapters and reviews, and has edited 9 books and authored a famous *Handbook of Hydrothermal Technology*, published by Elsevier Publishers, UK in two editions. He is an Elected Fellow, Royal Society of Chemistry (FRSC), London, UK, Elected Fellow of World Academy of Ceramics, Italy, Elected Fellow of Asia Pacific Academy of Materials. Prof. Byrappa has received several national and international awards. In the year 2017, he was awarded Sir CV Raman Birth Centenary Award by the Hon’ble Prime Minister of India.

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3. PROF. B.V.R. CHOWDARI

Title of the talk: Advanced Materials for Sustainable Development

Abstract: Discussion on the role of advanced materials in finding solutions for the challenges faced by the current society and the way forward is the main theme of this presentation. In the process, the concept of sustainable development and the materials as technology enablers will be brought out. Human behavior and the need to change it through greater awareness and educating all the connected ones will be emphasized. A paradigm shift in materials science research and teaching is proposed. Some results on energy storage aspects obtained from the work carried out at the author’s laboratory will be presented.

Biosketch:
Dr. B.V.R. Chowdari obtained Ph.D degree from IIT Kanpur, Doctor of Literature (Honoris Causa) from the Mangalore University and the Doctor of Science (Honoris Causa) from the K.L. University. He served as Professor at both National University of Singapore (NUS) and Nanyang Technological University (NTU) Singapore. Currently he is the Director, NTU – India Connect, a special initiative of NTU, Singapore. Dr. Chowdari was conferred the titles of the “Officer in the Order of Academic Palms” by the French Government and the “Business Event Ambassador” by the Government of Singapore. He is the Honorary Fellow of the Andhra Pradesh Academy of Sciences, Academician and Vice-President of the “Asia Pacific Academy of Materials”. He served as the President of the “International Union of Materials Research Societies (IUMRS)” and the “Asian Society for Solid State Ionics”. Currently he is the President of the Materials Research Society of Singapore. His research interests lie in the development of electrode and electrolyte materials for energy storage applications including Lithium Ion Batteries. He has published 419 papers in regular journals or conference proceedings and trained more than 20 students for Ph.D degree. He has 19,104 citations with h-index of 72. He is on the Editorial Board of a number of international journals. He is one of the Global Highly Cited Researchers 2018.
listed by Clarivate Analytics. His current administrative responsibilities include fostering research collaborations between NTU Singapore and the Indian Universities and Institutes of Higher Learning. He is a member of the Board of Management of SRM University, AP – Amaravati, India; Vel Tech University, Chennai; India, and the Vignan University, Guntur, India. He is also a Member of the Board of Governors of the Viswakarma University, Pune, India. He has the honor of being the Chief Guest at the Convocations of the K L University and the University of Mysore.

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PLenary Session 11

Title: Materials Science and Technology for Rural Development

1. PROF. MARTIN HARTMANN

Title of the talk: Tailored Design of Nanoporous Functional Materials

Abstract: Advanced nanoporous molecular sieves are interesting materials for a wide range of potential applications. In the last decade, hierarchical zeolites as well as porous coordination polymers (metal organic frameworks, MOFs) have been identified as a novel classes of nanoporous materials which play a major role in the development of advanced technologies for energy storage, air and water treatment, sensing, separations, catalysis and medicine. MOFs are inorganic-organic hybrid materials comprised of metal clusters linked by organic ligands principally through coordination bonds. In particular, their modular design allows a rational construction of tailor-made pore systems, which can be adjusted in form and function to the interacting molecules. The synthesis and properties of selected MOFs will be discussed with respect to potential applications in catalysis, olefin/paraffin separation and energy storage.

Hierarchical zeolites have received increasing intention in the last decade mainly due to their outstanding catalytic performance. They combine the intrinsic catalytic properties of conventional zeolites and the facilitated access and transport in the additional meso- or macropore system. Novel synthesis routes that allow the preparation of hierarchical zeolites with tunable porosity, i.e. the synthesis of multilamellar as well as zeolites with additional macropores, will be presented. The tailor-made materials have shown outstanding performance in selected catalytic reaction.

Biosketch:
Martin Hartmann is Director of the Erlangen Catalysis Resource and Professor of Catalysis at FAU Erlangen-Nurnberg, Germany. He was born in 1965 and obtained his Ph.D. degree in Physical Chemistry from TU Dortmund in 1993. Martin Hartmann held post-doc positions at the University of Houston (TX, USA) and the University of Stuttgart (Germany). He became Assistant Professor of Chemical Technology at TU Kaiserslautern in 2002. Prior to joining FAU as Full Professor in 2009, he has been Professor
of Advanced Materials in the Department of Physics at University of Augsburg, Germany from 2005 to 2008. Martin focusses on the synthesis, characterization and industrial application of porous materials such as zeolites, mesoporous silicas and carbons as well as metal organic frameworks (MOF) in energy storage, separation and heterogeneous catalysis. He uses infrared spectroscopy as well as solid state NMR and ESR spectroscopy for the characterization of nanoporous materials also under in-situ and operando conditions. His research work resulted in more than 250 publications in scientific journals and an H-index of 51 as well as several patents. In 2018, he received the Richard A. Glenn award from the ACS Energy and Fuels Division. He serves on the board of the International Zeolite Association (IZA) since 2016 and became its President in 2019.

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2. PROF. KESTURU S GIRISH

Title of the talk: Berberine Mitigates High Glucose-Potentiated Platelet Aggregation and Apoptosis

Abstract: Intravascular hemolysis (destruction of RBCs) is a critical event observed in many clinical conditions including malaria, paroxysmal nocturnal hemoglobinuria (PNH), sickle cell disease (SCD), hemolytic anemia and sepsis. However, its pathophysiological significance is not well understood. Hemolysis results in the release of hemoglobin (Hb) and heme into the circulation, which leads to undesired redox reactions and severe oxidative stress. It is known that free heme can increase the levels of reactive oxygen species (ROS) through Fenton-type reactions, leading to cytotoxicity. Heme activates coagulation cascade and P-selectin expression, and also induces the formation of Neutrophil Extracellular Traps (NETs), which together can lead to thrombo-vascular complications. In this study, for the first time, we demonstrate that hemin induces platelet activation and death via a ferroptosis-like mechanism, which in turn leads to the activation of neutrophils and subsequent release of NETs. Thus, ferroptosis, platelet activation and formation of NETs may contribute to the thrombosis-mediated vascular damage. Although the involvement of hemin in thrombosis has been studied in hemolytic conditions, we report for the first time that hemin-mediated generation of lipid-ROS and ferroptosis-like events are responsible for the initiation of thrombotic complications via platelet activation. Further, we demonstrate that Ferrostatin-1, a ferroptosis inhibitor, significantly attenuates hemin-induced cytotoxicity both in vitro and in vivo, indicating that the regulation of ferroptosis-like process in platelets can be considered as a potential strategy to treat hemolytic disorders.

Biosketch: Girish S Kesturu is a Professor in the Department of Studies and Research in Biochemistry at the Tumkur University, Tumkur, India. He earned his Ph.D. from the University of Mysore in 2004, then conducted post-doctoral research at the University of Pittsburgh, Pittsburgh and University of Virginia, Charlottesville in USA from 2004-2007. Before joining the Tumkur University, he was an Assistant Professor in the Department of Biochemistry at the University of Mysore, Mysore, India. He has over 100 publications in the areas of Platelet biology, Snake Venom Pharmacology, and Chemical biology. His research is focused on understanding the platelet functions at different pathophysiological conditions including hemolytic disorders and diabetes and arthritis. He is also working to understand the mechanism for sustained tissue necrosis at the bitten site during viper bites.

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3. PROF. RAVINDRA PANDEY

Title of the talk: Photo- and Ultrasound Triggered Multifunctional Nanoparticles for the Treatment of Glioblastoma.

Abstract: Both photodynamic therapy (PDT) and sonodynamic therapy (SDT) treatment of various types of cancers, including glioblastoma are based on external stimulation. The former, uses light and a photosensitizer (PS) is known for decades while the latter requires ultrasound (US) to excite the photosensitizer is still an emerging concept. In contrast to light, the US has no limitation in depth of tissue penetration. We have shown that formulation of certain PSs in a non-toxic and biodegradable polyacrylamide-based nanoparticle (NP) enhances their tumor-imaging and therapeutic potential. The focus of our research has been to develop certain target-specific multifunctional NPs and investigate their utility in the treatment of glioblastoma in combination of PDT &SDT with and without chemotherapy.

The success of polyacrylamide nanoparticles (PAA NPs) in drug delivery spurred the creation of novel variations in surface functional groups. We propose a simple, reproducible, efficient, and novel approach for the creation of modifiable nanoparticles that are characterized by their long-term stability and high loading efficiency. In our experiments, hydrophobic photosensitizers, such as HPPH and other proposed PS were able to be post-loaded at more than 90% efficiency across all types of PAA-based NPs. Moreover, the NPs have tunable release kinetics; ranging from 9% to 23% released by 96 hours in 1% serum albumin, depending on the surface modification used. The overall goal of this project is to develop an all-in-one NP for cancer imaging and therapy. The initial in vitro and in vivo results are quite promising and provide an opportunity not only to clarify the true extent of the tumor margin, but also to destroy any non-resectable tumor tissue. The synthesis and biological efficacy of the non-toxic polyacrylamide-based NPs will be discussed.

Biosketch:
Dr. Ravindra K. Pandey, Distinguished Member, PDT Center, Professor of Oncology and Director of Pharmaceutical Chemistry at Roswell Park Cancer Institute, is a trained medicinal chemist with extensive experience in drug design, drug delivery, molecular recognition, and tumor diagnostics. He was awarded Ph.D. under Prof. B. C. Joshi, University of
Rajasthan, Jaipur, India. After a Post Doctoral training at U. C. Davis, University College, Cardiff, U. K., he joined Roswell Park Cancer Institute Buffalo in 1990. He has been working on photodynamic therapy, cancer-imaging (PET, Fluorescence and MR imaging), and sonodynamic therapy. One of the photosensitizers (HPPH) synthesized in his laboratory is currently undergoing Phase II human clinical trial of head & neck cancer in the United States. HPPH has received an ORPHAN DRUG STATUS for the treatment of esophageal cancer. The other two candidates: (i) PET-ONCO: for tumor imaging by PET and (II) Photobac, near infrared (NIR) fluorescence-guided surgery with an option of photodynamic therapy of glioblastoma are under consideration at the US FDA for Phase I human clinical trials. Photobac has also received an ORPHAN DRUG STATUS by the US FDA for the treatment of glioblastoma.

Dr. Pandey has published/submitted near 300 research papers, including several review articles, book chapters and has >30 patents (approved & submitted) to his credit. A Handbook on PDT co-edited by him has been published by World Scientific in May, 2016.

He is a member of the Editorial and Advisory Board of several International Scientific Journals. Dr. Pandey has received several awards: The western New York Inventor of the year awards (several), international award on heterocyclic chemistry, award for the excellence in PDT by the International Society of Porphyrins and Phthalocyanines, the American Chemical Society’s Jacob Schoelkopf award, China 1000 Talent Scientists Award for his contribution in translational research, and the Life Time Achievements Award from Who’s Who. Dr. Pandey is the Founder and Chief Scientific Officer (CSO) of Photolitec LLC, a spin-off company of Roswell Park Cancer Institute. His research is “truly” translational, and some of his inventions are already licensed to the pharmaceutical companies located in India, China and the United States. Photolitec, LLC. In collaboration with AMI ORGANICS, India he has also established a joint venture “AMI ONCOTHERANOSTICS” in Buffalo, NY, United States with a goal to initiate global clinical trials of the products developed in his laboratory.

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PLENARY SESSION 12

Title: Emerging Drug Development and Approach to Novel Therapeutics

I. PROF. PETER LOBIE

Title of the talk: Novel Therapeutics in Oncology

Abstract: Theranostics is a useful approach in modern medicine which predicts the efficacy of specific targeted therapies based on the ability to identify responsive patients using specific diagnostic tests. Hence, Theranostics facilitates a transition from conventional medicine to a contemporary personalised and precision medicine approach. Theranostics is also now a widely used approach in drug development in Oncology.

Intrinsic or acquired resistance chemotherapy or targeted therapy is a major clinical challenge impeding successful treatment of various carcinomas which afflict the human population. We have utilized a Theranostics approach which, in collaboration with the University of Mysore, has thus far produced two novel first in class drugs that may address the issues of multidrug resistance in cancer treatment. One compound targets the final endpoint protein (BAD) utilized by the heavily targeted Ras-Raf-MAPK and PI3K-Akt pathways. The second compound targets TFF3, a powerful driver of cancer progression. There is much preclinical research and development work needed to understand the biology and application of these new drugs such that they may be successfully utilized in the clinic. During this presentation I will highlight the mechanisms of action of these drugs and highlight their potential use, particularly in chemoresistant breast and ovarian carcinoma.

Biosketch:
Peter Lobie obtained a B.Med.Sci. (Distinction) and M.B.B.S, (Medicine and Surgery, First Class Honors) from the University of Queensland in Australia. He was awarded the highest accolade from the University in the form of a University Medal. His postdoctoral work was undertaken at the Karolinska Institute in Sweden where he also obtained his doctoral degree (Ph.D.). He has consecutively held faculty positions in Sweden, Singapore and New Zealand. He was also New Zealand’s first chair of Breast Cancer funded by the Breast Cancer Research Trust. Until joining Tsinghua-Berkeley Shenzhen Institute (TBSI) (a collaboration between Tsinghua University and The University of
California Berkeley) as co-Director of the Centre for Precision Medicine and Healthcare Research Centre, he was Professor and Senior Principal Investigator at the Cancer Science Institute of Singapore. Peter Lobie is author of over 180 publications and is an international authority on molecular mechanisms of hormone action with a h-factor of 58. Recent emphasis in his laboratory has focused on the capacity of specific secreted proteins to initiate or progress cancer and thereby evaluation of individual molecules for their potential therapeutic application. He is the inventor on a number of patent families and has been associated heavily with industry during his time in Sweden (Pharmacia), has consulted for Pfizer Inc. and Metabolic Inc. and in New Zealand served as a senior consultant to Neuren Pharmaceuticals as head of their cancer research programme. He was the founding scientist of Perseis Therapeutics Ltd and Sinotar Therapeutics Ltd, two new entities focused on development of therapeutics to novel cancer target molecules. He is/was an editorial board member of Endocrinology and Molecular Endocrinology, among a number of other international journals and served on the Annual Meeting Steering Committee of The Endocrine Society (USA). He has served as a reviewer for more than 50 academic journals and more than 15 local and international granting agencies. He is the recipient of multiple local and international awards and has been appointed a Fellow (Academician) of the Royal Society of New Zealand. He was also recently awarded the Chinese Government Friendship Award, the highest honor given to foreigners from the People's Republic of China.

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2. PROF. LARRY S. SHERMAN

Title of the talk: Novel flavonoids for the treatment of neurodegenerative disease

Abstract: Injury to the central nervous system often leads to myelin damage that causes sensory, motor, and cognitive disturbances. Remyelination is often inhibited or delayed due to the failure of oligodendrocyte progenitor cells (OPCs) to mature into myelinating oligodendrocytes (OLs). We find that digestion products of the glycosaminoglycan hyaluronan (HA) block OPC maturation, and that hyaluronidase activity is directly linked to remyelination failure. We have characterized a novel modified flavonoid that inhibits hyaluronidase activity. This compound, called S3, reverses HA-mediated inhibition of OPC maturation in vitro, an effect that can be overcome by excess recombinant hyaluronidase. Furthermore, we find that hyaluronidase inhibition by S3 accelerates OPC maturation in an in vitro model of perinatal white matter injury. Finally, blocking hyaluronidase activity with S3 promotes functional remyelination in mice with lysolecithin-induced demyelinating corpus callosum lesions. All together, these findings support the notion that hyaluronidase activity originating from OPCs in CNS lesions is sufficient to prevent OPC maturation, which delays myelination or blocks remyelination. These data also indicate that modified flavonoids can act as selective inhibitors of hyaluronidase activity and can promote OPC maturation, making them excellent candidates to accelerate myelination or promote remyelination following CNS insults.

Biosketch:
Larry S. Sherman is a Professor in the Division of Neuroscience at the Oregon National Primate Research Center and in the Department of Cell, Developmental and Cancer Biology at the Oregon Health & Science University in Beaverton, Oregon USA. He is also the President of the Oregon and Southwest Washington Chapter of the Society for Neuroscience. He earned his Ph.D. from the Oregon Health & Science University in 1993, then conducted post-doctoral research at the Institut für Genetik at the Forschungszentrum Karlsruhe in Germany from 1993-1997. Before joining the Primate Center in Oregon, he was an Assistant Professor in the Department of Cell Biology & Anatomy at the University of Cincinnati School of Medicine in Cincinnati, Ohio. He has over 100 publications in the areas of neural development and disease, and serves on numerous national and international scientific panels. His research is focused on understanding how changes in the extracellular matrix influence neural stem/progenitor cell proliferation and differentiation, and how manipulating the matrix can influence
nervous system repair in neurodegenerative diseases. He was recognized as one of the most innovative people in the State of Oregon by Portland Monthly Magazine and the Oregon Museum of Science and Industry, and has won awards for his outstanding teaching and science outreach accomplishments.

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3. PROF. T. GOVINDARAJU

**Title of the talk:** Diagnostic and Therapeutic Strategies for Multifactorial Alzheimer’s disease

**Abstract:** Alzheimer's disease (AD) is a common form of dementia and multifactorial neurological disorder. There are no approved diagnosis or disease modifying therapies for AD. Current treatments are only symptomatic and temporary, and do not directly target the mechanisms underlying the disease pathogenesis. The production, accumulation and aggregation of proteins in the human brain are considered as one of the hallmarks of disease. Oxidative stress, neuroinflammation, mitochondrial dysfunction and microglia contribute significantly to the disease pathogenesis. Reactive oxygen species (ROS) and reactive nitrogen species (RNS) are the major sources of oxidative stress in cells, which damage proteins, lipids, and DNA. In this context, we have adopted multipronged strategies to develop diagnostic and therapeutic tools to modulate multifaceted toxicity. I shall present our concerted efforts towards the development of multifunctional molecular tools to diagnose and ameliorate multifaceted toxicity of AD.

**Biosketch:**
Prof. T. Govindaraju received his B.Sc and MSc in Chemistry (2000) from Bangalore University and PhD in Chemistry (2005) from the National Chemical Laboratory, Pune, India. He carried out postdoctoral work (2005–2006) at the University of Wisconsin-Madison, USA. He received the Alexander von Humboldt postdoctoral fellowship and worked (2006–2008) in the Max Planck Institute of Molecular Physiology, Dortmund, Germany. His research interests are at the interface of chemistry, biology and biomaterials science, include Alzheimer’s disease, peptide chemistry, molecular probes, molecular architectonics, nanoarchitectonics, templated DNA nanotechnology, silk-inspired biomimetics and biomaterials. He has published more than 95 papers in peer reviewed journals, >10 patents, 5 book chapters and a book. Many of his laboratory inventions are commercialized or licensed to develop bioimaging and point-of-care diagnostics. He is the recipient of several awards and honours, Alexander von Humboldt Fellowship (2006) of AvH Foundation, Germany, profiled as “India’s Young Blood” by Chemical and Engineering News, ACS, USA, Innovative Young Biotechnologist Award (2010) of DBT, Govt. of India, INSA Medal for Young Scientist (2011), Prof. D. K. Banerjee Memorial Lecture Award of IISc (2012), Prof. CNR Rao Oration Award of JNCASR (2014), founding member of INYAS, Prof. CNR Rao Award of RMIT, Australia (2014-15), CRSI Bronze Medal
(2016), Sir C V Raman Young Scientist Award by Govt. of Karnataka (2014), MRSI medal (2017), IPS-Young Scientist Award (2017), Swarnajyanti Fellowship (2015-16), DST, Govt. of India and CSIR-CDRI Award for Excellence in Drug Research. He is serving as the secretary of Chemical Research Society of India (CRSI) and Indian Peptide Society (IPS)

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Title: Medicinal Chemistry- Drug Discovery & Drug Delivery

1. DR. ALEXEY SUKHORUKOV

Title of the talk: Strategic applications of nitro compounds in organic synthesis: Recent progress

Abstract: Aliphatic nitro compounds have long played important roles as convenient and readily available building blocks in organic chemistry, including total synthesis of natural products, pharmaceutical ingredients, and high-energy materials. The diverse reactivity in C,C- and C,X-bond forming reactions, together with the ease of transformation of the nitro-group into other functional groups, make nitro compounds ideal reagents for organic synthesis.

At the same time, the synthetic potential of the nitro group is far from being exhausted by classical transformations exploiting nitroalkanes as $\alpha$-C-nucleophilic synthons. Recent studies on the reactivity of nitronates (O-esters of nitroalkane tautomers) have led to the development of conceptually novel approaches to the functionalization of the carbon backbone of nitro compounds. Thus, activation of the nitro group with strong electrophiles (silylating and acylating agents) allows the introduction of nucleophiles in the usually inert $\beta$-position in nitroalkanes (see Scheme). In the presentation, new strategies for the construction of C,C- and C,X-bonds using electrophilic activation of nitroalkanes together with some applications of this methodology in total synthesis will be outlined. This work was supported by the Russian Science Foundation (grant 17-13-01411).
Biosketch:
Alexey Sukhorukov received his Ph.D. degree from the N. D. Zelinsky Institute of Organic Chemistry under supervision of Professor Sema Ioffe. In 2018, he defended his habilitation theses on the CH-functionalization of nitronates. At present, he is a leading research scientist and deputy head of the Laboratory of Functional Organic Compounds at the same Institute. He also holds a position of full professor at the Organic Chemistry Department of D. Mendeleev University of Chemical Technology. Prof. Sukhorukov’s research interests cover the chemistry of nitrogen-oxygen systems, organic reaction mechanisms, the chemistry of adamantanes and the target-oriented stereoselective synthesis of bioactive molecules.

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2. PROF. HIROSHI KITAGAWA

Title of the talk: Deciphering roles of chondroitin sulfate by sugar-remodeling

Abstract: Chondroitin sulfate (CS) chains constitute a class of glycosaminoglycans (GAGs). CS chains are distributed on the surfaces of virtually all cells and throughout most extracellular matrices; they are covalently attached to serine residues of core proteoglycan proteins. CS proteoglycans have been implicated as regulators of a variety of biological events, including cell-cell and cell-matrix adhesion, cell proliferation, morphogenesis, and neurite outgrowth. The functional diversity of CS proteoglycans is mainly attributed to the structural variability of the GAG chains, specifically the CS chains. Despite their relatively simple polysaccharide backbones, CS chains acquire remarkable structural variability via several types of enzymatic modifications, including sulfation. Moreover, the sulfation status of CS chains, chain length, number of CS chains per core protein, or combinations thereof can be finely tuned via CS biosynthetic machinery to specify the structure and function of CS proteoglycans. The term “Sugar remodeling” refers to the experimental or therapeutic structural alteration of CS chains via perturbation of specific CS biosynthetic enzymes in cells or living organisms; sugar remodeling is a promising approach to the study of CS chain function. In this talk, I will describe our recent findings regarding CS function which have resulted from studies involving sugar remodeling.

Biosketch:
Prof. Hiroshi Kitagawa received his Ph.D degree from Pharmaceutical Sciences at Kyoto University in 1991. He is a Professor and Trustee at Kobe Pharmaceutical University, Japan. He is a member of the scientific committee of Japanese Society of Carbohydrate Research from 2007. He is a member of the scientific committee of Japanese Biochemical Society from 2015. He is in the Editorial Board of Scientific Reports from 2015. He was a Associate Editor of Journal of Biochemistry from 2016 to 2018. He is a Chief Editor of Journal of Biochemistry from 2018. He was awarded The Pharmaceutical Society of Japan Award for Divisional Scientific Promotions in 2013.

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Title of the talk: Halogen Bonding in Thyroid Hormone Action and Membrane Transport

Abstract: Thyroid hormones regulate almost every process in the body, including body temperature, growth, and heart rate. They influence carbohydrate metabolism, protein synthesis and breakdown, and cardiovascular, renal, and brain function. The deiodination of thyroxine (T4) by iodothyronine deiodinases (DIOs) play a crucial role in thyroid hormone action. These enzymes contain selenocysteine, the 21st amino acid, in their active sites. The phenolic ring (5′) deiodination of T4 by the type 1 and 2 enzymes (DIO1 and DIO2) produces the biologically active hormone, 3,5,3′-triiodothyronine (T3), whereas the tyrosyl ring (5) deiodination of T4 by the type 3 enzyme (DIO3) produces the biologically less active hormone rT3. Therefore, the complex biochemical dehalogenation pathways play an important role not only in human hormone action, but also in the development of drugs for thyroid-related disorders.

In this lecture, the chemical mechanism by which the deiodinases and organoselenium compounds selectively activate and inactivate the thyroid hormones will be discussed. The role of iodine atom, halogen bonding and endosomolytic peptides in the membrane transport of fluorescent molecules will also be discussed.

Biosketch:
Mugesh received his Ph.D. (1998) at the IIT Bombay. In 2000, he moved to Germany as an Alexander von Humboldt Fellow at the Technical University, Braunschweig. In 2001-2002, he worked with Prof. K. C. Nicolaou at the Scripps Research Institute, as a Skaggs postdoctoral fellow. His research involves chemical synthesis and chemical biology. He is an author of more than 150 publications in international peer reviewed journals and is a recipient of several awards/fellowships, which include: CRSI Silver Medal (2018); Prof. R. C. Mehrotra Commemoration Lecture Gold Medal, Indian Science Congress (2018); Prof. K. N. Ganesh Endowment Lecture Award, IISER Pune (2018); National Prize for Research on Interfaces of Chemistry and Biology (2017); Rajib Goyal Prize in Chemical Science by Kurukshetra University (2017); Bhagyatara Award by Panjab University (2017); JSPS Invitation Fellowship for Research in Japan (2016); ISCB Award for Excellence (2016); He is a fellow of the Royal Society of Chemistry (FRSC, 2013), The National Academy of Sciences, India (2012), Indian Academy of Sciences (2012) and Indian National Science Academy (2016). He currently serves as Vice-President and Secretary General of
the Chemical Research Society of India (CRSI), President of the Asian Chemical Editorial Society (ACES) and Convener of the Kishore Vaigyanik Protsahan Yojana (KVPY), Government of India. He serves in the Editorial or Editorial Advisory Boards of *Organic and Biomolecular Chemistry* (RSC), *ACS Omega* (ACS); *Bioorganic Chemistry* (Elsevier) and *Biological Chemistry* (De Gruyter, Germany).

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4. **DR. YULIA VOLKOVA**

**Title of the talk :** Development of Novel Positive Allosteric Modulators of GABAAR Receptors

**Abstract :** γ-Aminobutyric acid is the most abundant inhibitory neurotransmitter in the mammalian central nervous system (CNS) [1]. γ-Aminobutyric acid released from GABAergic axon terminals influences neurons via GABAAR receptors (GABAARs), which are ligand-gated chloride ion channels that mediate fast synaptic inhibition when activated by GABA. GABAAR bears several allosteric sites including those for barbiturates, benzodiazepines, neurosteroids, and avermectins [2]. GABAARs are widely distributed in the CNS and the clinical use of drugs that alter GABAARs function act as anxiolytics, hypnotics, and anticonvulsants provides ample proof of the concept that the GABAAR is a verified target for medicinal chemistry. Meanwhile, multiple GABAAR subtypes that mediate these clinical effects raised the need for the development of novel highly efficient ligands for this receptor.

Here, we report comprehensive studies of novel classes of GABAAR PAMs acting through benzodiazepine binding site [3]. Potent compounds were discovered using a radioligand competition binding assay. The functional properties of highest-affinity compounds as GABAAR PAMs were determined by electrophysiological measurements. Their potential in the design of hypnotics analogous to Zolpidem was demonstrated in *in vivo* studies on Zebrafish. Structural basis for activity of novel compounds were proposed using extensive molecular docking studies. This work was supported by the RFBR grant 18-33-20087.

**Biosketch:** Dr. Yulia Volkova graduated with honors from the Moscow M. V. Lomonosov State University in 2008 and defended her PhD thesis at the same place in 2011. Over the period 2012-2015 she had fellowships in Institut de Chimie Moléculaire de l’Université de Bourgogne (Dijon, France) in group of Pr. Franck Denat, the University of Illinois at Chicago (Chicago, USA) in group of Pr. Vladimir Gevorgyan and Imperial College London (London, UK) in group of Dr. Marina Kuimova. At present she is Senior Researcher at the N. D. Zelinsky Institute of Organic Chemistry, Russian Academy of Sciences. Dr. Yulia Volkova’s research interests cover chemistry of heterocycles and synthesis of heterosteroids.

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PLENARY SESSION 14

**Title**: Hemostasis and Thrombosis- Biochemistry and Physiology

I. **PROF. SATYA P KUNAPULI**

**Title of the talk**: Novel Concepts in ITAM Signaling in Platelets

**Abstract**: Collagen induced platelet activation is predominately mediated by GPVI receptor through activation of Syk, LAT, and PLC-\(\gamma\)2. GPVI activation results in tyrosine phosphorylation of several residues on Syk. The function of these phosphorylated tyrosine residue is not known in Syk activation or its activity. We evaluated the role of Tyr-342 (equivalent of Tyr-348 in human Syk) in GPVI-mediated platelet activation by generating a Syk Y342F knock in mouse and studying the platelet signaling events and functional responses. GPVI stimulation with collagen-related peptide caused phosphorylation of Y342, Y346, and Y519/520 on Syk in wild-type (WT) and Lyn-/- platelets, but not in Fyn-/- null platelets. Platelets from Syk Y342F knock in mice were bred to homozygocity suggesting that Syk Y342 is not crucial for the embryonic development. Platelets from Syk Y342F murine platelets displayed a selective impairment of aggregation and dense granule secretion mediated by the collagen receptor glycoprotein VI, but not by ADP or AYPGKF. Syk Y342F knock in mice show delayed time to occlusion compared to WT littermates using the ferric chloride-induced carotid artery injury model. Signaling downstream of the GPVI receptor, indicated that tyrosine phosphorylation of Syk Y346 and phospholipase C\(\gamma\)2 were also impaired. Thus we conclude that Syk is phosphorylated by Fyn in murine platelets upon GPVI stimulation and plays an important positive regulatory role in GPVI signaling by controlling the platelet functional responses and tyrosine phosphorylations of Syk and PLC-\(\gamma\)2.

**Biosketch**: Satya P. Kunapuli, Ph.D. Professor of Physiology and Pharmacology received his Ph.D. from Indian Institute of Science, Bangalore, India. He has been serving as Director of the Thrombosis Research Center since 2011. Over the past 30 years, Dr. Kunapuli has made contributions in platelet physiology and signaling. Over the course of his career he published over 200 papers in this area. Among multiple achievements of his laboratory in this area, characterization of the ADP receptors on platelets and identification of proximal signaling pathways involving HS1, nPKC isoforms,
Akt, and PI3 kinase isoforms. Platelet signaling and the functional regulation of platelets by signaling molecules is the major focus of his laboratory. He has identified three receptors for ADP on platelets and has identified several signaling events by the P2Y1 and P2Y12 receptors and their contributions to platelet functional responses. He has also identified the role PI3 kinase beta in Akt activation by GPVI agonists and downstream of P2Y12 receptor. He has been funded by NIH for the past 20 years with multiple grants and is currently serving on the editorial board of the Journal of Biological Chemistry and Thrombosis Research. He is a member of the American Society of Hematology, American Society for Biochemistry and Molecular Biology, American Society for Pharmaceutics and Experimental Therapeutics, and International Society of Thrombosis and Hemostasis. He also received numerous honors and Awards, including the Mario Toppo Distinguished Scientist Award, ASIOA Service Award, Paul Eberman Faculty Research Award, and American Heart Association Established Investigator award.

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2. **DR. SIDNEY W. WHITEHEART**

**Title of the talk**: The Ins and Outs of Platelet “Cell” Biology in Hemostasis and Beyond

**Abstract**: Surprisingly, platelets are capable of bidirectional interactions with their microenvironment through basic cellular processes, such as endo- and exocytosis. We have defined much of the molecular mechanisms of platelet secretion, identifying the relevant SNAREs and SNARE-regulators, which control activation-dependent cargo release. Using this knowledge, we have begun to assess how secretion affects thrombosis and hemostasis in arterial and venous models. Our data demonstrate how modulating secretion may be valuable in controlling thrombus growth without compromising hemostasis. Further work on platelet endocytosis, endo-lysosomal trafficking, and processing of endocytosed cargo has identified some of the machinery involved and has led to the discovery that platelets take up pathogens, e.g., viruses. This process activates platelets, but in a manner distinct from what is seen with hemostatic agonists. We propose that bidirectional membrane trafficking, endo- and exocytosis, are essential for platelet-specific functions, specifically thrombosis/hemostasis and innate immune responses. We present data to describe platelet exocytosis and endocytosis at mechanistic and physiological levels using an extensive suite of reagents, transgenic mouse strains, and technologies. Our data are directly applicable to the understanding and treatment of human disease, especially thrombotic diseases which accounts for 1 in 4 deaths world-wide and chronic viremia, e.g., AIDS/HIV1, which increases CVD risk.

**Biosketch:**

Dr. Whiteheart is a University Research Professor at the University of Kentucky where he has been on the faculty for >25 years. Previously, he was a postdoctoral scientist at Princeton University and Sloan Kettering Research Institute, under the mentorship of Dr. James E. Rothman and earned his doctoral degree at Johns Hopkins University School of Medicine under the mentorship of Dr. Gerald W. Hart. The Whiteheart laboratory focuses on platelet “cell” biology, with specific attention to how platelets sample and affect microenvironments in the vasculature and in a growing clot. The group has contributed to the understanding the molecular mechanisms of platelet exocytosis and identifying
therapeutic targets. Their recent work on platelet endocytosis and endocytic trafficking has uncovered how platelets can participate in innate immune responses to viremia. Their clinical studies of HIV1/AIDS are beginning to unravel how chronic viral infection precipitate the ~50% increase in CVD risk in HIV1/AIDS patients. Dr. Whiteheart is funded by the Department of Veterans Affairs and the National Institutes of Health and his work has led to >125 publications. He has served on grant review panels in the United States, Europe, and Asia and was a two-term, member of the editorial board of the Journal of Biological Chemistry. Presently, he is an editor of the journal Platelets. He serves as Director of the University of Kentucky College of Medicine’s MD/Ph.D. program. He has been honored with the Albert D. & Elizabeth H. Kirwan Memorial Prize and the University of Kentucky Alumni Association Great Teacher Award.

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3. DR. MORTIMER PONCZ

Title of the talk: Curing sepsis using a pathogenic HIT antibody

Abstract: Sepsis is a multiorgan dysfunctional response to microbial invasion. While antibiotics and cardiovascular support have been beneficial supportive measures, additional improvement in outcome in sepsis over the past 40 years has been slow. Dr. Poncz will present insights into the pathogenesis and treatment of sepsis coming from his studies of the prothrombotic disorder Heparin-Induced Thrombocytopenia (HIT), a disease due to pathogenic HIT antibodies that recognize the chemokine platelet factor 4 (PF4) bound to the polyanion heparin. Dr. Poncz will show that in HIT activated neutrophils are important in the observed venous thrombi, and this is in part due to the release of neutrophil extracellular traps (NETs). The way NETs contribute to the pathogenesis of HIT will be presented using microfluidic in vitro systems and murine models with human (h) PF4 and a pathogenic HIT-like monoclonal antibody KKO. Dr. Poncz will show that PF4 complexes to NETs and stabilizes them and that the HIT antibody KKO enhances that stabilization. He will show that these same observations, detrimental in HIT, may be protective in sepsis if the Fc portion of the pathogenic antibody is removed. In vivo studies will be presented using a lipopolysaccharide (LPS) endotoxic model and a cecum ligation and puncture (CLP) polymicrobial model of murine sepsis showing the benefit of infused hPF4 and KKO. The implications of these findings to the benefit of NET stabilization with reduced release of NET degradation product release and enhanced entrapment of microbes will be discussed.

Biosketch:
Dr. Mortimer Poncz is a pediatric hematologist at the Children’s Hospital of Philadelphia and the University of Pennsylvania School of Medicine. While still following pediatric hematology patients and chairing one of the largest pediatric hematology divisions, Dr. Poncz has over the past 40 years contributed to our understanding of platelet biology. These studies have ranged from understanding how and where platelets are released from megakaryocytes to studies of the biology of receptors and platelet-specific chemokines to studies of the inherited basis of platelet disorders. His research has resulted in many awards in recognition of his contributions, including his recent selection to receive a United States National Institute of Health...
Outstanding Investigator Award and an American Heart Association Transformational Research Award. One of his focus has been on understanding the prothrombotic disorder Heparin-induced Thrombocytopenia (HIT). He has described the role of platelet factor 4 (PF4) as the target antigen in this disorder when complexed to heparin. His recent studies of PF4 and neutrophils in HIT has led to insights on how PF4 complexes with neutrophil extracellular traps or NETs. Dr. Poncz has used these insights to formulate how PF4 and a pathogenic HIT-like antibody KKO can in turn be protective in sepsis, which is the focus of this presentation.

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4. PROF. PUDUR JAGADEESWARAN

Title of the talk: Knockout of von Willebrand Factor in Zebrafish by RISPR/Cas9 Mutagenesis: A beginning of a novel screen to identify modifier genes.

Abstract: Von Willebrand factor (VWF) is a multimeric glycoprotein that plays critical role in hemostasis. Each subunit contains domains arranged as D'-D3-A1-A2-A3-D4-B1-B2-B3-C1-C2-CK. The D'-D3 interacts with and stabilizes coagulation FVIII. The A1 and C1 bind to GPIb-V-IX and GPIbIIIa, respectively. A1 and A3 bind to collagen. The deficiency of VWF results in von Willebrand Disease (VWD) which is the most prevalent bleeding disorder. In one of the types, type I VWD, modifier genes controlling vwf levels have been proposed. Unfortunately, identifying the modifier genes using mouse genetics had only limited success. To develop an alternate VWD model to screen for modifier genes, we targeted exon29 encoding A3 domain to generate indels in zebrafish vwf gene by CRISPR/Cas9 method. We created a 55 bp insertion mutation in exon29 resulting in a frameshift generating a termination codon. The homozygous larvae yielded prolonged arterial TTO in a laser thrombosis assay compared to controls. The homozygote adult fish blood compared to controls showed prolonged kPTT, greater bleeding, prolonged time to agglutination with ristocetin and lack of multimerization. We then injected heterozygotes separately with neuraminidase and knockdowns reagents for ST3Gal and beta-galactosidase. We found that all the injected fish showed greater bleeding and prolonged time to agglutination with ristocetin compared to uninjected controls. In conclusion, we generated vwf knockout zebrafish and using the heterozygotes we showed that the knockdown of the known modifier genes reduced the levels of vwf in a way that resulted in VWD. Thus, this approach should identify modifier genes in future to characterize Type I VWD.

Biosketch:
Pudur Jagadeeswaran received his Ph.D. from Indian Institute of Science. After his postdoctoral training at Yale University, he held positions as an assistant professor at the University Of Illinois College Of Medicine at Chicago, in the Department of Genetics, and as an Associate Professor with tenure in the Department of Cellular and Structural Biology at the University of Texas Health Sciences Center at San Antonio. He rose to the rank of a full professor at the University of Texas Health Sciences Center at San Antonio. He then moved to
Department of Biological Sciences at the University of North Texas where he is currently the Director for the Division of Biochemistry and Molecular Biology. His major interests are in the genetics of blood diseases. Jagadeeswaran has about 100 publications, including patents. He has been funded by NIH since 1984. He also had funding from the American Heart Association, CPRIT, Howard Hughes and other miscellaneous corporate funding. He taught Genetics, Histology, Biological Regulatory Mechanisms, Biochemistry of Differentiation, Principles of Biology and Medical Genetics. He trained numerous postdoctoral fellows, graduate students, high school students, undergraduate, and MD students. He served on many NIH study section panels and international review panels. He served on editorial board of a journal in biochemistry area in addition to reviewing papers for many journals. He also organized national and international meetings, served as a chair in many conferences, and gave invited presentations. He also founded the Biennial National Meeting of ASIOA and Texas Zebrafish Development and Genetics meeting.

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Title: Novel Solutions for Oil and Gas Industry Problems

I. DR. DHULIPALA PRASAD

Title of the talk: Environmentally Preferable Smart Chemistries for the Oil and Gas Industry

Abstract: The oil and gas industry uses chemicals like acids and oxidizers as polymer breakers in hydraulic fracturing and Thiazine and Glyoxal for H2S mitigation. In addition to serving the intended purpose, the chemicals cause secondary effects like non-specific oxidation, acid corrosion, precipitation and danger to oil field personal. We present novel, environmentally preferable smart chemistries to address various issues in the oil and gas industry. Recombinant enzyme breaker was cloned from thermophilic organism and expression in E.coli. Similarly, chlorophyll was obtained from commercial sources and studied for their efficacy as polymer breakers against guar based fracturing fluids. An enzymatic scavenger was generated by cloning a cDNA sequence from a thermophilic bacterium. Field assessment of the scavenger was carried out by treating sour oil at a Bakken oil field.

The studies using enzyme as polymer breaker showed breaking of cross-linked guar polymers at elevated pH (7-12) and temperature (≥ 80° C) ranges. Chlorophyll-treated cross-linked fluids showed more than 90% viscosity reduction. The chlorophyll worked efficiently up to 250° F, but the optimum temperatures are at 175 to 200°F. The chlorophyll treatment also showed a reduction of molecular weights of a linear polymer from 1,472,000 to 6,000. Further, H2S mitigation was addressed using a novel recombinant Sulfide Quinone Reductase enzyme (SQR). Functional studies conducted by treatment of soured brine, mixed production and oil revealed 72% and 90% reduction in H2S concentration, respectively. Field testing of SQR showed a reduction of headspace sulfide from 400 ppm to 2 ppm and BS&W values less than 0.5%. These studies confirm that this novel biotechnology based environmentally preferable tools can be successfully used to break polymers and mitigate H2S in various systems without causing adverse effects.
Biosketch:
Dr. Prasad Dhulipala completed his PhD in Biochemistry from S.V. University, Tirupati and worked as Post-doctoral fellow at Jefferson Cancer Center, Philadelphia and worked on Structure and Functional analysis of ETS oncogenes involved in Leukemia and soft tissue tumors. Dr. Dhulipala progressed to faculty at Department of Animal Biology, Univ Penn, Philadelphia and Adjunct Professor at Robert Wood Johnson Medical School, New Brunswick researching ion-channel gene regulation. Dr. Dhulipala obtained National Kidney Foundation Career investigator Award to work on Heme Oxygenase regulation in mesangial cells in kidney. Dr. Dhulipala worked as R&D Scientist at GE Healthcare, developing nucleic acid labeling, detection, amplification and sequencing reagents. As Staff Scientist at Life Technologies he developed GIBCO media for single cell cloning, bio-therapeutics production and vaccines for Foot and Mouth Disease. Dr. Dhulipala was awarded Life Technologies Corporate invention and innovator award in 2011. Dr. Dhulipala joined Baker Hughes as Biotechnology as Team Leader and developing greener alternative to hazardous chemicals used for polymer breakage, reservoir souring, scale inhibition and novel technologies for microbial identification and treatment. He published 10 papers and filed 15 patents. Dr. Dhulipala got 2014 and 2015 Best Safety Product Development awards and 2016 Best Research Project Award. Dr. Dhulipala won Mario Toppo Distinguished Scientist and Distinguished Service awards from Association of Scientists of Indian Origin in America (ASIOA) and served as its Secretary and President.

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2. DR. RAGHU CHUNDURU

**Title of the talk**: Pore Pressure Prediction for Drilling High Pressure and High Temperature Wells - Implications on Health, Safety, Security and Environment

**Abstract**: Pore pressure prediction (PPP) plays an important role in safe drilling of exploration and development wells to find hydrocarbon reservoirs. The deep play exploration becoming focus of the major exploration and production companies and one of the key challenges are high pressures and temperatures (HPHT). In this paper, we would like to include latest best practices of pre-drill pore pressure prediction in HPHT environments, well site monitoring, shallow hazards, new technologies, basin modelling, pressure in complex stress regimes, and implications for geomechanics using various examples from various basins across the world. We will also touch upon some of the non-technical challenges e.g., security issues involved in planning and drilling of the wells. Clear understanding, planning and addressing technical and non-technical issues involved in drilling of the wells will benefit industry in reducing risks to the health, safety, security of rig workers and the environment.

**Biosketch**:

Raghu K. Chunduru has 23+ years Oil and Gas industry experience that includes about 18+ years in Shell and rest in Baker Hughes R&D. Raghu currently working as GOM exploration QI Technical advisor in Houston. Raghu is exploration global subject matter expert in pore pressure prediction. Raghu worked on various basins across the globe that includes Niger Delta, South China sea, etc., and is involved in many major oil and gas discoveries on land and deep water across the globe. Raghu was instrumental in starting the borehole geomechanics/pore pressure team in India and is involved in drilling more than 20+ HP wells across the globe. Raghu also teaches courses on steep dips around salt, pore/fracture pressure prediction, seismic inversion, well log interpretation etc. both within Shell and outside. Raghu obtained Ph.D. (1996) in geophysics from The University of Texas at Austin and holds five patents in borehole geophysics.

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3. DR. AKHIL AGARWAL

Title of the talk: Challenges and Prospects of Microbiology in Oil and Gas Industry

Abstract: The importance of fossil fuel for the development of the society and its environmental consequences are very well documented. Nevertheless renewables have got significant attention for energy production, but they are still in developing stage. Hence making the oil and gas production cleaner and greener is the recent focus of oil industry. Although microbiology has traditionally played only a minor role in fossil-fuel extraction, two novel technologies have potential to contribute immensely in the process.

First technology is to control souring in the oil fields. Souring is production of high levels of sulfide from the oil well due to reduction of sulfate to sulfide by Sulfate reducing bacteria (SRB). Nitrate injection can control reservoir souring by number of microbiological phenomena like bio competitive exclusion and sulfide oxidation etc. To overcome this problem in western Rajasthan oil fields, we have recently developed a green technology using a combination nitrate and Benzalkonium chloride (BAC). Our laboratory tests in oil field simulating bioreactors showed that co-injection of nitrate with BAC can completely control production of sulfide in the field and make produced water reusable for injection in the field (1).

Second, microbial enhanced oil recovery (MEOR) processes are becoming increasingly important for production of crude from marginal wells. Different enhanced oil recovery processes are widely applied nowadays such as polymer flooding to solve the problem of water channeling during secondary flooding. There are a number of polymers and copolymers that have been developed and used in field studies for improving oil recovery, but are sensitive to changes in the reservoir environment (2). Therefore in the present study changes in rheological properties of different polymer solutions and the potential of using natural polymers for altering wettability of reservoir rocks were evaluated under reservoir conditions. The intrinsic viscosity values of all the samples, except for a novel naturally derived polymer (~21 gm/dl at 65°C) showed significant reduction in their viscosities when subjected under reservoir conditions. Contact angle measurements were performed on oil wet reservoir rocks (both carbonate and sandstone) treated with different polymers to evaluate wettability alteration behavior. The change in the contact angle was maximally noted in the case of novel natural polymer which was found to be 81° near to that of Triton-X-100, a surfactant (79°) taken as control. Qualitative wettability studies (floatation based and two phase separation tests) had also shown similar tendency of novel natural polymer solutions to alter wettability of oil wet surfaces towards water wet. FTIR of the oil wet powdered rock samples treated with polymer solutions were performed and the absorption spectra revealed reduction in peaks of methyl and
methylene indicating altering wettability for both carbonate and sandstone rock samples. This changes indicates a stable nature of novel natural polymer, making it a more suitable to be used as a biopolymer for EOR polymer.

**Biosketch:**
Dr. Akhil Agrawal is an Assistant Professor and Group leader of Energy and Environment Research laboratory at Central University of Rajasthan. He received his PhD from The Energy and Resources Institute (TERI), New Delhi and Flemish Institute for Technological Research (VITO), Belgium in Petroleum Microbiology. To further extend his prospective in same field, after his PhD in 2009, he joined Petroleum Microbiology Research Group at University of Calgary, Canada as Postdoctoral Scientist. Dr. Agrawal's areas of expertise are Oil field Souring and Enhanced Oil Recovery. He had worked on several Conventional oil and Shale gas fields with Shell, BP, Enerplus, Chevron, ONGC, Oil India Assam, Baker Hughes, Nalco-Champion etc. He has 30 publications in peer-reviewed journal and one US/ Canada patent to his credit. Presently he is a Principal Investigator of several projects funded by Govt. of India like prestigious IMPRINT2, DBT Twining, DST-SSTP and industrial projects from Cairn India Ltd, ONGC and Oil India Ltd. His current research focus on “Development of novel Biochemical Enhanced oil Recovery (BcEOR) technology for oil fields of India”. Recently he was invited in ISMOS-7 conference at Halifax Canada to present about BcEOR technology. He has won several awards and fellowships like REIL Energy Innovation Award, JKL Water and Environment Award, Best Business Plan Award, SERB Travel Award and Belgium Government Fellowship. He is member of Association of Microbiologist of India and International Society of Chemists and Biologists. In addition to this, Dr. Agrawal has been invited as resource person to number of international conferences like ISMOS Canada, Reservoir Microbiology Forum UK and at University of Toronto, Canada.

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PLENARY SESSION 16

Title : Novel Solutions for Oil and Gas Industry Problems

1. DR. SUNDER RAMACHANDRAN

Title of the talk : Mitigation of Corrosion of Mild Steel by Acid Gases in the Oil and Gas Industry in Challenging Environments using Production Chemicals

Abstract : In this presentation, instances of successful mitigation of mild steel corrosion by acid gases are collected and reviewed. These instances involve several challenging situations. One challenging scenario is one where natural gas contains high concentrations of hydrogen sulfide causing sulfur deposition. Other challenging systems are carbon dioxide flood systems. Subsea tie back systems require chemicals that are umbilical approved and will be extremely reliable. High temperature wells require corrosion inhibitors that are heat stable. Use of corrosion inhibitors allows use of cheaper materials for construction for oil and gas facilities. Successful protection of a field for many years, requires use of a chemical tested in the laboratory under conditions that mimic aggressive field conditions. Successful mitigation occurs when the field is consistently monitored for corrosion and the treatment with chemical is varied based on corrosion monitoring and variation of production rates, gas composition and water chemistry. This presentation collects and reviews cases where production chemicals have prevented corrosion for many years. This information will help design and operate oil and gas facilities safely and inexpensively.

Biosketch:
Sunder Ramachandran is a Technology Advisor for the Global Chemicals division of Baker Hughes, a GE company. He is located in Sugar Land, Texas. Dr. Ramachandran has been recently involved with developing corrosion inhibitors for high temperature and high shear conditions and new H₂S Scavengers. He has also been involved in the development and understanding of how surfactants change flow regime and can be used to unload liquids from wells and pipelines.

Dr. Ramachandran was a member of the Research Faculty at the California Institute of Technology from 1994 to 1996. Dr. Ramachandran has doctorates in Chemical Engineering from Colorado State University and from the Indian Institute of Technology in Madras. He obtained his Bachelor’s degree in Chemical Engineering from the Indian Institute of Technology, Kanpur. Dr. Ramachandran has 90 publications on a variety of subjects related to his research and nineteen US Patents. He is a member of SPE and NACE. Dr. Ramachandran served as the Technology Coordinator of
the Science Committee (Corrosion Science and Technology Committee) of NACE from 2011 to 2013. He currently is a member of the Technical Advisory Group (TAG) for the United States on the International Standard Organization (ISO) Technical Committee (TC) 156 on Corrosion of Metals and Alloys. He also serves on the Technical Committee of the SPE International Conference on Oilfield Chemistry. He received the 2019 NACE Distinguished Service Award at CORROSION 2019.

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2. DR. D.V. SATYA GUPTA

Title of the talk: Exploiting Nano and Biomimetic technologies for Efficient Oil and Gas Exploration and Recovery

Abstract: The oil and gas industry is traditionally a very conservative industry with little appetite for risk, particularly in utilizing new technologies. However, with low recovery factors in both high cost deep water projects and low cost unconventional fields, there is interest in using new technology for increasing the recovery of oil and gas cost-effectively. One of the technology frontier areas that are being utilized for this purpose is to exploit development of technology in other industries. Comparisons of challenges in the oil and gas industry with those of the medical and space industries will reveal the commonality. The presentation will cover the success in exploiting nanotechnology and biomimetic technologies for efficient oil and gas exploration and recovery as developed and commercialized by the leading service company in oil and gas industry.

Biosketch: Dr. D.V. Satya Gupta is Baker Hughes Technology Fellow. He was previously Business Development Director, Technology for Baker Hughes pressure pumping (BJ Services). He has over 40 years of oil field chemical product development and applications experience. His main personal research interests are applications of molecular science in the oil field including green chemical technologies and unconventional fracturing fluids. He has co-authored chapters on "Fracturing Fluids" in the book Modern Fracturing, edited by Economides and Martin; the new SPE monograph on Hydraulic Fracturing; and the chapter on "Fracturing Fluids and Proppants" in the book Hydraulic Fracturing and Drinking Water published by AWWA. He is on the editorial board of SPE and also the Hydraulic Fracture Quarterly Technical Journal. He has presented talks on unconventional fracturing fluids all over the world. He is a member of SPE, NACE, ACS and AIChE. He was SPE Distinguished Lecturer in 2014-15 giving lecture on “How to Frac with Less or No Water” around the world. He has published more than 70 papers and is an inventor on over 180 international and US patents. He is the recipient of Baker Hughes Life Time Achievement Award in 2013, SPE International Completions Optimization and Technology Award in 2017 and IIT Madras Distinguished Alumnus Award in 2018. He has a Doctor of Science in Chemical Engineering from Washington University, St. Louis, Missouri, USA

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3. **PROF. K.N. THIMMAIAH**

**Title of the talk:** Targeting of PI3-kinase/AKT/mTOR Signaling in Cancer by Lipophilic Phenoxazines

**Abstract:** Cancer, a catastrophic disease, is one of the major causes of death irrespective of age and sex. To date, safe treatment for cancer is not yet available. The discoveries on the molecular mechanisms of cancer development and progression have prompted the search for small molecules which are more selective for cancer cell molecular targets. Of many targets, Akt has been identified as a central player in human malignancy. Evidence has accumulated implicating Akt as a central regulator of the apoptotic response in a wide array of cell types. Akt is overexpressed in a variety of human tumors including lung, breast, ovarian, gastric, and pancreatic carcinomas. Additionally, PTEN mutation, which results in the increased Akt activity, have been described in a wide variety of malignancies, including breast cancer, prostate cancer, melanoma, glioblastoma multiforme and endometrial cancer. As Akt activation has been observed in human cancers, intense efforts are underway to develop specific Akt inhibitors as cancer therapeutics. Despite many efforts, an ideal Akt inhibitor is yet to be discovered. At present there are no specific inhibitors directed against Akt in the clinic. Phenoxazines shut down the activation of Akt/mTOR/p70S6/S6 kinase pathway and induce apoptosis to a considerable extent in rhabdomyosarcoma cells. Towards this goal, highly lipophilic phenoxazines were synthesized, and examined for their ability to block the phosphorylation of Akt at serine-473 in cells. The results demonstrate that 10-[6’-(N-Diethyl)hexyl]-2-chlorophenoxazine (10D) and 10-[6’-[N-(β-Hydroxyethyl)-piperazino]hexyl]-2-chlorophenoxazine (15D) at 100 nM inhibited the phosphorylation of Akt at ser-473 without affecting the phosphorylation of Erk-1/2. 10D or 15D did not inhibit the activity of PDK1 or SGK1 but potently inhibited the kinase activity of recombinant Akt and AktΔPH. Further, phenoxazines blocked IGF-I stimulated nuclear translocation of Akt in rhabdomyosarcoma cells under serum-containing culture conditions. Modeling studies suggest phenoxazines may bind in the ATP-binding site. In conclusion, we have successfully identified a small group of novel lead compounds, which at nanomolar concentrations, not only specifically block Akt activation and downstream substrates such as mTOR, p70S6 kinase, and S6 kinase without affecting activation of the upstream kinases, PDK-1 and PI3 kinase, or other kinases downstream of ras such as Erk-1/2 in cancer cells, but also led to massive apoptosis in rhabdomyosarcoma cells. [Supported by National Institute of Health grant 520860 and Western Illinois University Research Council grant to KNT].
Biosketch:
Prof. K. N. Thimmaiah has worked as Lecturer, Reader, and Professor at the Department of Chemistry, University of Mysore, Mysore, India, and worked as a Postdoctoral Fellow/Visiting Scientist at (a) Wake Forest University, USA, (b) Bowman Gray School of Medicine of the Wake Forest University, USA, (c) The University of Texas at El Paso, USA, (d) St Jude Children’s Research Hospital, USA. Also worked as Professor of Chemistry at Western Illinois University, USA. Published over 200 research papers in reputed journals and has 3 Patents to his credit. Successfully guided several research students for the Ph. D degree in Chemistry of the University of Mysore and several Graduate Students at the Western Illinois University Macomb, Illinois, USA. Currently, working as the Chairman of the Natural Science Division, Northwest Mississippi Community College, Desoto Center, Southaven, MS 38671, USA.

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Title: New Developments in the Field of Neuroscience

I. DR. N.K. VENKATARAMANA

Title of the talk: Pathophysiological basis of management of Parkinsons’ Disease

Abstract: Parkinsons’ Disease (PD) is increasingly being diagnosed significantly causing disability due to tremor, rigidity, bradykinesia and motor fluctuations. In addition many non-motor functions can affect the quality of life of those affected. It can occur in very young people called Juvenile PD, in the middle age as young onset PD and the regular disease is common after the age of 60. A series of genes called “Parkin 1 – 11” were identified especially in the younger onset group. The basic pathology seems to be the degeneration of cells in the substantia niagra compacta losing their pigment thereby causing deficiency of Dopamine. At the cellular level disturbance of Alpha synuclein metabolism leading to intra cellular accumulation of this protein. A 3 hit theory has been proposed to explain the pathogenesis.

PD is primarily treated by the drugs that enhance the production of dopamine and later direct replacement of dopamine. Various sophisticated formulations as well as, root of administrations are being tried to improve the efficacy of the drug and its effects. Apomorphine has been introduced recently for select indications. Various surgical procedures are in vogue for the advanced disease resistant to the medical therapy. That includes Thalamotomy, Pallidotomy, Sub Thalamotomy and Deep Brain Stimulation (DBS). DBS has become the gold standard due to its efficacy, adjustability and reversibility. Various new targets in the brain to combat the symptoms of PD are in relentless search. For the future metabolic and mitochondrial alterations, Gene substitution, Epigenetics that can regulate the gene mechanisms, newer targets for surgical therapy and more effective medications are in the pipeline.

Biosketch:
Dr N K Venkataramana is the Founder Chairman & Chief Neurosurgeon of BRAINS and an internationally acclaimed Neurosurgeon, Researcher and Academician. After training in Micro Neurosurgery and Neuroendoscopic surgery at Nordtstud Krankenhause Hannover Mainz, Germany. He served as Assistant professor in Neurosurgery at the Bangalore-based
National Institute of Mental Health and Neurosciences (NIMHANS). Later he founded the Manipal Institute for Neurological Disorders (MIND) at the Manipal Hospital in Bangalore and turned it into a leading facility. Alongside he pioneered 1062, the country's first GPS-enabled mobile trauma care service. Then Dr Venkataramana served as Vice Chairman of the Bangalore-based BGS Global Hospitals and Chief Neurosurgeon at the Global Institute of Neurosciences.

A recipient of number of prestigious awards including Karnataka Rajyotsava in 2008 award and C V Raman Birth Centenary Award for 2015-16 from Sri Narendra Modi – Hon’ble Prime minister of India. He is the President of Cerebro Vascular Society of India. Presently he is Editor in chief of “Brain voice”. Dr Venkataramana is past President of Indian Society for Paediatric Neurosurgery, Neuro endoscopic society of India, Indian society for Stereotactic & Functional Neurosurgery. Past Editor in Chief of Journal of Cerebro vascular sciences.

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2. **DR. E.V. JOSHY**

**Title of the talk**: Evolving concepts of Autoimmunity in Parkinsons Disease

**Abstract**: Parkinsonism, defined by bradykinesia, is of course the hallmark feature of idiopathic Parkinson's disease, which often also shows unilateral onset and persistent asymmetry, rest tremor (typically 'pill-rolling'), and an excellent response to Levo-DOPA. In contrast, 'atypical parkinsonism' is defined by features not in keeping with idiopathic Parkinson's disease and typically by a poor response to Levo-DOPA. Autoimmune atypical Parkinsonism is characterized by atypical Parkinsonism with neuronal specific antibodies, sometimes associated with abnormal CSF and significant response to immunotherapy.

Parkinson's begins with abnormal clumping of a protein called synuclein in the brain. Neighbouring dopamine-producing neurons then die, causing tremors and difficulty moving. The prevailing wisdom has been that these neurons die from a toxic reaction to synuclein deposits. However, Parkinson's has been linked to some gene variants that affect how the immune system works, leading to an alternative theory that synuclein causes Parkinson's by triggering the immune system to attack the brain. The team has now conducted blood tests to reveal that people with Parkinson's show an immune response to these antigens, while people who don't have the condition do not (*Nature*, DOI: 10.1038/nature22815).

Findings from a new study suggest that environmental factors—specifically those in the gut—may increase susceptibility to Parkinson's disease and that mitochondrial quality control, mediated by the lysosome, plays a central role in the disease. This study provides additional reasons to consider that autoimmunity may contribute to Parkinson's disease.

**Biosketch:**

Dr. Joshy E. V. is a full-time Senior Consultant Neurologist at SSNMC-Brains Hospital. He practices Autoimmune Neurology and Immunotherapy at Brains Hospital. This is a unique Holistic centre, where patients with various neurological problems who are not improving with traditional treatment are evaluated extensively for autoimmune / genetic causes and taken up for specialised treatments. With 35 years of practicing experience, Dr Joshy is a veteran neurologist with a staggering academic and clinical record including 100,000 Neurology consultations in 9 years at Sri Sathya Sai Super-speciality Hospital, apart from his administrative contributions as HOD Neurology Department and other Hospital Executive Committees.
Before that, he served 20 years as Chief Neurologist at Mafraq Hospital, Government of Abu Dhabi, UAE. Dr Joshy earned his DM in Neurology from NIMHANS Bangalore and has a Post-doctoral fellowship training in Neuromuscular disorders at the Jerry Lewis ALS Center & Neuromuscular Center, Los Angeles, University of Southern California USA. He has also created a number of Consciousness-based healing programs.

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3. **DR. SUDHEENDRA RAO N. R**

**Title of the talk:** Advanced Therapy Strategies for Parkinson’s Disease in Clinical Setting

**Abstract:** Advanced Therapy Medicinal Products (ATMPs) are gene or cell-based medicinal products or engineered tissue products. More than 900 ATMPs have been evaluated in clinical trials for various disorders till now, while 8 ATMP products have already entered the market. Emerging ATMP product landscape for Parkinson’s disease (PD) clinical trials looks very promising. Several possible disease-modifying and non-disease modifying genetic targets have been identified for PD. At least 4 disease modifying gene targets and 5 non-disease-modifying gene targets have been tested in PD clinical trials. On the other hand, EU-funded “TRANSNEURO” trial involving 150 PD patients clearly suggested that, where standard pharmacological therapy fails, innovative cell-based therapies constitute an approach worth pursuing. Another EU-funded “NeuroStemcellRepair” program helped refine the strategies for regenerative therapy for PD. In 2018, CiRA-Kyoto has launched an allogenic -HLA matched iPSC derived dopaminergic neuron transplantation clinical trial for PD. The impetus is now on modifying the disease environment, gene dosage regulation and regulation of dopamine production. The emerging consensus is that a combinatory cell-therapy might be the key to address some of the challenges of engraftment. Additionally, immunomodulatory cells or cell-based products are also being explored. There is also an urgent requirement for regulators to understand the shortcomings of various pre-clinical model systems to effectively simulate human diseases such as PD. This has implications on how regulators might approach ATMPs for PD clinical trials. There are an estimated 80 thousand to 7 lakh PD patients in India (Gourie-Devi M, 2014), but so far only 62 clinical trials have been conducted on PD patients. Out of these, only two of them have used ATMPs (bone marrow MSCs) as disease modifying agents. India is uniquely positioned to develop ATMPs, especially stem cell and cell-based products (SCCPs). With a strong regulatory framework and stem-cell guidelines in place, it is time to drop the skepticism on SCCPs and encourage academic and industry engagement to capture the ground on this emerging therapeutic field.

**Biosketch:**
Dr. Sudheendra Rao is a physician turned scientist. He is the chief scientific officer at ONNSA Research Innovations Private Limited, a biotech R&D startup dedicated to establishing a cell and cell-based therapy platform to address the unmet medical research needs. Dr. Sudheendra Rao completed his MBBS from Mysore Medical...
College and provided health care services under NGOs and public-private-partnership clinics. Exposure to managing various neurodegenerative disorders during his non-PG-residency in the department of neurology, NIMHANS, Bangalore, convinced him to take up research to better understand the diseases from a cell and molecular biology perspective. He completed doctoral studies at the National Brain Research Centre, Gurgaon on molecular pathogenesis of Lafora myoclonic epilepsy. Following which, he pursued postdoctoral study at The Miami Project to Cure Paralysis, University of Miami, USA to gain first-hand experience of gene-therapy and cell-therapy combinatory strategies in pre-clinical studies for USFDA submission. He has published his scientific work in international peer-reviewed journals and serves as a review editor on several international journals. He is a member of prominent gene and cell therapy societies (ASCGT and ISCT) and serves on early stage professional committee of ISCT. In addition, Dr. Sudheendra Rao is also a research advisor for Organization for Rare Diseases India to address the challenges to diagnostics and indigenous therapy development for rare diseases.

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4. DR. KAVINA GANAPATHY

Title of the talk: Regenerative Strategies for Parkinson's Disease: Challenges and Promises

Abstract: Several mechanisms and systems may be involved in PD pathogenesis but clinical manifestation of severe motor dysfunction requires a loss of 60-70% of dopaminergic (DA) neurons in the substantia nigra - pars compacta. Loss of DA neurons is compounded by the limited neurogenic capacity in the adult brain. Available PD therapies till date provide only a symptomatic relief and do not halt the progression of the disease. Hence, there is a need to develop long term regenerative strategies to replace the deficient neuronal pathways. Extensive cell-based studies have provided evidence of stem cells as a promising tool for neurorescue in PD models. In addition, the advancements in cellular reprogramming have paved way to better understand PD patient-specific pathophysiology under in vitro conditions. Besides, reprogrammed cells has shown efficacy to replace affected cells while slowing further neurodegeneration in various PD models. The fundamental question that draws all PD models together is that how well do they recapitulate the PD pathology? To understand and implement a cell therapy for PD, one must seek a model system that mirrors the biochemical, molecular and cellular manifestations of PD as closely as possible. Such a PD model is expected to reflect the progressive nature of the illness in humans as well as its complexity in terms of the extent of pathology. Establishing therapeutic candidates in such a PD model would provide the necessary proof-of-concept derived from regenerative strategies, and propel the cell-based therapies for treating PD, either alone or in combination with disease modifying agents, a step closer to reality.

Biosketch:
Dr. Kavina Ganapathy is a senior scientist at ONNSA Research Innovation Private Limited, a biotech R&D startup dedicated to establishing a cell and cell-based therapy platform to address the unmet medical research needs. Dr. Kavina has completed masters in regenerative medicine from Manipal School of Regenerative Medicine (SORM) in the year 2011. Since then she has been extensively working in the field of stem cells and its application in various disease settings. She has completed her doctoral studies on “The role of endogenous and adult stem cell-derived supportive cell on survival of Dopaminergic neurons” at Manipal University in collaboration with National Institute of Mental Health and Neurosciences.
(NIMHANS), Bengaluru. She pursued postdoctoral study on “cytopathology of iPSCs derived from OCRL deficient Lowe’s syndrome patient” at National Centre for Biological Sciences (NCBS). She has written chapters called “Modification of α-Synuclein by Phosphorylation: A Pivotal Event in the Cellular Pathogenesis of Parkinson’s Disease” in the book called Protein Phosphorylation and “Stem Cells and Neuronal Differentiation” in the book called Stem Cell Therapy for Organ Failure. She has 6 articles in international peer-reviewed journal for her credits.

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PLENARY SESSION 18

Title: Novel Heterocycles and their Biological Applications

I. PROF. HIROSHI HINOU

Title of the talk: Chemical Glycobiology (Starting from Glycoconjugate Syntheses)

Abstract: Post-translational modification of proteins and cell surfaces with glycans is a critical biomarker that sharply reflects changes in biological information such as cancer and lifestyle-related diseases. Such glycan-related biomarker has already been clinically applied in various forms for decades. However, precise reconstruction techniques of these glycan-related biomarkers are limited by the difficulty of artificial control of the chemical structure of the sugar chain.

Over the past 15 years, I have developed rapid synthesis methods for glycoconjugates, based on the automated method devised by Professor Nishimura, Hokkaido University. By using the chemically designed glycoconjugates, we have studied the function of the glycans in life. In this presentation, I will report the basis of the glycoconjugate synthesis, and application studies using the designed glycoconjugates.

Biosketch:
Hiroshi Hinou received his Ph.D degree from Ph.D., Graduate School of Science and Technology, Saitama University in 2000. He was a Postdoctoral Fellow at Synthetic Cellular Chemistry Laboratory, RIKEN from 2000-2002. He is a Professor at Graduate School of Life Science, Hokkaido University. His research field is Organic Chemistry, Glycotechnology, and Medicinal Chemistry. He is a Director of technology at Medicinal Chemistry Pharmaceuticals, Co.Ltd. from 2011. He received Best Poster Award: “Synthesis and Evaluation of Novel Cyclic Sialidase Suicide Substrate” International Symposium on Challenges in Drug Discovery Programme, February 16-17th, 2011, Mysore, India.

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Title of the talk: Design and Development of New Efficient and Greener Strategies for the Synthesis of Biologically Important Heterocycles

Abstract: In recent years, some of the important issues faced in the synthesis and production of organic compounds are search for environmentally benign methods, the preservation of resources, the handling of waste and above all, the increase in efficiency. Consequently, synthetic organic chemists are faced with challenge to discover concise, elegant, conceptually novel synthetic and environmentally benign routes which has become a steadily increasing driving force both in academia and industry. Therefore they have sought and devised fruitful strategies that inevitably tackle the very fundamental principle of efficacy and efficiency. ‘Small molecule heterocycles’ play important role in both drug discovery and material science research providing one of the richest source of diversity, besides serving as rigid scaffolds for further display of a range of functionalities. The present lecture will focus on our recent research directed towards design and development of new, efficient and concise routes for biologically important heterocycles such as indoles, benzothiazoles, benzothiophenes, benzofurans, substituted thiophenes, pyrazoles, imidazoles, oxazoles, etc., involving transition metal catalyzed cross coupling and atom economy reactions such as C-H activation, domino reactions and multicomponent one-pot reactions, from easily accessible organosulfur building blocks. Some of our recent results involving bio-inspired synthesis of few of non-natural indole alkaloids using β-carboline derived enaminone precursors will also be presented.

Biosketch:
Prof. Ila did her Ph.D. in 1969 from Indian institute of technology (IIT), Kanpur, and subsequently she went to US for postdoctoral fellowship at Purdue Uni, USA and joined Central Drug research institute Lucknow, in 1970, then moved to North eastern Hill Uni, Shillong, in North Eastern part of India from 1977-1995 as Assistant Professor, Associate Professor and then Professor. In 1995 she moved to IIT Kanpur as professor and after her superannuation in 2007, she moved to JNCASR, Bangalore and since then she is continuing as honorary chair professor there. Prof. Ila has been senior Alexander von Humboldt Fellow, Marie Curie Fellow (Uni of Cambridge). She has been visiting professor at Uni of Southern California, Los Angeles, USA, Institute fur Investigacione, Sevilla, Spain.
She has travelled several countries throughout the world and has given several invited lectures in various symposia and conferences, universities and research institutes. Her research area is design and development of new synthetic methods for biologically important five and six membered heterocycles, from readily accessible building blocks, employing transition metal catalyzed cross-coupling, C-H activation reactions, domino and multicomponent reactions. She has more than 250 research papers in international journals. She has trained more than 60 Ph.D. students. She is Fellow of Indian National Science Academy, New Delhi (FNA) and Indian Academy of Science Bangalore (FASc.). In 2019, she was awarded Chemical Research Society of India (CRSI) ‘Life Time Achievement Award’ gold medal.

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3. PROF. B.S. VISHWANATH

**Title of the talk**: Neutralization of ‘Big Four’ Indian snake venom-induced systemic and local toxicities

**Abstract**: Snake venom comprises of myriad blend of toxins which leads systemic and local toxicities upon envenomation. The only accepted treatment for such snakebite is by administering polyvalent anti-snake venom (ASV) raised against ‘Big Four’ snakes; spectacled cobra (Naja naja), saw-scaled viper (Echis carinatus), Russell’s viper (Daboia russelii) and common krait (Bungarus caeruleus). Although ASV is able to reduce mortality, their use has several inherent problems including serum sickness, anaphylactic reactions and inability to neutralize local tissue toxicities. The major enzymatic toxins are metallo-proteases (SVMPs), phospholipase A2s (PLA2s) and hyaluronidases (SVHYs). Administration of small molecules such as dimethyl ester of bilirubin (PLA2 and SVMPs inhibitor), Tetraethyl thiuram disulfide (SVMPs inhibitor) and sylimarin (SVHYs and PLA2 inhibitor) can compensate the load of ASV usage that may reduce the secondary complications. Among ‘Big Four’ snakes, viper bite, leads to local manifestations such as progressive tissue necrosis and non-healing wound at bitten site. Recently it has been found out that the releases of decondensed chromatin/DNA lined with cytotoxic proteins from immune cells are the principle cause for non-healing wound. Topical application of plant protease and DNase offers effective healing against venom induced non-healing wound. Several medicinal plants extracts exhibited the presence of protease/DNase activity and found to be rich in Tricosanthus tricuspidata (Tt). Topically applied Tt-protease was able to neutralize E. carinatus venom-induced mouse footpad tissue necrosis in mice and also accelerates the healing of open wound in rabbit model. Further, Tt-DNase was neutralized the E carinatus venom-induced mouse tail tissue necrosis and restore the normal tissue morphology. The small molecules followed by topical applications of plant enzymes found be promising therapeutic agents in treating snake bite induced systemic toxicity and non-healing wounds.

**Biosketch:**
Dr. B.S. Vishwanath is a Professor of Biochemistry, University of Mysore, Mysore. He specializes in the mechanisms of snake venom toxins and its neutralization by folk medicinal plants. His other research areas are to understand the molecular mechanism of inflammation, wound healing, hypertension and designing specific inhibitors to therapeutically important clinical enzymes. He has spent three years in USA and seven years in
Switzerland pursuing his research ambition. Out of 21 students he has guided 8 students carried out research in clinical inflammation, 7 in venom pharmacology, 4 in latex protease and wound healing 3 in hypertension for their Ph.D. degree and presently guiding 8 scholars for their doctoral degree. He has more than 103 research publications published in National and International peer reviewed journals and published six chapters in specialized books. The total number of citations is over 3341 with an h-index of 31, and i10-index of 68. He mobilized research grant worth more than Rs. 1.0 crore from UGC, DST, DBT and part of major University research projects Institution of Excellence of UGC and Promotion of University Research and Scientific Excellence of DST. He has established collaboration with Madras University, Tezpur University, Vellore Institute of Technology and University of Bern, Switzerland. His research accomplishments has been recognized by UGC and awarded Basic Scientific Research Fellowship.

As an ardent sports lover, and enjoys playing shuttle badminton and has won several tournaments in Karnataka. In USA, he ran marathon twice. Because of his sports interest he was given the additional charge as Chairman for the Postgraduate Sports Council at the University of Mysore. As a Biochemist to educate sports persons he has delivered several talks on ‘Performance enhancing drugs’ and ‘Talent identification in sports through genetic analysis. He has rich administrative experience as Registrar, Finance Officer and Vice Chancellor (in charge) at Karnataka State Open University, Mysore. Presently, he is the coordinator for Office of the Directorate of outreach and online programme, University of Mysore.

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Title: Biological Study on Animal Disorders and Medicinal Development

I. DR. GURUSHANKARA H.P.

Title of the talk: Malathion Induced Leukemia: Molecular Mechanisms

Abstract: Leukemia is the most common cancer in children below the age of 15 years. The aetiology of childhood leukemia remains unexplained. Malathion is an organophosphate pesticide widely used in agriculture and its potential exposure to humans is unavoidable. Epidemiological studies have reported that parental exposure to malathion before conception, in utero and direct exposure during childhood may influence the leukemogenesis. But, the specific mechanism triggering the induction of leukemia by malathion exposure is unknown. Our lab has been working on molecular mechanisms in which malathion exposure induces leukemia. The results have revealed that excessive generation of reactive oxygen species (ROS) and lipid peroxidation (LPO) and depletion of antioxidants in the cell following the exposure to malathion induces oxidative DNA damage, in the form of single-strand breaks (SSBs) and double-strand breaks (DSBs). DSBs constitute the molecular event in formation of chromosomal aberrations. Chromosomal translocations and deletions are key molecular events eventually results in the deregulation of crucial cellular proteins, those encoded by proto-oncogenes and tumor suppressor genes, which are critical functional regulators of the cell and their genetic alteration playing an important role in onset of haematological malignancy. Gene expression profiling and fluorescence in situ hybridization (FISH) studies have evidences malathion exposure induce the leukemia. From this it can be considered that malathion exposure represents a potential etiological driver in risk of leukemia.

Biosketch:
Dr. Gurushankara did his MSc in Zoology with specialization in Drosophila Genetics from University of Mysore and obtained his Ph.D. in Zoology from Kuvempu University, Karnataka. He served as faculty in the Department of Environmental Science at Kuvempu University, Department of Bioscience at University of Mysore and did his post-doctoral research at the University of Mysore and Indian Institute of Science. He has also worked as Coordinator (Biology) at Talent Development Centre, Indian Institute of Science,
Bangalore. He is working in the Department of Zoology, at the Central University of Kerala from the inception (2010) to till date. He has published many research papers and presented his research results in national/international conferences. He has authored a book “Understanding in Cytogenetic Techniques”. Many of his general scientific articles are published in the Kannada encyclopaedia (Viswa Kosha, The University of Mysore) and in books. He is a scientific reviewer for many prestigious international journals. He is the life member of Indian Science Congress Association (ISCA), Indian Academy of Bio-Medical Sciences, Society of Biological Chemist, Indian Immunological Society, and so on. He has organized many National and International Scientific meetings. He has been invited to give lectures at many scientific meetings/colleges/workshops/refresher courses. His research projects are funded by UGC, DBT, and DST. He has research collaborations with Indian Institute of Science and other premier Institutes. Dr. Gurushankara’s current research interests are on Oxidative stress and Carcinogenesis, Natural peptides: Structure and Function, Neurotoxicity and Neurodegeneration mechanisms.

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2. PROF. VELAYAN SUBRAMANIAM

**Title of the talk**: The Current Status of Zoo Medicine in Malaysia: A 57 years History

**Abstract**: Presently there are 6 Zoos and 2 Bird Parks in Malaysia. The first established zoo in Malaysia is the Johore Zoo; this is followed by Zoo Negara Malaysia, Zoo Taiping, Zoo Melaka, Lok Kawi Wildlife Park, Sabah and Matang Wildlife Reserve Centre, Sarawak. The early veterinarians who worked with Zoo animals in Malaysia were Malaysians graduate from India and these was followed by Americans. The first established Bird Park is the Penang Bird Park followed by Kuala Lumpur Bird Park. The other parks that were opened in the recent decades include the Butterfly Park, Crocodile Farm, Dear Farms, and Aquarias namely Underwater World, Langkawi and Kuala Lumpur City Centre Aquaria. This paper highlights the current situation of veterinarians in zoos and parks prior to and after 1980. The development in the various fields of Zoo and bird park management, which in turn contributes to the development of zoo medicine in Malaysia.

The role of zoo directors, curators and veterinarians in Zoos and bird parks that have seen a substantial increase well trained personals have been engaged as curators, supervisors, educators and field officers. Keeper must now possess a recognized secondary school qualification. All this are required for the better management and care for zoo animals, many whose existence in the wild are been threatened. The zoos and parks may well be the only refuge for such animals. The establishment of the Malaysian Zoos and Parks Association (MZPA) and the Southeast Asian Zoos Association (SEAZA) have contributed in training of the zoo veterinarians and zookeepers. Recourse to “IT bodies” have stimulated the interest of those associated with animal care to seek information on animal care well-being. Now more than before maintenance of links with zoos outside the country is only at the touch of the computer key.

**Biosketch:**
Dr. S. Vellyan retired from Zoo Negara Malaysia as an Assistant Director and Head Veterinarian on 1st June 2008. He is the longest serving Zoo Veterinarian in Malaysia (28 years). On retirement, 2nd June 2008 he joined as Associate Professor teaching Medical Parasitology at the Faculty of Medicine UiTM for four years. At the Faculty of Medicine, Sungai Buloh he was instrumental to establish Laboratory Animal Care Unit (LACU) and he was the first Co-ordinator for LACU.
He is an Associate Fellow of the Academy of Sciences Malaysia (ASM), Fellow of Malaysian Scientific Association (MSA), Nutrition Society Malaysia (NSM) and Veterinary Association Malaysia (VAM). Associate Professor Dato’ Dr. S. Vellayan is also a two time Fulbright Professional Scholar (2000 and 2005). He is the past president of Malaysian Society of Parasitology and Tropical Medicine (MSPTM), Immediate Past President of Fullbright Alumni Association of Malaysia (FAAM) and Past Acting President of the Veterinary Association Malaysia (VAM). He is also the Vice President of Confederation of Scientific and Technological Association Malaysia (COSTAM); Malaysian Scientific Association (MSA) and Council Member of the Malaysian Senior Scientist Association (MSSA) and the Malaysian Small Animal Veterinary Association (MSAVA). He is an active member of numerous scientific organisations both in Malaysia and abroad. His research areas focus on parasitology, surgery, treatment, enrichment behaviour and zoonotic disease of wildlife and exotic animals.

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3. DR. SHILPA B.M.

**Title of the talk**: An overview on various approaches employed in understanding and treating chronic stress-induced depression in animal models

**Abstract**: Major depressive disorder (MDD) is a psychiatric disorder often under-treated and a leading cause of disability and mortality worldwide. Depression has a lifetime prevalence of 9.1% in India and 15% worldwide signifying global health threat due to its lower productivity causing considerable disability. MDD precipitates co-morbid medical conditions like anxiety and coronary heart disease. The heterogeneity MDD suggests that multifaceted biological mechanisms underlie its aetiopathology. Chronic stress, can one of the major players in causing depressive symptoms, which can induce functional impairments and morphological changes in the hippocampus, frontal cortex and amygdala. Currently, there are no efficient pharmacotherapy options for chronic stress-induced learning and memory impairments, neuronal damage and molecular changes. We tried to understand the neurobiology of stress-induced depression through many approaches namely antidepressant, environmental enrichment (EE) and endocannabinoid signalling system. By using animal models (Wistar rats) as well as selectively inbred strain (Wistar Kyoto rats) which helped to assess and also to check different treatment modalities. The most common thing which was seen in human post-mortem brain with depression and animal models of stress-induced depression is the reduction in levels of BDNF and other neurotrophic factors, structural alteration, biochemical changes correlating to behavioral abnormalities. This will later be ameliorated by exposure of animals to EE, comparable to social support in terms of human scenario, new generation antidepressant treatment and different endocannabinoid enzyme degrading enzymes blockers. These findings will help to underlie causative factors delineating in precipitation of different psychiatric disorders like stress, depression, anxiety and post-traumatic stress disorder.

**Biosketch:**

Dr. Shilpa B.M. is working as Assistant Professor in the School of Basic and Applied Sciences, Dayananda Sagar University, Kumaraswamy Layout Bangalore. She completed her Masters in Biotechnology from University of Mysore. She holds a Ph D degree from National Institute for Mental Health and Neuro-Sciences (NIMHANS). She was awarded with prestigious CSIR fellowship. She started her research journey working on neuro-oncology in the department of Neuropathology, where she worked on broad range of molecular
markers expressed in different grades of gliomas. This work attributed significantly in understanding various gene regulation in cancers, the roles of the tumour microenvironment and various predictive molecular markers in the genesis of brain tumours, further benefit in detecting grades and cancer therapies. Focusing on her Ph.D., it’s on understanding the role of chronic stress-induced depression and anxiety in animal models. This worked engrossed on depression associated biochemical, structural and behavioural alterations leading to cognitive deficits. After completion of doctorate degree, she got her post-Doctoral training from Nathan Kline Institute for psychiatric Research, New York. Her post-doctoral work was focused on understanding the retrograde neurotransmission with respect to endocannabinoids and its receptors mediated brain derived neurotrophic factor signalling associated with depressive behaviour in post-mortem brain. She has published her research work in reputed international journals with cumulative impact factor of 24.38.

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Title: Insight into the Structure and Functional Studies of Pathogenic Physiological Diseases

I. PROF. T. P. SINGH

Title of the talk: Introduction of innate immunity proteins as resistance-free antibiotics

Abstract: Considering the alarming rise in the incidence of bacterial resistance to currently known antibiotics, there is a desperate need to develop bacterial resistance-free new antibiotics. Here we propose a new concept of introducing the innate immune proteins as resistant-free antibiotics by exploiting the differences in the potencies of innate immune proteins from different animal species. It has been well known that the proteins of the innate immune system provide the first line of defense against invading microbes. Innate immune proteins, the peptidoglycan recognition proteins (PGRPs) recognize the conserved motifs that are present on the cell walls of bacteria. Thus the success of the innate immune system depends on the affinity of these proteins towards the bacterial cell wall molecules. The conserved motifs of microbial cell walls are called pathogen associated molecular patterns (PAMPs) that include the well-known peptidoglycan (PGN), lipoteichoic acid (LTA) and lipopolysaccharide (LPS). The PAMPs are specifically recognized by innate immunity proteins, PGRPs. PGRP-S is one of the members of PGRPs and is responsible for the recognition. We have determined the structures of PGRP-S from various species. The structures of PGRP-S from human, camel, yak and porcine have revealed that the PGRP-S from camel forms a functional dimer whereas the human protein acts as a monomer. As a result of dimerization, a deep binding cleft is formed in the camel protein whereas only a shallow cleft is present in the case of human monomeric protein. Thus the dimerization of camel protein has enhanced the binding affinity of camel protein by many fold as compared to the same protein from human source. In general, the potencies of innate immunity proteins from different species differ considerably. Thus for example, if camel protein is used or accordingly modified human protein is prepared and used, the fight against bacterial infections will improve substantially.
Biosketch:
Currently, Prof. T.P. Singh works as an SERB Distinguished Fellow in the Department of Biophysics at All India Institute of Medical Sciences, New Delhi. He is also a Distinguished Professor (Life-long) of Mysore University. His fields of research interests include X-ray Crystallography, Protein structure determination, Ligand and Peptide Design and Drug Discovery. He has published more than 420 research articles in the peer reviewed scientific journals. He has submitted more than 600 protein structures in the protein data bank (PDB). He received his M.Sc. degree in 1971 from University of Allahabad, He obtained his Ph.D. degree in 1976 from Indian Institute of Science, Bangalore, He worked as a post-doctoral fellow during 1978-80 in the Max-Planck Institute for Biochemistry in Martinsried, Germany. He was awarded D.Sc. (hc) degree in 2010 by Karnataka State Open University, Mysore. He is Fellow (FTWAS) of the TWAS, the World Academy of Sciences, Fellow (FNA) of the Indian National Science Academy, Fellow (FASc) of the Indian Academy of Sciences, Fellow (FNASc) of the National Academy of Sciences, Fellow (FBRS) of the Biotech Research Society of India and Fellow of the Alexander von Humboldt Foundation. He is the President of the Bioinformatics and Drug Discovery Society 2017-2019, he is President of the Biotech Research Society of India 2016-2018, 2019-2021, he was the President of the Indian Biophysical Society 2013-2015. He was also the President of the Indian Crystallography Association 2010-2013. He was a Vice President of the Indian National Science Academy 2007-2009. He was the Editor-in-Chief of the INSA journal, Proceedings of the Indian National science Academy.

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2. PROF. TAPAS KUNDU

**Title of the talk**: Epigenetics, life beyond gene sequence: Implications in health and disease

**Abstract**: The DNA sequence of living organisms codes for RNA and is referred to as ‘Gene’. However, the gene sequence alone cannot determine the regulation of gene expression (function) during development, signal response and disease manifestation. Small chemical modifications of gene (DNA sequence) and its associated proteins, such as DNA methylation, histone methylation, acetylation, phosphorylation etc. regulate the gene function on and above the gene sequence. Therefore, it is termed as ‘Epigenetics’. Epigenetics is related to not only our tissue type but also to all the activities, behavior and ability to fight diseases. We do inherit some epigenetic modifications, and this phenomenon is referred to as ‘Transgenerational Epigenetics’. But most of the epigenetic modification are trans-cellular and are closely linked to different diseases which are not hereditary. This phenomenon is universal and therefore applicable for the plant world also. Different biotic and abiotic stress induces several epigenetic modifications in plant system. In order to combat with heat, drought and pathogenic infections like in human, plant also alters the landscape of DNA methylation, histone modification and expression of several non-coding RNAs. Interestingly, genetic or chemical modulation of these modifications severely affect the plant defence mechanism and thereby survivality. Recent advances in our understanding of the epigenetic system in the plant suggest that like in human health, in plants also there are enormous scope to intervene the epigenetic health for better plant protection and crop production.

**Biosketch**: Prof. Tapas Kumar Kundu graduated in Agriculture (B.Sc Hons) from Bidhan Chandra Krishi Viswavidyalaya in 1986 and completed his master's degree in Biochemistry from University of Agricultural Sciences, Bangalore in 1989, winning a gold medal for standing first in the master's degree examination. He was awarded his Ph.D. from the Indian Institute of Science, Bangalore, in the year 1995 with the best thesis award. Following his Ph.D., he had a short stint as a visiting foreign research associate in the National Institute of Genetics, Mishima, Japan, followed by a post-doctoral fellowship at the Rockefeller University, USA (1996-99). He joined CSIR-Central Drug Research Institute as Director in 2018.
Prof. Kundu has made significant contributions in the area of regulation of gene expression and its link to disease and therapeutics. He is not only elucidating the mechanisms of transcription regulation through the epigenetic modifications, but also targeting them to design new generation diagnostics, as well as therapeutics. Over the years, he has published several research papers in many international journals. Several patent applications from the laboratory have been granted and some are under process, which includes several academically important research reagents with potential commercial values, some of which have already been commercialized by renowned companies. He is the recipient of several awards, noteworthy among which are: the Shanti Swarup Bhatnagar prize from CSIR (2005), the National Academy of Science, India- Reliance Industries Platinum Jubilee Award (2008), the Sir JC Bose National Fellowship from DST (2010), the GD Birla award for scientific research (2011), The Ranbaxy Research Award 2011 in the field of Medical Sciences – Basic Research and India Innovation Award 2012 given by Merck Millipore 2012 (First place). He is the fellow of three major national academies of India and served as an editorial board member of the *Journal of Biological Chemistry (JBC)* from 2011-2016. He was instrumental to establish the *Asian Forum for Chromatin and Chromosome Biology* and *Chemical Biology Society, India*. Besides fundamental research, Prof. Kundu is also involved in teaching and organizing science outreach programs. His popular lectures on ‘Genes, Disease and Therapeutics’ have benefitted high school and college students greatly.

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3. PROF. GANESH NAGARAJU

Title of the talk: RAD51 paralogs: Unraveling the new roles in genome stability and tumor suppression

Abstract: RAD51 recombinase plays a central role in homologous recombination (HR) mediated repair of DNA double-strand breaks (DSBs). Mammalian cells encode five RAD51 paralogs: RAD51B, RAD51C, RAD51D, XRCC2 and XRCC3. These paralogs have been implicated in repair of DSBs by HR and DNA damage signaling. Mouse knockout of any one paralogs leads to embryonic lethality, implying the essential functions of RAD51 paralogs in genome maintenance. In addition, RAD51, RAD51C and XRCC3 have been shown to localize to mitochondria and contribute to stability of the mitochondrial genome (mtDNA) during oxidative stress. Recent studies show that germline mutations in RAD51 paralogs cause breast and ovarian cancers as well as Fanconi anemia (FA)-like disorder. Using pathological RAD51C mutants our lab showed that RAD51C distinctly regulates DNA damage signaling and repair. We showed that RAD51C binding partner XRCC3 S225 undergoes phosphorylation in an ATM/ATR dependent manner and this phosphorylation is crucial for the execution of intra-S-phase checkpoint and DSB repair by HR. In an effort to understand the essential roles of RAD51 paralogs, our investigations revealed that RAD51 paralogs in distinct complexes regulate replication fork stability and its restart. We also showed that RAD51C and XRCC3 facilitates mitochondrial DNA replication and maintains the stability of mitochondrial genome. Our recent work shows that XRCC2 restrains pathological fork progression during dNTP alterations and safeguards the genome integrity. The fork restraining function is dependent on XRCC2 S247 phosphorylation by ATR kinase. Together, these data provide evidence for the new roles of RAD51 paralogs in genome maintenance and tumor suppression.

Biosketch:
Ganesh Nagaraju did his Ph.D at Indian Institute of Science, Bangalore, and for his excellent thesis work in the area of recombination mechanisms in mycobacteria he received Prof. K.V. Giri memorial best thesis award in 2003. He carried out his postdoctoral studies at Harvard Medical School and Beth Israel Deaconess Medical Center, Boston USA between 2003-2007. During his postdoctoral training Prof. Ganesh has discovered that genetic mutations in DNA repair genes leads to gene amplifications - an hallmark feature of cancer cells. After establishing his lab at IISc in 2007, he has been...
working on DNA damage responses, chromosome instability genetic diseases and cancer and has made outstanding contributions in this area. He has demonstrated that RAD51C is indeed a Fanconi anemia and breast cancer susceptibility gene, and RAD51C mutant tumor cells can be specifically targeted by low dose of ionizing radiation and PARP inhibitors. He also showed new roles of RAD51 paralogs in the protection and restart of stalled replication forks which provided insights into tumor suppressor and essential functions of RAD51 paralogs in genome maintenance. He has published more than 38 publications including many in high impact journals like Cell Reports, Molecular and Cellular Biology, Nucleic Acids Research and Journal of Biological Chemistry. For these contributions he has received B.M. Birla, National Bioscience from DBT and Sir C.V. Raman young scientist award from Karnataka Government. In 2018 he also received prestigious Shanti Swarup Bhatnagar award from CSIR. He is an elected fellow of National Academy of Science, Allahabad.

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Title: Climate Smart Agriculture for Food Security

1. DR. C. TARA SATYAVATHI

Title of the talk: Pearl millet for Nutritional Security and Rural Development

Abstract: Pearl millet [Pennisetum glaucum (L.) R. Br.] is the staple nutritious food of majority of the poor and small land holders, as well as feed and fodder for livestock in rainfed regions of the country. Pearl millet excels all other cereals due to its unique features - C4 plant with high photosynthetic efficiency, high dry matter production capacity grown under the most adverse agro-climatic conditions with less inputs in short duration where other crops like sorghum and maize fail to produce economic yields. In India, pearl millet is the fourth most widely cultivated food crop after rice, wheat and maize. During 2017-18, pearl millet was grown in 7.4 million ha with an average production of 9.13 million tonnes and productivity of 1237 kg/ha (Directorate of Millets Development, 2019).

The major pearl millet growing states are Rajasthan, Maharashtra, Gujarat, Uttar Pradesh and Haryana which account for more than 90% of pearl millet acreage in the country and commonly grown in rainy (kharif) season (June/July–September/October). It is also cultivated during summer season (February–May) in parts of Gujarat, Rajasthan and Uttar Pradesh; and during the post-rainy (Rabi) season (November–February) at a small scale in Maharashtra and Gujarat. Due to the excellent nutritional properties and resilience to climate change, pearl millet along with other millets is renamed as nutri-cereal (Gazette of India, No. 133 dtd 13th April, 2018) for production, consumption and trade and included in Public distribution system.

Development of high yielding, dual purpose disease resistant cultivars for low rainfall areas i.e. A1 zone is of utmost priority for increasing pearl millet productivity at national level. Refinement of technologies for processing of grain, development of value added products along with development of sound extension support for popularization of these technologies and products; spread of pearl millet cultivation in nontraditional areas and pearl millet hybrid seed production in North - Western part of the country is the need of the hour. These changes will certainly add to the national efforts of doubling the farmer’s income. Through ICAR- All India Coordinated Research Project on Pearl millet, a total of 167 hybrids and 61 varieties were identified and released for cultivation in different agro-ecological zones of the country. Pearl millet is the first crop where MAS strategies and tools have been applied to develop "Improved HHB 67".
Pearl millet is a good source of energy, carbohydrate, fat, ash, dietary fibres, iron and zinc. It is high in fibre (1.2g/100g) and in α-amylase activity when compared with other grains. Pearl millet is gluten free and retains its alkaline properties after being cooked which is ideal for gluten allergic people. It is a rich source of vitamins like thiamine, riboflavin and niacin and minerals (2.3mg/100g) like potassium, phosphorous, magnesium, iron, zinc, copper and manganese. Pearl millet is rich in fat content (5mg/100g) with better fat digestibility. It is rich source of unsaturated fatty acids (75%). It has high proportions of slowly digestible starch (SDS) and resistant starch (RS) which contribute to low glycemic index (GI) and is the need of the transforming diets, food habits and the food industry.

Biosketch:
Tara Satyavathi received her Ph.D in Genetics from I.A.R.I., N. Delhi – Gold Medalist and M.Sc. (Ag) in Genetics and Plant Breeding from Agriculture College, Bapatla, ANGRAU – Gold Medalist. She is serving as Project Coordinator, ICAR- All India Coordinated Research Project on Pearl millet, Jodhpur, Rajasthan from April, 2017 to till date. She served as served as Principal Scientist – Division of Genetics, Indian Agricultural Research Institute, New Delhi -12 August 2010 to March, 2017. She received outstanding research contribution for Pearl millet improvement in the country award from Society for Millet Research and All India Coordinated Pearl Millet Improvement Project, Mandor-2008. She received Best Multidisciplinary research in Pearl millet improvement award from Society for Millet Research and All India Coordinated Pearl Millet Improvement Project, Mandor-2018.

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2. **R. CH. SRINIVASA RAO**

**Title of the talk**: Building Climate Change Preparedness for Sustainable Agriculture In India

**Abstract**: The livelihood and food security of billions of people who are dependent on agriculture is threatening by the climate change. Agriculture sector is highly susceptible to the change in weather conditions leaving the people poor who are involved in agricultural activities for their livelihood. At the same time, agriculture emits significant amounts of greenhouse gases (GHGs) which is one of the principal cause for climate change. Due to consistent warming trends and extreme climatic events, farmers need to be prepared by modifying the existing farming practices through adaptation techniques that combat climate change. Otherwise it is expected to have a multifaceted impact on agriculture; rather climate change is an additional burden on efforts to meet the long-term development goals. We cannot address the food security without addressing the climate change. Transformation into climate-resilient system would be the appropriate and possible solution to achieve the sustenance in agriculture. Sustainable agriculture seeks to sustain the producer, resources, and the communities by providing profitable yields and promoting clean environment. It helps the agricultural production adjust to the new realities brought by climate change. Building preparedness through climate change mitigation options like improving crop and grazing lands to increase carbon storage; restoration of degraded lands; improving rice cultivation techniques; judicious application of chemicals and fertilizers; improved energy use efficiency; biodiversity and watershed conservation; developing drought and flood resistant varieties; crop residue and weed management; changing sowing dates; better pest and disease management; improved moisture conservation techniques; better soil conservation methods; agroforestry practices; improved livestock and fishery management etc. contributes more to the sustainable agriculture. Adaptation for climate change in agriculture is not going to be easy and inexpensive. In fact, some financing methodologies need to be improved. Current and future funding on climate adaptation and sound development of climate related policies are required to address climate change. Integration of information on climate change risks and adaptation planning is one of the priorities for sustainable agriculture. Therefore, every individual farmer, private organizations, government, community groups are required to create awareness on climate change and implement the suitable climate adaptation and mitigation techniques in agriculture to meet the food requirement as well as income to the present and future generations. Adaptation of sustainable agriculture reduces the GHG footprints, satisfies the human needs, and balances the planet resources. Several national programs and policies are contributing climate change preparedness besides state programs. In this light, overcoming social, financial, and political barriers to
adaptation to climate change and preparedness for the future risks of climate change through sustainable agriculture is imperative for the welfare of the society and the environment.

Biosketch:
He received his Ph.D from IARI (1988-92), New Delhi and Post-Doctoral from Tel-Aviv University, Israel. Worked at Indian Institute of Soil Science-Bhopal, Indian Institute of Pulses Research-Kanpur, ICRISAT, Patancheru and CRIDA, Hyderabad, Project Coordinator (All India Coordinated Research Project on Dryland Agriculture) (2013-14), Director, ICAR-Central Research Institute for Dryland Agriculture (2014-17) and Director, ICAR-National Academy of Agricultural Research Management (2017 to till date). He led as National Coordinator for ICAR-flagship program on Climate Change, NICRA. He was technical Chairman of National Mission for Sustainable Agriculture (NMSA), Climate Change Negotiator in Indian delegation represented at UNFCCC, SBSTA, COP meetings at Germany and France. Executive Board Member of International Dryland Development Commission, Cairo, Egypt and Member, Asian Carbon Network Group, Japan. Received prestigious awards from Hon’ble President of India and Hon’ble Prime Minister of India. Received Best Emerging Technology Business Incubator Award from DST, Govt. of India.

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3. PROF. A. ARUNACHALAM

Title of the talk: Agriculture and Food policies in India

Abstract: With our billion plus population constituting about 17 % of world, food security has to be the core agenda of Agricultural Development. The task becomes much more challenging considering the population growth and limited availability of land and water resources i.e. about 2.3 % of global land and about 4.2 % of water resources. Added to this is the issue of improving the income levels of about 60% of the population dependent for their livelihood on Agriculture that constitutes just 14% of the GDP. Sustained growth in Agriculture sector is essentially required from crop diversification, agri-processing, and secondary agriculture to provide ancillary income to the farmers. The food grain production has increased more than five fold in the past four decades, mainly due to availability and adoption of high yielding crop varieties, inputs and farm machinery, key ingredients of the ‘Green Revolution’. The country adopted good agriculture practices (irrigation, improved seeds, fertilizers, plant protection) well supported by investments in agricultural research & development and irrigation development. Assured minimum support prices of key commodities encouraged the farmers to produce more. Consequently, food grains production has increased from 82 million tonnes in 1960-61 to 300+ million tonnes in 2017-18. It is noteworthy that 190 million tons more food grains have been produced during the 2017-18, exceeding the production targets for each of the food crops especially the pulses, which crossed 22 million tons mark for the first time from 14 million tons stagnating for the past decade.

The researchers, policy makers and farmers are seized of the problems of growth and sustainability of the agriculture sector. This can be rectified through a mix of technological developments and appropriate agricultural policies and synergizing them with the dynamism of the farming community. Interdisciplinary approaches, many from outside the traditional agricultural approaches, needs to be involved for breaking yield barriers. Not only the food security but also the nutritional security is of paramount interest as anaemia is increasingly engulfing rural India due to iron deficiency. Vitamin A and Zinc deficiency are also becoming common in India.

Changing economies both at macro level (globally or nationally) as well as micro level (household level) is putting significant change in the tastes and food preference of the people. Consequently, the consumption pattern of Indians is undergoing significant changes. This has diversified the food demands towards high value products like fruits and vegetables, milk, meat, etc. this is again likely to put pressure on agriculture to increase the resource allocation amongst competing commodities. To meet the challenges of the 21st Century, particularly concerning feeding the swelling population of our country, heavy
investments for developing the requisite infrastructures and other areas of agriculture are essentially required. The same becomes more important in view of the increasing extreme weather events, while exploring options to meet the sustainable development goals.

**Biosketch:**
Present Position: Principal Scientist & Assistant Director General (International Relations), Indian Council of Agricultural Research, New Delhi, 2009 to date.
Awards: ICFRE Awards for Excellence in Forestry – 2018, Indian Council of Forestry Research and Education, Dehradun; Dr. M.S. Swaminathan National Award for Outstanding Research in Hill Agriculture (Biennium 2017-18), ICAR Research Complex for NEH Region, Umiam; Dr. Dr. J. Venkateswarlu Award for Excellence in Dryland Agriculture Research for the year 2017, Indian Society of Dryland Agriculture, Hyderabad; Dr. K.G. Tejwani Award for Management of Natural Resources (biennium 2002-03)
Research Areas: Agroforestry, Restoration Ecology & Natural Resource Management

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4. PROF. CHANDRA NAYAK

Title of the talk: Current status of Pearl Millet diseases and it’s Management Approaches

Abstract: Pearl millet (Pennisetum glaucum (L.) R. Br.) is one of the most widely grown millet and an important crop in India and Africa, extensively cultivated in arid and semi-arid regions after rice, wheat and sorghum. India is the single largest producer of pearl millet in the world, Rajasthan state being the largest producer of pearl millet in India. The crop is best suited for areas with low soil fertility, drought, high temperature, low pH or high salinity. In comparison to maize and sorghum, pearl millet has a higher level of heat tolerance and is more efficient in utilization of soil moisture. India is the largest producer of pearl millet in terms of both area and production. Pearl millet plays an imperative role in the food and energy security to the rural people especially in the rain fed areas thereby supplants other major cereals which are not otherwise feasible to cultivate. Pearl millet is affected by a number of diseases caused by fungus, bacteria, virus, oomycetes and nematodes, among which few are economically very important, namely downy mildew, blast, rust, ergot and smut. Among various constraints in attaining high grain yield potential of improved pearl millet cultivars in India and in Africa, downy mildew disease is considered as one of the major problem. Nevertheless, in last decade, blast disease of pearl millet has emerged as a very serious threat. The severity of rust disease has also amplified; most likely this alteration is mainly attributed to changing climate. The use of host plant resistance is the most suitable approach in managing these diseases as pearl millet is grown on the resource poor soils under ruthless climatic conditions and by resource-poor farmers of Africa and India. Due to commercialization of new hybrids in the past two decades in India, the status of downy mildew infestation has changed, resulting in new virulent strains. In the meantime, severe outbreaks of Magnaporthe blast disease have been reported in pearl millet growing states of India during the past five years. Rust disease, which was reported limited to post rainy sowings, has turned out to be severe in rainy and summer crops. These findings indicate the need to recognize novel sources of resistance to be employed in the pearl millet breeding program. Management practices aim at reducing the disease impact on the crop and prevent crop loss. In this process, the main objective is to reduce the primary inoculum source and subsequently to prevent the secondary spread. This can be achieved by using disease resistant cultivars which is most economical and practical to farmers. Continuously monitoring in the shift in virulence of pathogen and breakdown of resistance in the released hybrids in the farmers’ fields is critically important to keep track of development of new virulent pathotypes of pathogen in order to identify the sources of resistance and incorporate them in new parental lines of hybrids. In addition, cultural practices
and chemical control can also be adopted by the farmers wherever it is feasible. Integrated approach for disease management includes using host resistance, chemicals and bioagents. Identified and formulated several environmentally safe fungicides, bioagents, and plant growth promoting rhizobacteria, by many researchers for the management of major diseases of pearl millet. A interface between pathologists and breeders would assist develop disease resistant and durable hybrids and varieties in pearl millet to prevent losses caused by major disease causing organisms.

**Biosketch:**
Dr. S. Chandra is an agricultural biotechnology researcher specialized in the application of biotechnological tools in plant pathogen detection, host-pathogen interaction and plant disease management. He has 20 years of experience in research including visiting researcher at Danish Government institute for seed pathology (Copenhagen University), Denmark, China Agricultural University, Beijing, China, International Crops Research Institute for the Semi-Arid-Tropics (ICRISAT), Hyderabad, India. He is recipient of prestigious Japan International Award for Young Agricultural Researchers 2017. Working as Principal Scientist- ICAR at University of Mysore in Indian Council of Agricultural Research (ICAR), responsible for research works in “Genome-wide analysis of Sclerospora graminicola the causal agent of downy mildew of pearl millet and characterization of effector candidates”. His laboratory is one of the leading research laboratories on pearl millet downy mildew research in India. We are mainly working on the following three major areas of pearl millet disease, viz., biology of the pathogen, biochemical and molecular aspects of host-pathogen interaction, epidemiology and management of the disease. His group is the first group in the world who sequenced full length genome of biotrophic highly virulent strain of S. graminicola and he is the key person involved in this study. He contributed significantly on seed health technology and Molecular plant pathology, biological control of plant pathogens and molecular detection and characterization of seed-borne pathogens. His research findings will help the researchers/Scientists/quarantine peoples/Private company personnel/ to understand the implication of novel molecular markers for accurate and rapid detection and characterization of plant pathogens. He won several awards for his significant research contribution in the area of Agriculture Biotechnology.

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Title: Use of Indian Medicinal Plant Based Drugs in Context of Rural Healthcare

I. PROF. AVIJIT BANERJI

Title of the talk: Investigations of Indian Medicinal Plants

Abstract: The uses of medicinal plants have been documented for centuries in the Indian schools of traditional medicine. Indian medicinal plants came under modern scientific scrutiny only since the end of the nineteenth century. At Calcutta University, Acharya Prafulla Chandra Ray initiated work on a few medicinal plants. His lead was followed by Dr. P. K. Bose and Professor (Mrs.) Asima Chatterjee, who built up a flourishing school of Natural Products research. She edited two series of publications, viz. Bharater Bonousudhi (Indian Medicinal Plants - in Bengali) and Treatise on Indian Medicinal Plants (6 volumes), and took steps to establish a Research Institute on development of drugs from Indian medicinal plants at Kolkata - now the Central Ayurveda Research Institute for Drug Development (CCRAS) under the Ministry of Ayush.

Her research group investigated a large number of indigenous medicinal plants: the isolation, characterisation and synthesis of their chemical constituents were achieved and their biological properties investigated. The Natural Products isolated included indole and steroidal alkaloids, coumarins and other polyphenolics, Piper amides and terpenoids. Plants investigated included Rauwolfia canescens and other Rauwolfia species, Alstonia scholaris (Saptaparna) and other Alstonia species, Rhazya stricta, Bacopa monnieri (Brahmi), Marsilia minuta (Susni), Nardostachys jatamanshi (Jatamanshi), Swertia chirayata (Chirata), Ferula assafoetida (Hing), Aegle marmelos (Bael), Prangos pabularia, Jatropha gossypifolia, Hemidesmus indicus (Anantamul), Caesalpinia indica (Kuberakshi), Pongamia pinnata (Karanja), Wrightia tinctoria (Indrajau), Piper longum and other Piper species. Among the drug formulations developed were the anti-epilepsy Ayush 56, anti-malarial Ayush 64 and for treatment of psoriasis.

The research work of Professor Chatterjee’s group was followed up in subsequent years by those of her students and others and are still continuing. This presentation will highlight the earlier work and link-up with later investigations.
Biosketch:

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2. PROF. CHANDRA SHEKHAR MATHELA

**Title of the talk**: Himalayan Valerian: Exploiting chemical diversity as potential contributor in rural healthcare and improving economy of hill region

**Abstract**: Biodiversity has been source of numerous bioactive lead molecules for drug discovery in the changing scenario of pharmaceutical industry. Some important anticancer, antimalarial and antihypertensive drugs have their roots in traditional herbal remedies. Traditional medicines aim to restore balance by mixing together different plant species and often result into maximizing a synergic effect to make it more effective. There is a great scope for traditional herbs to make a great contribution to health care. One such genera is *Valeriana* widely occurring in the high altitude of the Himalayan region. Chemical composition screening and molecular structure studies greatly enable possibility of new molecules for drug formulation. Newer approaches like chemoprofiling coupled with sophisticated analytical techniques and bioactivity determinations of can result into new biomolecules and important phytomedicines. These include a variety of bioactive sesquiterpenoids and valepotriates as well.

Modern research in drug discovery from medicinal plants involves a multifaceted approach combining phytochemical, bioprospecting, pharmacological and hyphenated analytical techniques (GC-MS/MS, LC-MS/MS, GC-FTIR, LC-NMR, ICP-MS) have contributed in the standardization, validation, trace analysis and study of marker compounds of herbal medicines. Traditional medicine involves knowledge, skills and practices based on theories and experiences indigenous to different cultures. It is convenient source of healthcare to millions being accessible and affordable for many living in remote areas. *Valeriana* species (Valerianaceae) has been used as phytomedicines for curing nervous unrest, emotional troubles, epilepsy and insanity. *Valeriana wallichii* (*V. jatamansi*) has common occurrence in Himalayan region. Various other Valeriana species have traditional use in USA, Europe, China and Japan. Our results on large number of Himalayan *Valeriana* species have brought to light new species with unique chemical compositions which can be source of new pharmaceuticals and molecules of commercial importance. Some species possess compositions similar to Japanese Valerian drug prepared from *V. faurie*. Some of Himalayan Valerian species have also potential as developing new sources for use in rural health care and as source of expensive flavor chemicals. These species could be cultivated, commercialized and exploited by the rural population for economic development of the region.
**Biosketch:**

Educational Qualifications: MSc (Organic Chemistry) - 1969; Kumaun University - PhD (Chemistry) - 1976.

Kumaun University, Nainital, Chemistry Department - Academic/Teaching Experience: UG & PG Courses for 41 years, of which Professor (1995-2010); Emeritus Scientist CSIR, 2010-2015. Former: Head, Department of Chemistry & Dean, Science Faculty; Head, FIST; Director, Research & Extension. Emeritus Professor (2010 - present). Consulting Advisor R&D: DS Group, NCR (2016-2019; Three years)


Research Specialisation: Natural Products; Himalayan Medicinal Plants.

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3. DR. JAYRAM HAZRA

Title of the talk: Evidence-based Ayurvedic Drugs and Scientific Validation

Abstract: “Drugs from Indian Medicinal Plants: Traditional Approach to Modern Usage; Relevance to Rural Healthcare”

The uses of Traditional Schools of healthcare are gaining importance worldwide. Among the advantages are the low costs, and relative absence of side-effects which sometimes attend the use of synthetic drugs. The topic is pertinent to Rural Health care.

Biosketch:

Educational Qualifications: BAMS - J .B. Roy State Ayurvedic Medical College & Hospital, University of Calcutta - 1983; M.D. (Ay.) - Institute of Medical Sciences, Banaras Hindu University - 1988 Dravyaguna;


Research Specialisation: Dravyaguna (Ayurvedic Pharmacology) and clinical trial.

Research Projects carried out as Principal Investigator: 19

Member: State Medicinal Plants Board, Government of West Bengal; Board of Academy: Post Graduate Ayurvedic Education, WBUHS; Member, Governing Body; Bengal Institute of Pharmaceutical Sciences; Board of Director; West Bengal Pharmaceutical Phytochemical and Development Corporation; Member , Governing Body; Rajib Gandhi Memorial Ayurveda College & Hospital, West Bengal.

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Title: Technology in Sericulture and Climate Changes for Rural Development

I. DR. P.J. RAJU

Title of the talk: BmNPV Resistant Transgenic Silkworm – An Epoch making technology

Abstract: Transgenic silkworm Bombyx mori resistant to Bombyx mori Nuclear Polyhedrosis Virus (BmNPV) has been developed using RNA interference technology. The viral genes viz., ie1, lef1, lef3 and P74 were targeted to achieve resistance. The trait has been introgressed in commercially used strains CSR2 and Nistari of B. mori by recurrent back crossing. In multi-generation experiments in contained conditions, the transgenic strains have exhibited effective resistance to BmNPV infection that has been estimated to cause around 40-60% of the total cocoon crop loss to silk growing farmers in India. The identified hybrids [PM x CSR2 (Tg); CSR2 (Tg) x CSR4 and Nistari (Tg) x (SK6 x SK7)] were tested for efficacy of resistance and various silk parameters in multiple locations across the country. Results have shown a 20-30% increase in pupation rate in the transgenic hybrids as compared to controls, leading to economic advantage. Biosafety evaluation for impact on health and environment has also been undertaken in parallel to demonstrate safety of transgenic silkworm as per the applicable rules. The results of multilocation trials and biosafety assessment shall be presented. Efforts are underway to undertake expanded studies to establish environmental, economic and social benefits on a larger scale, with greater farmer participation.

Biosketch:
Dr. P. J. Raju started his Research career in the year 1983 at University of Mysore in Silkworm Breeding and Genetics and obtained his PhD. He joined Karnataka State Sericulture Research and Development Institute (KSSRDI) during the year 1992 and has conducted research especially for Rainfed Sericulture. He was also instrumental in bringing nearly 75 tribals to mainstream Sericulture through the project entitled, “Socio-economic empowerment of tribals through State-of-art technologies in Sericulture”. Presently, Dr. P.J. Raju is working as the Director of Andhra Pradesh State Sericulture Research and Development Institute.
Research and Development in Sericulture especially in the development of new silkworm breeds/hybrids with reference to disease resistance including abiotic stress. He is associated with Centre of Excellence for Genetics and Genomics of Silkmoths in collaboration with Centre for DNA Fingerprinting and Diagnostics, Hyderabad, India in developing transgenic silkworm stocks. In addition, the Biotechnology Industry Research Assistance Council (BIRAC), New Delhi has funded for the project entitled, “To conduct Multilocational Field trials on Transgenic BmNPV resistant Silkworm hybrids to establish their efficacy and generate data for their regulatory approval” wherein the efficacy studies have proved the worthiness of transgenic hybrids at various test centres across India. Besides, he has to his credit, several silkworm hybrids developed by him which have been authorized by Central Silk Board, Ministry of Textiles, Govt. of India and some of these hybrids are under commercial exploitation. Currently Dr. Raju is Coordinator/ Principal Investigator for several of the projects on development of thermotolerant Silkworm breeds, Sex limited breeds including that of extension and training related projects sanctioned by Dept. of Science and Technology, Dept. of Bio-technology, Govt. of India, NABARD, RKVY, ICAR, New Delhi and Central Silk Board, Bangalore, India. The Dept. of Sericulture, Govt. of Andhra Pradesh assigned Silkworm Seed Production activity to Dr. P. J. Raju to streamline and strengthen the Silkworm Seed Sector.

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2. DR. GAUTAM GOSWAMI

Title of the talk: Technology vision 2035: A Technology Perspective for India’s Development

Abstract: Technology Information, Forecasting and Assessment Council (TIFAC), a technology think tank under the Department of Science and Technology (DST), Government of India, keeps an eye on technology trends and try to delineate possible technology trajectories that the country need to pursue. TIFAC commended Technology Vision 2020 to the nation in 1996 under the leadership of Dr A P J Abdul Kalam with an objective to make India a developed nation.

Changes in the global economic scenario, growing aspirations of Indians for better living and innate desperation for faster, had prompted TIFAC to delineate a vision for the country in the beginning of 2011 and thus TIFAC prepared the Technology Vision 2035 document which was released by Hon’ble Prime Minister of India, Shri Narendra Modiji in 2016 in the 103rd Indian Science Congress at Mysuru. This document has been prepared on a consultative framework taking into account India’s capabilities and constraints, regional aspirations, priorities & disparities.

This technology vision 2035 roots itself into the collective aspirations of the people of India, the ambitions of our youth and the likely expectations of Indians in 2035 as the country grows. It builds on the perceived needs of our compatriots and enunciates them in the form of 12 prerogatives – 6 individual and 6 collective. Apart from describing these prerogatives and specific targets for each, critical technologies that would help achieve these prerogatives are identified and placed them on a time scale viz. Technologies ready for deployment, Technologies that need to be moved from lab to field, Technologies those are in R&D stage and Technology that are still in imagination stage. Artificial Intelligence, IOT, Brain Computer Interface (BCI), Artificial Photosynthesis, Interactive Food, Self Healing Pipelines, Homeostatic Diamond Trees (Artificial Tree) etc. are few to mention from the entire gamete of technologies which will definitely attract the attention of research community.

Further, India’s capabilities and constraints in ensuring delivery of technologies are also discussed in detail in this report. A set of 10 Grand Challenges have also been identified. Realisation of these grand challenges and prerogatives would not only be necessary to address the needs of diverse sections of our country but also should help us emerge strong in technologies of relevance to us.

In this plenary lecture, insights from this report will be presented and the methodology adopted in delineating the technology vision for India will also be touched upon.
Biosketch:
Dr. Gautam Goswami is the Head “Technology Vision 2035” Programme in Technology Information, Forecasting and Assessment Council (TIFAC), Dept of Science &Technology, Govt. of India. Dr. Goswami is also heading climate change projects in TIFAC. He coordinated Technology Vision 2020 Agriculture demonstration projects in different parts of the country where he worked closely with Dr. A. P. J. Abdul Kalam, Former Hon’ble President of India. He is trained in technology foresight from “School of International Future (SOIF), UK. He also participated in the exercise for preparing a document on “World 2050” by OECD conducted in Paris. Under his leadership, TIFAC prepared Technology Needs Assessment report for India in the context of Climate Change. Dr. Goswami conducted panel discussions on technology aspects of Climate Change in COP 21, COP 22, COP 23 and COP 24 in Paris, Morocco, Bonn and Katowice, Poland respectively. Dr. Goswami gives training to private and public sector organizations on Foresight and its application in decision making process. Recently, Dr. Goswami has taken the lead role in preparing the Policy on “Scientific Social Responsibility” in association with DST. Academically, he is Ph.D. in Agricultural Chemistry and Soil Science from University of Kolkata. He has written a chapter in “Clay Research” published in Australia. Before joining TIFAC, Dr. Goswami was guest lecturer in University of Kolkata prior to joining in TIFAC.

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3. Mugdha Sinha

Title of the talk: Putting science in service of society through policy design

Abstract: The talk will focus on the role of governments as facilitators and catalysts in designing policy architecture for putting science in the service of society. The science of today is the technology of tomorrow and yet we are unable to fully grasp or utilize the potential of data backed research and evidence based scholarship for solving real life problems of our society. Therefore, what is required is a twofold approach—one, to break the silos in which research happens un-understood or unappreciated by society and second, to align the priorities of the welfare state with research and innovation in a meaningful manner that leads to science and research as bellwethers for problem solving. The keyword is convergence between our aspirational socio-economic goals (including our SDG goals) and outcomes in terms of providing a better quality of life to our citizenry at the micro level and better performing human development indices at the macro level. This convergence necessitates that governments act as a bridge between science and society using all tools at its command to make interaction between its stakeholders a two-way street where society acts as demandeurs and science acts as solution and service providers. This tripartite handshake between the scientific community in universities, colleges and institutions, government departments and society at large is the imperative need of the hour and can come about only through impactful policy design and government intervention through its policy architecture. How this is being done in Rajasthan in a significant manner will be the focus of my deliberations.

Biosketch: Mugdha Sinha is a civil servant of the Rajasthan Cadre with two decades of experience in policy making and international trade negotiations. She is currently holding charge as Secretary Science & Technology, Government of Rajasthan. She was previously the Secretary Food, Civil Supplies and Consumer Affairs in the State of Rajasthan where she leveraged IT and Data Analytics for bringing in transparency and accountability in Public Distribution System with an outreach of 450 million consumers. She has huge experience in the field of Industry and Commerce, having worked as MD RIICO and Commissioner Delhi Mumbai Industrial Corridor (DMIC) in the...
State and as Director of Foreign Trade for NAFTA and Latin America Regions as well as Director of Export Promotion for Commodity Divisions of Textiles and Marine Products, in the Ministry of Commerce, Government of India. She was also the Lead Negotiator and Coordinator for the India-Canada CEPA Negotiations from 2014 to 2016. She received her Honours Degree in History from Lady Shri Ram (LSR) College where she not only topped the College but was also the recipient of the Manorama Desai Best Student Award in History and the Principal’s Prize for Promoting the Academic Ethos of the College. She also holds a Masters Degree in Philosophy (MPHIL) (International Diplomacy) from the Jawaharlal Nehru University in New Delhi. She has also been an EPPI Spring 2016 Executive Program Fellow in Public Policy for Internationals at Goldman School of Public Policy, University of California at Berkeley, USA. Ms. Sinha has received various awards including a Letter of Commendation from the Election Commission for her work as DEO of Hanumangarh and Jhunjhunu (2012), the State Award for Best District in the PrashashanGaonke Sang Revenue Campaign (2010), the Director’s Gold Medal for the Best Judicial Assignment in LalBahadurShastri National Academy of Administration (2001), the Manorama Desai Prize for the Best Student in History from Lady Shri Ram College (1994-95 and the Principal’s Prize for Promoting Academic Ethos of the College from Lady Shri Ram College (1992-95), among others. She was also the Best All Round Student in her School at St Patrick’s Jr College (CJM). Currently, she is also the Literary Secretary of the IAS Association, Rajasthan, where she curates Book-Author Talks for the civil servants and civil society. The Literary Society has an Instagram handle @iaslitsoc and a facebook page by the same name.

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4. PROF. N.B. RAMACHANDRA

Title of the talk: Genomic Variations and Human Health

Abstract: Human diseases and sufferings are as old as humanity. The problems of genetic diseases are enormous, causing sufferings to millions of people. Genomics is the study of the genomes particularly the set of techniques, analytical methods and scientific questions special to the study of complete genomes. Genomics offer a powerful opportunity to identify highly conserved motifs in coding and noncoding genomic DNA which in turn helps us to predict protein-coding regions, regulatory elements within DNA and also identification of disease-genes. At present, several millions of individuals genomes and exomes are sequenced and the variations are recorded which are being used for treating many diseases. Over the decade, the medium of analysis of human genetic variations in genomes of patients with many disorders is indeed changing society into an era of personalized medicine. Molecular genetic markers namely, Single Nucleotide Polymorphisms, Microsatellites, Insertion/deletion polymorphisms and Copy number variations (CNVs) are the most powerful tools for the analysis of genomes and enable the association of heritable traits with underlying genomic variations. Advancement in high-throughput technology and bioinformatics pipelines help to detect combinations of various DNA variants and relate to disease mechanisms and phenotypes. Some of our findings in genomics will be discussed.

Biosketch:
Dr. Nallur B. Ramachandra is a distinguished academic career with distinctions at Bachelor’s and Master’s Degrees. He joined the University of Mysore as a Lecturer in Zoology in 1992. Since then he is being serving the University at different academic positions. He was instrumental to start M. Sc. genetic course and since 2015, he is the Chairman of the Department of Studies in Genetics and Genomics, University of Mysore. In addition to his teaching and research responsibilities in Zoology and genetics and genomics department, he is actively involved in giving courses to M.Sc., Biotechnology, Microbiology and Genetics students of other Universities. He has completed 16 research projects successfully. He is collaborating with many National and International labs. His research interests are in the field of Drosophila Genetics and evolution, Human genetics and Genomics. His significant contributions includes evidences for adaptive genome evolution in Drosophila, identification of SNPs, inDELs and CNVs for several complex human
genetic diseases, advanced grandmother age as a cause for Down syndrome in India, identification of a new recombining region, PAR3, in human sex chromosomes and establishment of University of Mysore Genome Centre database. Dr. Ramachandra has published 200 research papers in highly reputed National and International peer reviewed journals. He has delivered 200 invited lectures including UGC educational TV programs. His contributions to science have been recognized by the State and central Government of India and awarded several Awards. In 2017, he was elected as fellow of Indian Academy of Sciences, Bangalore.

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Title: New Paradigm in Health Care System of India Under Ayushman Bharat Yojana

I. DR. SATYAMURTHY

Title of the talk: Ayushman Bharath and Tele Health

Abstract: Ayushman Bharat yojana or National Health protection scheme is a centrally sponsored scheme launched in 2018, under the Ayushman Bharat Mission of MoHFW in India. The Scheme aims at making interventions in primary, secondary and tertiary care systems, covering both preventive and promotive health, to address healthcare holistically. It is an umbrella of two major health initiatives namely, Health and Wellness centers and National Health protection scheme (NHPS).

The National Health Policy, 2017 has envisioned Health and Wellness centers as the foundation of India’s health system which the scheme aims to establish.

1. National health Protection Scheme
Ayushman Bharat – National Health Protection Scheme, which will cover over 10 crore (One Hundred Million) poor and vulnerable families approximately 50 crore (Five hundred million) beneficiaries providing coverage up to 5 Lakh rupees ($7,100) per family per year for secondary and tertiary care hospitalization.

Benefits of the scheme are portable across the country and a beneficiary covered under the scheme will be allowed to take cashless benefits from any public or private empanelled hospitals across the country.

It will be an entitlement based scheme with entitlement decided on the basis of deprivation criteria in the SECC database. It will target about 10.74 crore poor, deprived rural families and identified occupational category of urban workers families as per the latest socio-Economic Caste census (SECC) data covering both rural and urban. One of the core principles of Ayushman Bharat – National Health Protection Mission is to provide cooperative federalism and flexibility to states.

2. Wellness centres.
Under this program 1.5 Lakhs centers will be setup to provide comprehensive health care, including for non-communicable diseases and maternal and child health services, apart from free essential drugs and diagnostic services. The government will upgrade existing public health.

3. Tele Health for Ayushman Bharath
Tele health programs adopted by the central & state Government ministry of Health as a part of providing ubiquitous health care will be the paradigm shift in creating new vistas in reaching the unreached and underserved population. This integration of Telehealth care with Ayushman Bharath will be the most challenging part of the new era of health care delivery system and capacity building in India.

This paper presents these aspects in detail during this plenary section of 107th Indian Science Congress at Bangalore.

**Biosketch:**
Dr. L S Sathyamurthy is a towering figure in the field of Telemedicine today. One could say that his efforts during his tenure with ISRO gave wings to what is now a vibrant ecosystem in India, with private players, governments and NGOs all using this concept to bridge the healthcare delivery gap. His work as the President of The Telemedicine Society of India bears testament to his passion and drive to solve India’s widespread Healthcare problem through technology.

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2. **DR. B. S. RATTA**

**Title of the talk**: Ayushman Bharat - An Opportunity or a Challenge to Transform India.

**Abstract**: This large flagship Health Insurance scheme by the Government for the people of India is to uplift the poor and downtrodden, indirectly decreasing poverty by lowering out of pocket expense and loans towards healthcare. It will accelerate India’s progress towards achievement of Universal Health coverage and Sustainable Development Goal 3 by 2030.

India stands tall in the eyes of the world—seven decades of toil from infectious diseases, malnutrition, poor inaccessible healthcare to Primary, secondary, and Tertiary healthcare pyramid, and now the World’s largest fully funded Health Insurance scheme providing coverage to 50 Crore population. This will leapfrog the healthcare sector, however the Q is can we pole vault from here to bring down the NMR, IMR, MMR as these yardsticks help the world to understand the stage of growth, economy a nation has reached from underdeveloped to developing and developed status. As we move towards a 5Trillion Economy, it’s obvious health care budget and spend will be moving up. Like Independence at the stroke of midnight Ayushman Bharat is a Game Changer that will uplift India from poverty. Lessons learnt so far and Challenges ahead gives us an opportunity to excel. Plugging the loopholes, creating a world class IT architecture main frame which can integrate individual State schemes with flexible portability and ease of identification of beneficiary will open up the gateway to progress and enhance the job opportunities at the same time. Removing inconsistencies, duplications, unviabilities, overlaps is a way forward, while we map the packages to International classification of Diseases. Ayushman Bharat has to upscale to be inclusive of all population and stitch all silos into an ecosystem that makes a world mark. National and State call Centres, triaging, Ambulance service, Emergency Call number will propel the scheme forward. Interactive TV Health channel will skyrocket the programme to reach it’s zenith. The benefits of the scheme and transformation in the lives of the beneficia ries and employment generation of the scheme will be highlighted.

**Biosketch:**

He is a paediatric surgeon / urologist, Ruby hall clinic, Pune. He was the past president of TSI, trustee connecting. He was the past president of rotary club of Pune riverside

- Fellow institute child health (London) UK
- Fellow texas children hospital (Houston) USA

**Communication address:**

Dr. B S Ratta, Paediatric surgeon / urologist,

Ruby hall clinic, Pune. Phone: 9822078715/9422057277,

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Title of the talk: Ayushman Bharat & Medical Education by Using Recent Technology

Abstract: The Government of India under the Hon’ble Prime Minister Shri Narendra Modi, the Ayushman Bharat implemented few years ago, has taken up a great revolution in our country bringing digital India in a single platform with regard to standardization & interoperability so that the maximum utility could be given, providing & sharing protocols and maintaining the standards both in private and govt. sector in every state and making the health information technology more transparent.

Technology disruption kills millions of jobs and most jobs that exist today will disappear within decades. Paradoxically, technology creates many new jobs. The disruption speed of killing existing jobs and creating new ones is now accelerating and traditional knowledge transfer methods cannot cope with this rapid pace of change.

We are still very long way back in utilizing High-end Technology for the purpose of Medical Education even though the technology is being available but not being put to use due to various reasons.

There is no doubt that automation is a powerful force for change and that it is already reshaping the world. Each technological leap has brought huge disruptions to the way, the economy works and the types of jobs that people do. And the coming revolution promises to be bigger and more disruptive than any that came before.

The age of Robotics and Artificial Intelligence (AI) could bring a catastrophic crisis due to automation job loss fallout, but it also presents an incredible opportunity to create a better life for everyone.

This paper will discuss on the past 2 decade experience and how this could be transformed in futuristic and this will also help us to learning the AI in clinical practice & medical education.

Biosketch:
Graduated from Madras Medical College in 1981 & M.Ch. Neurosurgery in 1987 from the same institution. Also graduated in Law from Dr. Ambedkar Law University. Tirupathi in the year 2015. Undergone 2 years special training at Fujita Health University, Japan, the world renowned neurological institution. He has been visiting fellow of Mayo Clinic, Rochester, USA in Neurosurgery. More than 30 years of rich experience.
in clinical practice & teaching in Neurosurgery.
Has been the Founder Member of Asian Congress of Neurological Society (ACNS)
Executive Committee Member – ISMIN (International Society of Minimally Invasive Neurosurgery, Part of ACNS) Vice President – CME training program of ISMIN for Young Neurosurgeons in Asian Countries Recipient of many awards and honors. He is the recipient of many awards for his excellent contribution in the field of Medicine as well telemedicine including a.Cushing Award from USA; Life Time Achievement award from Lions Club; Best Doctor award from Hon’ble Governor of Tamilnadu, Dr.Rosaiah GSA Outstanding Citizen of India award from His Excellency the President of India, Dr.Pranab Mukherjee in 2017

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PLENARY SESSION 25

Title: Wellness for Rural People: The Scientific Health Care for Modern World

1. DR. A. SREEKUMAR

Title of the talk: Wellness of the people by the people for the people

Abstract: Modern era has been witnessing the advances of science and technology in all dimensions of human life and this has been visualized in the emergence of fast world where time became the most precious commodity. This has led to the new challenges in health as Non-Communicable Life Style Diseases (NCLSD) where diabetes, heart disease, cancer, etc. and newer epidemics like Dengue, HIV, H1N1, H5N1, resistant Tuberculosis called as Communicable Life Style Diseases (CLSD). Routine medical advancement in disease diagnosis and treatment are not able to cater to the need of common man in combating diseases, preventive health and increasing productivity.

Wellness is a term coined for personalized optimal physical, mental, spiritual and social health at cellular or subcellular level. This is the new mantra in personalized health & wellness for 3-dimensional health. Modern advancements in cellular biology, genetics, biochemistry, nano science etc. has been proving different dimensions in health preservation, prevention and integrative wellness care for all sections of society.

Prosperity & health of a nation depends on the health & wellness of people at village level, the basic hub of our nation. India has got the most scientific ancient wisdom which has to be brought out with modern thinking and scientific understanding.

In this talk I will be impressing upon the community based personalized health and metabolic assessment and metabolic intervention for better health and wellness.

Biosketch:
Dr. A. Sreekumar graduated medicine and completed internship from University of Kerala in 1980 and completed postgraduate diploma in ENT from Karnataka university in the year 1986. His experience included in various countries – Unite Kingdom and Middle East and has more than 30 years of experience in ENT & Head & Neck Surgery. The passion took him to advanced biochemistry and took Fellowship in Nutritional & Environmental Medicine from 3
Email: wellnesssolutions9@gmail.com
2. PROF. USHY MOHANDAS

**Title of the talk**: Challenges that Affect Access and the Provision of Mental Health Services in Rural Areas

**Abstract**: Rural areas contain a diverse range of communities with differing mental health needs and health determinants. There is significant need for mental health services in rural India. The highly integrated nature of rural communities can also sometimes result in the exclusion of people who are seen as different or who are renew to the community.

Some factors are particular challenges to the provision or mental health services in rural communities: Accessibility – Rural residents often travel long distances to receive services for an illness; Availability - Chronic shortage of mental health professionals exist and mental health providers are more likely to practice in urban centers; Acceptability - The stigma of needing or receiving mental health care and fewer choices of trained professionals who work in rural areas create barriers to care.

This talk will address specific challenges and remedial measures suggested.

The regional economy: In rural areas, the regional economy is a key influence on mental health. Events such as drought and floods can have a heavy impact, especially in agricultural areas. The mental health consequences of regional economic recession can be long lasting.

Distance and isolation: Social isolation as a result of distance is an important factor in the mental health and well-being of rural people.

Cultural factors: A culture of self-reliance in rural areas can make people reluctant to seek help. Additionally, there can be considerable stigma attached to mental illness, even more so than in cities. Therefore, patients in rural areas are often less likely to report mental health problems.

**Biosketch:**
A very articulate powerful motivational speaker, a peak performance leadership coach for more than 3 decades, a communications scientist who has so far coached thousands of people across many cultures and countries. The creator of the widely acclaimed brand “The Mind Workshop”, she is the founder CEO and Principal Coach at Dr Ushy’s Wisdom Works. She is the regional head, IHRO.
for the States of Karnataka, Kerala, Andhra Pradesh, and Tamil Nadu. Formerly the Dean of KIMS Hospital, Bangalore, the Vice Chair person of the National Women’s Dental Council, she has been a mentor to many students and faculty across the globe. She is a specialist on board the advisory of womenplanet.com.
Her passions include cooking, sports and music besides reading and writing. She also loves animals and does volunteering work to protect nature.

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3. PROF. P.K. SASIDHARAN

Title of the talk: Uplifting community health through natural and economical means in scientific way

Abstract: Science is all about observing, studying and experimenting to learn how the world works. Science is also the study of the nature and behaviour of natural things and the knowledge that we obtain about them. Technology is the use of scientific knowledge for practical purposes or applications, whether in industry or in our everyday lives. So, basically, whenever we use our scientific knowledge to achieve some specific purpose, we’re using technology. Similarly when we use in investigations like MRI, CT scans, X-rays, PET scans, Telemedicine, robotics we are using technology.

Unfortunately technology as it is applied now does not provide health and wellness to the rural people or anyone anywhere in the world. We often see misuse and overuse of technology which, in an Indian scenario, even diverts all the available resources/depleting the resources needed for wellness, especially in our rural setting. Technology should not be applied blindly to health and wellness, we should know how to transform it to the situational needs of our society which has several unmet health needs. To give an example there are large number tribal and rural people with sickle cell disease. On a priority basis what the people with sickle cell disease need is not bone marrow transplant; what they need mostly is practice of balanced diet and good lifestyle, which can modify the behaviour of this disease and prevents new mutations. What they need is not renal transplant and dialysis facilities. We see the rural people developing diseases due to lack of balanced diet, lack of safe drinking water, and lack of social security and human development.

Based on my experience with large number of tribal people from Wayand/Attappdi with several health problems and studies on them in detail, I could find that one of the common factors for all their diseases is lack of a balanced diet and lack of safe drinking water and bad lifestyle habits. How will we use science and technology for the welfare of the people like them? We need to know what is health and what is wellness? Health is a state of complete physical, mental and social well-being; health is all about wellness of the body and mind as applied to a society and not just to some individuals alone. For social health what we need to do is to create awareness, accessibility and availability of all the social determinants of health to every individual.
**Biosketch:**
Prof. P.K. Sasidharan is an Emeritus Professor, Department of Family Medicine, Govt. Medical College, Kozhikode (Former Professor & Head, Department of Medicine & Haematology, Government Medical College, Kozhikode). He was formerly Dean Faculty of Medicine, University of Calicut Chairman PG Board of studies Kerala University of Health Sciences, President API Kerala Chapter, State President, Kerala Government Medical College Teachers’ Association. He received Dr. Pisharoty Memorial Gold medal for securing maximum marks in Medicine. In January 2004, he was awarded Fellowship of the Indian College of Physicians (FICP), Professor GK Warrier Memorial oration award of the Association of Physicians’ of India, National Hypertension oration award of the Hypertension Society of India, Netaji National oration award of the Associations of Physicians of India-2015. He received Fellowship of the International Medical Science Academy (FIMSA) in 2014 at Bangkok, Fellowship of the Royal College of Physicians (FRCP) Glasgow, Lifetime achievement award of the Association of Physicians of India.

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Title: Crop Improvement towards Food and Nutrition Security

I. DR. S.B. DANDIN

Title of the talk: Agrobioversity for Food and Health Security: A concept note

Abstract: Biodiversity the only source of raw material for food, fodder, fuel and fiber to sustain life on planet. Genetic diversity of crop plants is the main source of donor genes for crop improvement against biotic and abiotic stress besides incorporation several quality traits. Biodiversity is under continuous threat due to large scale anthropogenic activities and climate change effects. Besides cultivation of few crops in larger area has resulted in loss of landraces and crop wild relatives. The cumulative and irreversible effect of the above is the increased number of Rare, Endangered and Threatened (RET) species all over the world. The loss of biodiversity has led to shrinkage in food basket and as result people are consuming few species as daily diet which are short of minerals, vitamins and other nutritional elements. Three crops namely; Rice, Wheat and Maize provide more than 50% world calories. Currently across the World, 868 million people are under nourished. 195 million children under five years of age are stunted and show low BMI. Society has to carry triple burden of under nourishment, malnutrition and mineral deficiency. This will help in addressing the issues of health and nutrition and food becomes medicine to address human health and nutritional disorder. Besides broad-based genetic diversity appears to be the only tangible answer to climate change and uncertainty. The only way to address the challenge is consumption, commercialization and conservation of diverse genotypes of agriculture crops. A global integrated and joint program of all the concerned is imperative to halt the irreversible change of loss of biodiversity.

Biosketch:
Dr. S. B. Dandin, presently working as Liaison Officer, Bioversity International, Bangalore Office, was the Former and Founder Vice-Chancellor, University of Horticultural sciences, Bagalkot from 2008 to 2014. Dr Dandin held several important positions at different research institutes of Central Silk Board, (Govt. of India) Bangalore and Director Karnataka State Sericulture Research and Development Institute (KSSRDI), Bangalore (1989-2008). Dr. Dandin in his scientific carrier of nearly 38 years (1977-2014) has developed
and popularized two high yielding cardamom varieties, four improved and high yielding mulberry varieties and evolved three silkworm races. He is a life member of Thirteen National/International Organizations and recognized as a fellow of six Academic Societies. Dr. Dandin has 518 publications to his credit. Dr. Dandin has been recognized as research guide from FIVE universities and has guided 19 students for their Doctoral degree programme.

He is serving as a member, expert/advisory committees, task force, peer groups and member editorial boards in 24 organizations such as DBT, DST, ICAR, NCERT etc. He has visited many international organizations of Japan, China, Netherlands, South Korea, Thailand, Vietnam, USA etc. Dr. Dandin is a recipient of prestigious International and National awards namely Louis Pasteur Award by the International Sericulture commission, Lyon, France (2008), World Intellectual Property Organization Award by the World Intellectual Property Organization, Rome (2005), National Institute of Agricultural Science and Technology Award, Suwon, South Korea, Maxwell Lefroy Award, National Research & Development Council Award, (NRDC), Government of India, New Delhi, Sir M. Visveswaraya memorial award for his life time contributions in modern biology. Dr. S.B. Dandin did his B.Sc. (Botany) 1st class in 1971, M.Sc. (Botany with Cytogenetics in 1st class and 2nd Rank) in 1973 and Ph.D. (Cytogenetics and Plant Breeding) in 1977 from Karnataka University, Dharwad.

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2. DR. D. RAJAGOPAL

Title of the talk: Soil Biodiversity of Westernghats in Karnataka

Abstract: The Westernghats with mountainous ranges, deep valleys, sholas and evergreen natural rain forest is spread over 1,60,000 km² in India. It was regarded as one of the 18th earlier and now 25th biodiversity hot spots in the world which is under severe threat. Soil biodiversity is also affected, of which they have direct or indirect effects on the growth and development of Westernghats forests. In Karnataka, Westernghats stretched from high altitude hill region to the coastal tracts at the sea level, where soil faunal diversity is very much affected due to various reasons including deforestation, denudation, soil erosion along with growth promoting soil invertebrates. Soil is a permanent habitat for plants as well as animals including soil biodiversity. Hence studies were carried out to know the soil faunal abundance in different habitats and also their relationship to the naturally existing ecosystem of Westernghats. The study sites were chosen between Sakleshpur (Hassan district) and Uppinangadi (Dakshina Kannada district) on either side of national highway No.48 at 4 altitudes viz., 940m (Sakleshpur) 700 m (view point) 330 m (Hongarahalla or kempole) and 170 m (Nellyadi). Four habitats with clear demarcation at each altitude viz., virgin forest, afforested land, deforested land and grassland were selected. Observations were recorded by collecting soil samples at regular monthly intervals for a period of 4 years. The soil faunal diversity especially, the invertebrates in all the habitats and altitudes were recorded, analyzed and interpreted the data.

The soil biodiversity of Westernghats have been classified based in their body size. Microfauna (>20 -200 µ) include protozoa, bacteria, actinomycetes, fungi etc. Mesofauna (>200 µ – 10mm) include Protura, Diplura, Collembola, oribatid mite, Pauropoda, Symphyla, Psocids, Isopoda, Pseudoscorpions etc. Macrofauna (>10mm – 10 cm) include Earthworms, Millipedes, Centipedes, Crickets, Termites, Ants, Ground beetles, Dung rollers etc. The studies on the distributions of soil biodiversity in these habitats and altitudes revealed that the higher soil faunal diversity recorded in virgin forest followed by afforested land compared to grass land and deforested land. Similarly soil biodiversity was higher at 940m altitude followed by 700m, 330m, and 170m altitudes of westernghats.
The soil fauna are potential bio-indications of Physico-chemical characteristics of the soil and as a result of it, they play very important role in decomposition of organic matter and nutrient cycling for plant growth. About 40 groups of soil invertebrates, their abundance, diversity and distribution pattern at different altitudes of westrenghats are discussed in this paper.

**Biosketch:**

Dr. D. Rajagopal completed his graduation in Agriculture during 1967 and post-graduation in Agricultural Entomology during 1970 and Doctorate during 1979 from the University of Agricultural Sciences, Bangalore. He had undergone post graduate training in Nigeria and England under UNDP/FAO during 1978-79. Served the University for more than 36 year by starting his career as Instructor in Entomology and rose to become Professor of Entomology, Professor and Head of Entomology, Sericulture and Apiculture (1986-98), Director of Instruction (Agri), UAS, V.C.Farm, Mandya (1998-2001) and Dean (PGS), during 2001-2004.

Dr. Rajagopal has taught more than 3000 undergraduate students leading to B.Sc.(Agri.), B.Sc. (Hort.), B.Sc.(Seri.) and 450 Post graduate students leading to M.Sc.(Agri.) and Ph.D in Agricultural Entomology and Apiculture. He has guided 15 M.Sc.(Agri.) and 11 Ph.D students and served as a member of Advisory Committees for more than 60 P.G. students at UAS(B). Realizing the importance of Bee keeping in the State of Karnataka, he has established a separate Department of Apiculture at UAS(B) as “Founder Head of the Department”, which is the first of its kind in the country and developed course curricula and syllabi for P.G. courses in Apiculture.

Dr. Rajagopal operated more than 16 outside funded Research projects in Agricultural Entomology and Apiculture. He tackled many challenging pest problems and conducted pioneer research in Bio-Ecology and management of major crop pests. Most of his significant findings on Pest Management have been incorporated into the package of practices for the benefit of cultivators. He has published over 300 research papers in National and International Journals including 22 chapters in different books and also authored / co authored 13 books and 6 bulletins both in English and Kannada. He was nominated as an expert committee member in different Agricultural Universities, ICAR, KPSC,
UPSC, ASRB, KSPCB, TNPSC, Rallis Research Centre, etc. He participated in many bimonthly NAEP workshops either as Master Trainer or Resource Scientist, delivered 60 radio talks and 18 T.V. programmes in the State. He also served as expert member in many Editorial Advisory Committees of many National Journals and organized many national and international conferences and workshops. He has participated in 22 International and 90 National Conferences. He was the recipient of more than 15 awards among which ICARS’s Jawaharlal Nehru Award, Karnataka State Environmental Award, ICAR’s Best Teacher Award, Dr. M.Puttarudraiah Memorial Endowment National Award are important ones.

**Communication address:**
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3. PROF. R. UMA SHAANKER

**Title of the talk**: Endophytes: an exciting approach towards crop improvement

**Abstract**: It is now abundantly clear that all plants harbor within themselves, hordes of non-pathogenic microorganisms, both bacterial and fungal, collectively referred to as endophytes. While their evolution and occurrence in plants is enigmatic, a number of studies have shown that they might play an important role in modulating plant growth and in improving plant fitness under adverse environmental stresses, including abiotic and biotic stresses. These studies have encouraged workers to explore if such plant growth benefits could also be accrued to crop plants by their association with select endophytes and thus lend a new approach towards crop improvement. At our lab at the University of Agricultural Sciences, Bengaluru, we are exploring the use of fungal endophytes towards adaptation of crop plants, such as rice, tomato and chilli to abiotic stresses including salinity, drought and high temperature. In this talk, we shall highlight the salient outcomes of some of these studies and argue how endophytes offer an exciting approach towards crop improvement.

**Biosketch:**

Uma Shaanker obtained his Master’s degree in Genetics and Plant Breeding and a Ph.D in Crop Physiology from the University of Agricultural Sciences, Bangalore. After superannuating as Professor and Head of the Department of Crop Physiology and School of Ecology and Conservation, University of Agricultural Sciences, Bangalore, he is currently ICAR Emeritus Scientist. He is an elected Fellow of the Indian Academy of Sciences, Bangalore. He was a Fulbright Fellow and a Visiting Professor at the University of Massachusetts, Boston and an Honorary Fellow of the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore. He is one of the founder trustees and Senior Fellow of the Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore. Uma Shaanker’s major research interests are in the areas of plant evolutionary biology, conservation genetics, plant secondary metabolites and bioprospecting. He has published more than 230 peer-reviewed papers, about 30 articles in books and monographs, besides authoring or editing fifteen books.

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4. **DR. T.R. SHARMA**

**Title of the talk**: Molecular dissection of simple and complex traits and their utilization in rice improvement

**Abstract**: Rice is one of the most important food security crops of India contributing about 40% of the food grain production of the country. Rice is affected by many pathogens of which a fungal pathogen Magnaporthe oryzae causing rice blast is one of the important diseases of rice. This disease can be effectively managed by the deployment of resistance genes in different cultivars using markers assisted selection (MAS). For MAS genetic and molecular mapping of blast resistance genes with linked DNA markers is a pre requisite. Out of 100 blast resistance (R) genes mapped from different rice lines, more than 27 genes resistant to M. oryzae have been cloned during the past 18 years. One of the blast resistance genes, Pi54 was initially identified in a rice line Tetep which was later isolated in our lab by using positional cloning approach in 2005 and later characterized at molecular level. We predicted a leucine rich repeat (LRR) domain in addition to a small zinc finger domain in the Pi54 protein. The gene has showed stable and high-level of resistance expression against various strains of M. oryzae collected from different parts of India. Molecular basis of Pi54 and M. oryzae has also been deciphered by transcriptome analysis of monogenic rice lines. Another important disease of rice is Sheath blight caused by the fungus Rhizoctonia solani for which many QTLs have already been identified and mapped in different rice cultivars. We also performed mapping and molecular dissection of an important QTL for sheath blight resistance in rice line Tetep. We showed a cluster of 8 chitinase genes present within the QTL region, cloned these genes and functionally validated in heterologous system. Both the blast resistance gene Pi54 cloned by us and sheath blight resistance QTL Sbqtl11 have already been transferred in many commercial rice varieties using marker assisted selection.

**Biosketch:**

Dr. T. R. Sharma, Executive Director, National Agri-Food Biotechnology Institute (NABI) (An autonomous Institute of Department of Biotechnology, Govt. of India), Mohali, Punjab and CEO of Centre of Innovative and Applied Bioprocessing, Mohali. He has done his Post Doctorates, one from the University of Alberta, Edmonton, Canada & two from Cold Spring Harbor Laboratory, NY, USA. Dr Sharma is the fellow of Indian National Science Academy, National Academy of Sciences and National Academy of Agricultural Sciences. For his outstanding research contributions Dr. Sharma has been
Awarded various awards like; University Gold Medal and Certificate of Honour in Ph.D, 1990, Young Scientist Award, NAAS, 1998; ICAR Young Scientist Award (Crop Sciences), 1999; Prof. Umakant Sinha Memorial Award in Biochemistry, Biophysics and Biotechnology, Indian Science Congress Association, 2001; International World Technology Award for Biotechnology (jointly to Int. Rice Genome Sequencing Team) in 2003, DBT National Bioscience Award for Career Development, 2007. NAAS Recognition Award 2008; VASVIK Award 2011, Rafi Ahmed Kidwai Award-ICAR, 2011, NASI-Reliance Industries Platinum Jubilee Award, 2013, J C Bose National Fellowship, 2013, Prof MGK Menon Lecture Award (NASI) 2017 and Prof. K.S. Bilgrami Memorial Medal (INSA)-2018. His major research interests are in the areas of Genomics and plant disease resistance. Dr. Sharma has contributed extensively to the improvement of rice for the over 28 years and cloned and deployed rice blast resistance gene Pi54 in different rice varieties. Dr. Sharma has published more than 150 research papers, filed six Indian patents and associated in the development of three rice varieties Pusa 1637, HPR2880 and PusaSambha1850. Dr. Sharma has filed 8 Indian patents out of those, one patent (no. 308533) has already been granted by the Indian Patent-office. He has published more than 140 research papers in the journal of national and international repute. Dr. Sharma is actively involved in teaching and has already guided 25 Ph.D students from P.G. School, IARI, New Delhi and other Universities. He was also the Chief Editor of the journal of Plant Biochemistry and Biotechnology from 2009-2019. He has visited USA, Canada, UK, Japan, The Philippines, The Netherlands, Spain, Switzerland, Australia, Thailand, Brazil and Austria in connection with post-doctoral trainings and various official assignments.

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5. PROF. UTPAL NATH

Title of the talk: Integration of developmental and environmental signals in plant growth plasticity

Abstract: Plant growth is influenced by both developmental and environmental factors, and the effects of these endogenous and exogenous factors are integrated by major phytohormones such as auxin and brassinosteroid. Although the biosynthetic pathways that generate these hormones and their downstream signaling mechanisms have been extensively studied, the upstream transcriptional network that modulates their levels and connects their action to cell morphogenesis is less clear. We have found that the miR319-regulated TCP (TEOSINTE BRANCHED1, CYCLODEA, PROLIFERATING CELL FACTORS) transcription factors, notably TCP4, directly activate the transcription of YUCCA5, an auxin biosynthetic gene, and integrate the auxin response to a brassinosteroid-dependent molecular circuit that promotes cell elongation in Arabidopsis thaliana. Further, TCP4 modulates the common transcriptional network downstream to auxin-brassinosteroid signaling, which is also triggered by environmental cues, such as light, to promote cell expansion. Our study links TCP function with the hormone response during cell morphogenesis and shows that developmental and environmental signals converge on a common transcriptional network to promote cell elongation.

Biosketch:
Utpal Nath was trained in agricultural sciences in his Bachelors (B. C. Agricultural University, Kalyani, West Bengal) and Masters (T. N. Agricultural University, Coimbatore, Tamil Nadu). He did a PhD in molecular biology from NCBS, TIFR-Centre, Bangalore, specializing in protein chemistry. He received his postdoctoral training in the laboratory of Enrico Coen in John Innes Centre, Norwich UK, where he worked on the genetic control of organ shape and size. He then joined the Department of Microbiology and Cell Biology at IISc Bangalore in 2003 as an Assistant Professor. There he has established a group of students who have been carrying out research on the genetic control of leaf development for past decade and half using Arabidopsis and snapdragon as model plants. Utpal Nath has also been actively involved in teaching at the graduate and undergraduate levels in the area of developmental biology and genetics.

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6. PROF. KIRANKUMAR S. MYSORE

Title of the talk: A Functional Genomics Approach Identifies Novel Genes Involved in Plant Innate Immunity and Abiotic Stress

Abstract: World population is increasing at an alarming rate demanding more food with less land. Reducing crop losses from biotic and abiotic stresses is crucial to increase food supply. Plants employ various resistance mechanisms to combat potential pathogens. Nonhost resistance is one such mechanisms shown by a given plant species against all isolates of a specific pathogen that can cause disease in other plants. Using virus-induced gene silencing (VIGS)-based forward genetics approach; we identified novel genes that play a role in nonhost disease resistance. Couple of these genes play a role in regulating stomatal opening. Nucleolar GTP Binding Protein 1 (NOG1) is a small GTPase encoding gene required for plant immunity against bacterial pathogens. Two NOG1 copies were identified in Arabidopsis: NOG1-1 and NOG1-2, and are involved in nonhost resistance and stomatal defense, respectively. General control non repressible-4 (GCN4) is another protein that regulates stomatal opening. Silencing of GCN4 causes defective stomata that are unable to close during pathogen infection. AtGCN4 interacts with proteins such as RIN4 and 14-3-3 and destabilize plasma membrane H+ -ATPase complex to keep the stomata closed during pathogen infection. Interestingly, many of the characterized genes also play a role in abiotic stress tolerance. Translational research has been initiated in a hope to develop durable disease resistance and multi-stress tolerant crops.

Biosketch:
Dr. Kiran Mysore is a Professor at the Noble Research Institute, LLC., Oklahoma, USA. He is head of the Plant, Microbe and Soil section at the Noble Research Institute. He also holds Adjunct Professorship at the Department of Entomology and Plant Pathology, Oklahoma State University, USA and Department of Crop Physiology, University of Agricultural Sciences (UAS), Bangalore. He received his Bachelor’s degree in Agriculture at UAS, Bangalore, Master’s degree in Horticulture at Clemson University and Ph.D. in Genetics at Purdue University. He did his postdoctoral training in Plant Genomics at the Boyce Thompson Institute for Plant Research, Cornell University. His research interests center on
molecular plant-microbe interactions and plant genetic resource development. He has authored over 200 peer-reviewed manuscripts in international journals. He is a fellow of the American Association for the Advancement of Science (AAAS) and a recipient of Fulbright-Nehru Academic and Professional Excellence Award.

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I. DR. MITTUR N JAGADISH

Title of the talk: Academia – Industry Collaboration

Abstract: Challenges in India continue to be several and the solutions to mitigate them are slow coming. Reasons are many. The most pertinent one for a long time has been the lack of an action-oriented relationship between academia and the industry to tackle major challenges. The path needs to be for the government and other funding organizations to first become aware of the primary challenges affecting the nation, prioritize them and draw out a preliminary plan for R&D to generate solutions to benefit the society thereafter. Following this, identify multi-disciplinary experts in academia who could be spread across several institutions, on board relevant companies from the industry, create a well knit-team for interaction across board and collaborate for progress towards the common goal. With this goal constantly in mind, academia & industry experts would need to also train students and research scholars to contribute with innovative thoughts and the required skills. These types of challenge-driven mission programs will certainly advance and all things working in a well concerted and collaborative manner, benefits are bound to reach the society. In general, the current scenario in academia has been skill-based training (e.g. Molecular Biology; Cell Biology; Omics, etc..) oblivious to the larger purpose and how they can be key players in industry/academia to find answers. For example to find a complex trait of conferring drought tolerance key crops and enabling scale-up thereafter requires multi-disciplinary and multi-faceted approach involving academia, industry and the relevant government departments. This can only happen if all the relevant members work together from the conception to the result stage. academia and industry share a symbiotic relationship. Academia produces graduates who are absorbed by industry. Research work in universities are taken up by the industry and turned into products and services.Often new research topics arise out of interaction between the duos which benefit both academia and industry. Partnerships between academia and industry are nothing new, but only with the right strategy, enterprises will be able to prosper. By Arup Dasgupta. Academia and industry share a symbiotic relationship. Academia produces graduates who are absorbed by industry. Research work in universities are taken up by the industry and turned into products and services. Industry on the other hand looks to academia for solutions to their concerns. It would like universities to tailor their courses to turn out graduates whose skill-set are aligned to industry requirements. Often new research topics arise out of interaction between the duos which benefit both academia and industry. The latter therefore funds focused research in
universities which they can operationalize. This may include setting up laboratories, designating industry chairs, and providing guest faculty and placement opportunities. Geospatial industry entails all these facilitators and more because it is a multi-disciplinary field which requires geographers, computer scientists, environmental scientists, social scientists, and domain and management experts.

Biosketch:
Dr. Jagadish Mittur, a native of Mittur village in Karnataka, worked till recently as a Principal Consultant in the Biotechnology Facilitation Cell (BFC) at KITS (Karnataka Innovation and Technology Society), Department of IT BT and S&T, GOK, gaining government work experience. Following his M.Sc., Botany from Central College, Bengaluru in 1974, and PhD in Microbial Genetics from Dublin, Ireland in 1979, he secured 16 plus years of Academic and also 16 plus years of Industry Experience in 7 different cities across 5 countries (India, Ireland, USA, Germany & Australia). He has gained cultural competence from his rich experience of interaction across various humanities while touching several R&D and Industry segments of Biotechnology. His important positions included Principal Research Scientist – CSIRO, Melbourne, Australia; Senior Research Scientist – Astra Zeneca, Bengaluru, and Director – Monsanto Research Center, Bengaluru. He has published 31 research publications in international peer-reviewed journals, 6 in Proceedings / Books plus several articles in the popular press category. Leading the Biotechnology Facilitation Cell for ~7 years, he contributed towards: a) devising objectives for biotechnology policy; b) initiating new biotech programs; c) creating R&D and StartUp Bioclusters for innovation cum acceleration; d) enabling collaboration across borders via networking; e) assisting growth of biotechnology institutions & industry, and f) strengthening HR in Karnataka and beyond. He is on the board of directors of GOK’s Bangalore Bioinnovation Center and on the advisory board of a few biotech startup entities. Promoting ISR (Individual Social Responsibility) he built a team in 2001-02 in the busy streets of Malleshwaram for the safety of school children which continues to be active even after 18 years. His other activities include assistance towards elderly care, animal welfare, and places of worship. He has helped building and functioning of two separate village schools in Mulabagal, Kolar, Karnataka.

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