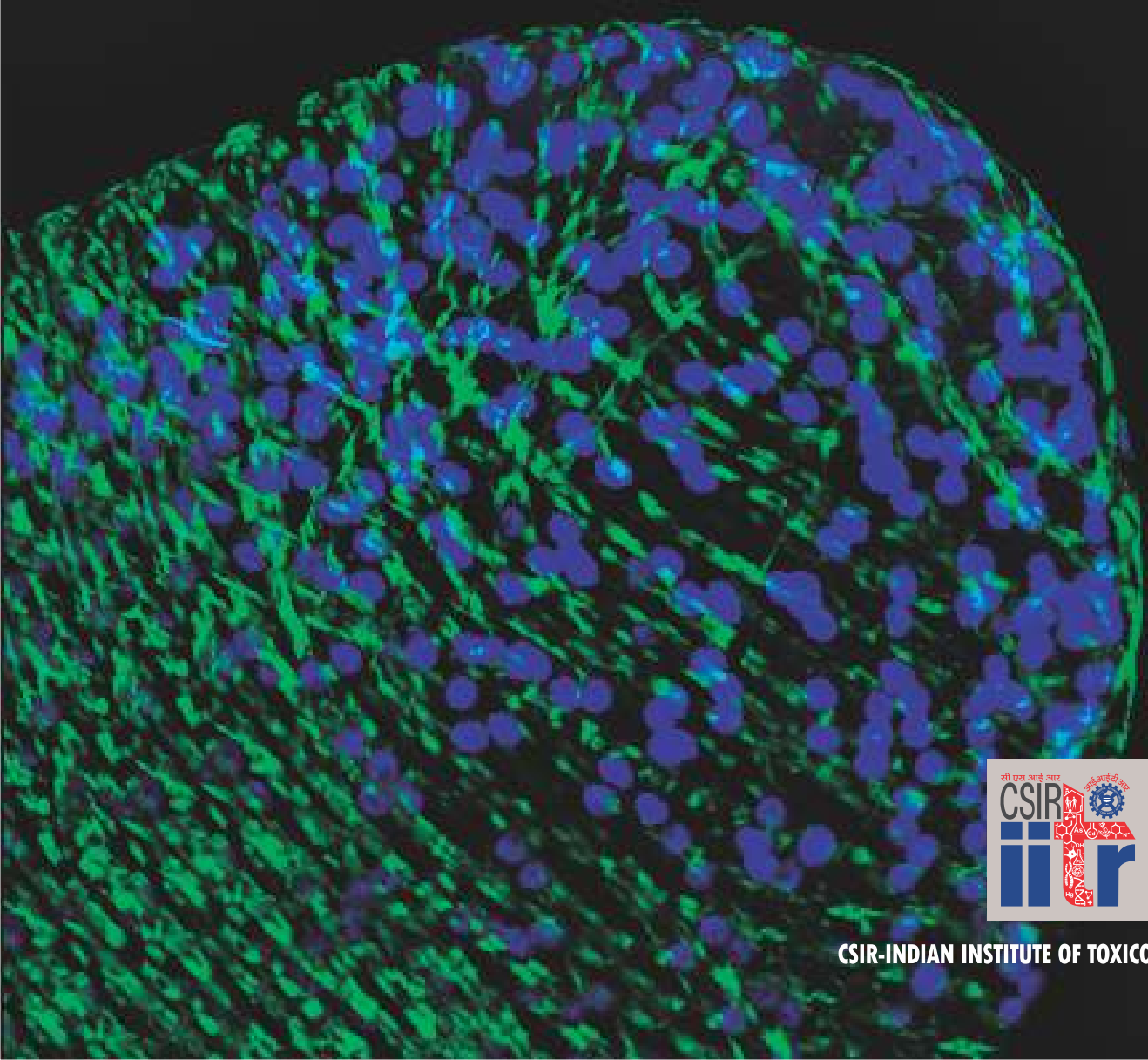
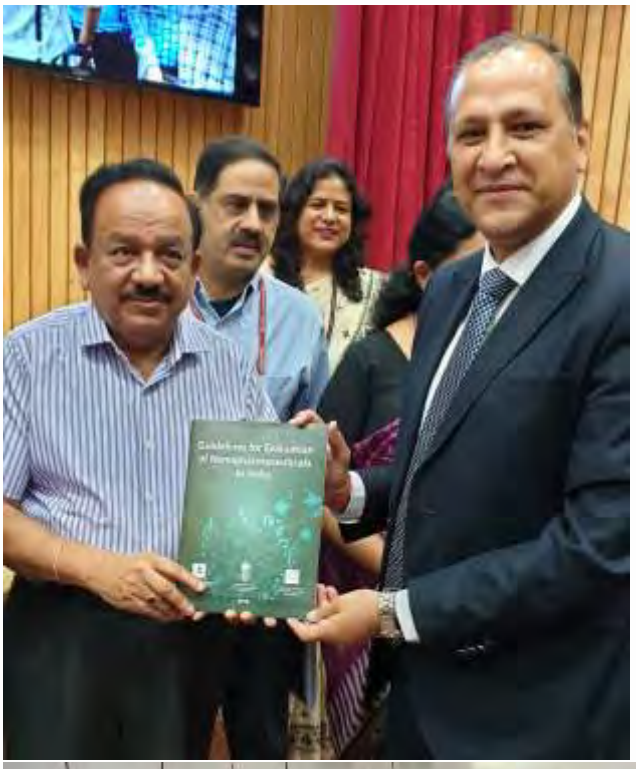
Annual Report
2018–19



CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH



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Annual Report

2018-19

CSIR-Indian Institute of Toxicology Research

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Lucknow-226001

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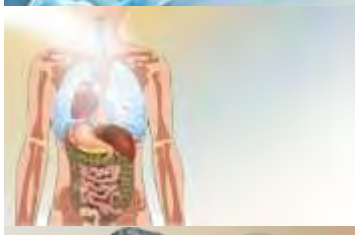


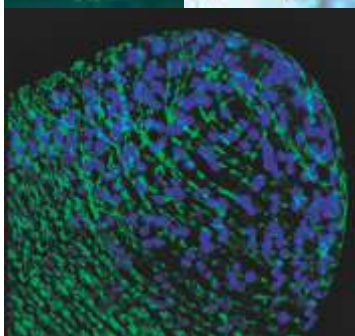










From the Director's Desk

CSIR-Indian Institute of Toxicology Research (CSIR-IITR), a Global leader in toxicology research for more than five decades, has been providing S&T interventions with the motto "Safety to Environment and Health and Service to Industry". CSIR-IITR is the only institute of toxicology in India and among a few in the world, which has contributed immensely to occupational, industrial and environmental toxicology for improving human health. CSIR-IITR has been focusing on 1. Scientific Social Responsibility 2. Translational R&D and 3. Fundamental Science and its advancements. CSIR-IITR is contributing to the implementation of the Sustainable Development Goals (SDGs) and National Mission Programs for socio-economic benefits and environmental sustainability. It is my privilege to put on record some of the significant milestones reached by the team CSIR-IITR during the period 2018-19.

CSIR-IITR conducts research in the niche areas of toxicology such as - Systems Toxicology & Health Risk Assessment; Food, Drug & Chemical Toxicology; Regulatory Toxicology; Environmental Toxicology; Computational Toxicology and Nanomaterial Toxicology and also in the field of mechanistic toxicology which includes method development for safety evaluation and research for policy. The institute has enriched the knowledge repertoire of toxicology by contributing 70 research articles with an average impact factor of 7.05. Of these, ~70% of the publications are in the range of impact factor >3 and about 40% publications in the range of impact factor 5 and above. Also, various monographs, books, copyrights, environmental air and water quality survey reports, awareness pamphlets (multilingual) and scientific contents in Hindi have positioned CSIR-IITR on the forefront of societal relevance.

CSIR-IITR has been working on research for the policy which has resulted in guidelines/standards for national regulatory agencies. CSIR-IITR has participated in the Global Burden of Disease Consortium and has published three articles in The Lancet this year. Further, we have embarked on computational toxicology as a new area of research which would be of help in risk assessment and predictive toxicology. Geno-QSAR has been developed for speciality chemicals using machine learning approaches. CSIR-IITR is now embarking on futuristic areas of toxicology including 3D printed tissues/organs, artificial intelligence, machine learning and alternate to animal models in toxicology to help the MSME sectors. CSIR-IITR has contributed to the formulation of two guidelines namely "DBT-ICMR-CDSCO Guidelines for Evaluation of Nanopharmaceuticals in India" and "FSSAI-CHIFSS Guidance Document on Risk Assessment of Novel Foods and Food Additives".

Several new programs in line with CSIR's mandate of linking research to market space were initiated by CSIR-IITR for the benefit of the country. CSIR-IITR is establishing the "Technology Development & Innovation Centre (TDIC)" which was inaugurated by DG-CSIR on May 02, 2019. TDIC of CSIR-IITR includes National Facilities for Food Safety, Nanotoxicology, Environmental Intervention Hub and Centre for Innovation and Translational Research (CITAR). Dr Shekhar C. Mande, DG-CSIR inaugurated the "Environmental Monitoring & Intervention Hub" supported by DSIR-Common Research & Technology Development Hubs (CRTDH) which will help in serving MSE's on the clean air/water and effluent management sector to develop indigenous and effective solutions for environmental monitoring, bioremediation, water treatment and effluent management.

I should also like to inform that in the year 2018-19, CSIR-IITR was able to licence its technology on drinking water disinfection to two entrepreneurs, one of which was done in the presence of Hon'ble Union Minister for Science & Technology, Dr Harsh Vardhan. This has now been commercialized and is readily available on E-market place for household users and on GeM for community and government clients. This year, CSIR-IITR received recognition as a **Referral Food Laboratory (RFL) and National Reference Laboratory (NRL)** from FSSAI. We are the first such designated laboratory in Uttar Pradesh and our outreach programs for students and rural population have gained a lot of attraction and have been appreciated by the State as well as by the Centre. New facilities and laboratories, such as, Toxicology High Performance Computing & Software Platform– the only high performance computing centre for toxicology in the country, Genome and Cell Integrity Lab, Biomolecular Toxicology Lab, Proteomics & Metabolomics Facility established this year, will advance fundamental science and cater to the needs of industries, providing services and promoting entrepreneurship as well as engaging more stakeholders for new business opportunities.

One of our scientists received prestigious Dr A.P.J. Abdul Kalam Cray HPC award for the year 2019 for his outstanding and sustained contributions in the High-Performance Computing field R&D in HPC Applications in India. Two of our scientists received CSIR Raman Fellowship and ICMR awards for international R&D collaboration.

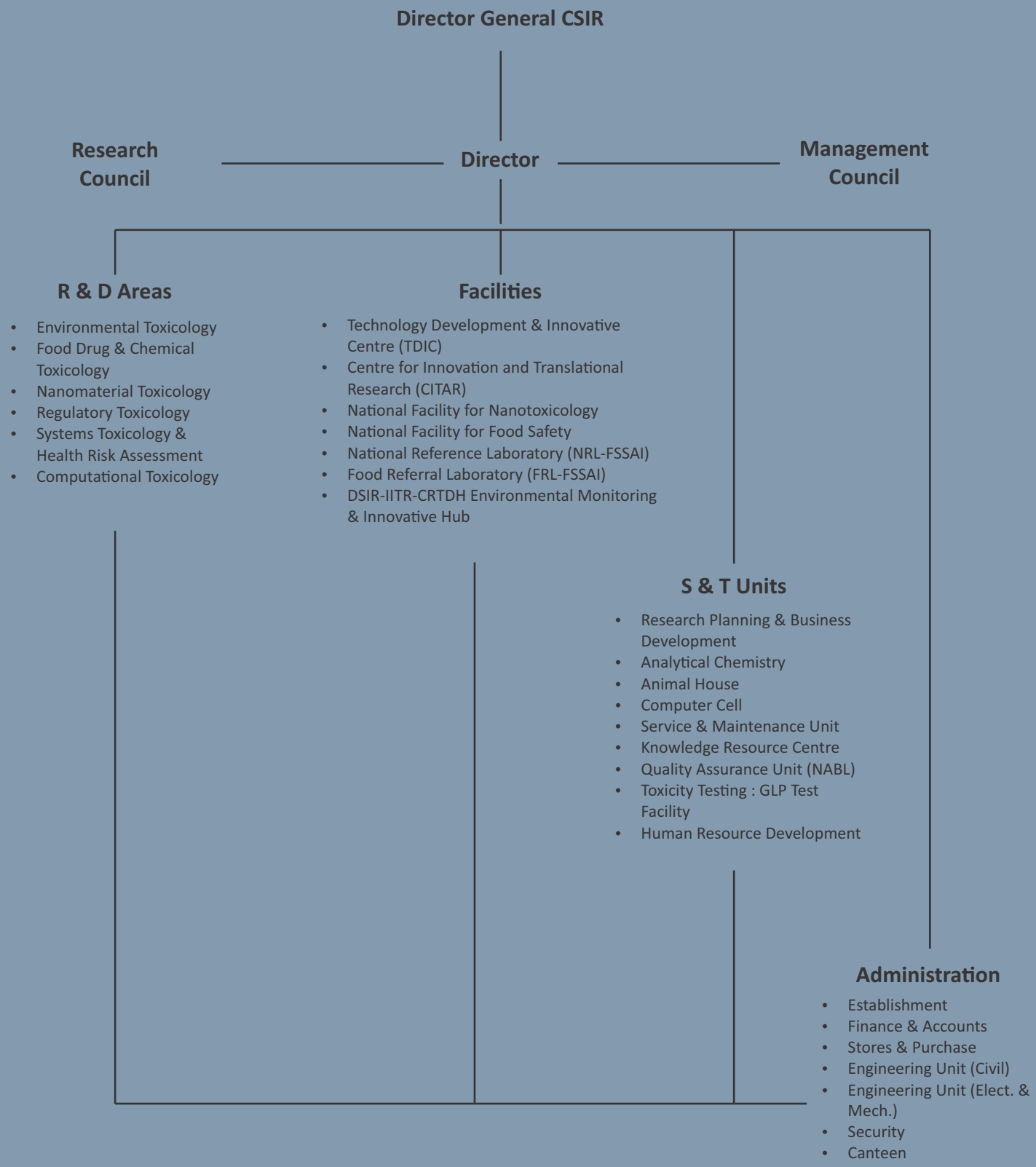
Regarding AcSIR-RMIT- Australia joint Ph.D. program, two students started their joint research at RMIT campus. As a part of Scientific Social Responsibilities (SSR), we regularly interact with the school students, bring them to our institute and infuse them to develop small exploratory program(s) as a part of summer camp. More than 200 participants benefited from the skill development programs and workshops organized during the year on the nanotechnology, environmental safety assessment techniques, food safety and chemical risk analysis.

During the year, team CSIR-IITR took prominent actions in Kumbhmela and National Clean Ganga Mission rafting projects not only for awareness campaign but also for testing water samples along the way for improving quality of living on river basin and around.

Overall, the institute leveraged its R&D portfolio leading to the development of fundamental and translational research, SSR and public outreach, strengthening country's policy framework, serving industries and innovative technology development for various causes of the societal health and the benefit of masses.

(Alok Dhawan)

CSIR-IITR Organizational Chart



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Contributions to SDGs

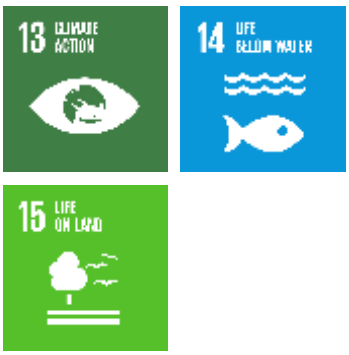
As a lead organization in health and the environmental safety, CSIR-IITR is contributing to the implementation of the Sustainable Development Goals (SDGs) and National Mission programs for socio-economic and environmental sustainability. Institutional mandate and R&D portfolio of CSIR-IITR lead to the development of fundamental and translational research, scientific social responsibility and public outreach, strengthening of country's policy framework, serving industries and innovative technology development. Activities of SDGs and societal relevance of CSIR-IITR are as follows:

SDGs and National Missions	Activities
  	• Food Safety and Security • Food and Consumer Safety Solutions (FOCUS) CSIR-mission mode project on delivering technologies for food safety and preventing post-harvest losses • Contributions in Global Disease Burden program • Scientific interventions to provide solution to unknown etiologies • National Reference Laboratory (FSSAI) • Referral Food Laboratory (FSSAI) • Policy outcomes to nanotechnologies and food
 	• Human resource development • Skill development programs • Jigyasa Program • Students connect program (~15,000 students and 300 teachers)

- Oneer–Solution for safe drinking water
- Technologies for water quality assessment and disinfection
- Clean water technology development and deployment
- Ministry of Jal Shakti: Clean Ganga programme
- National Mission Clean Ganga
- National Drinking Water Mission

- Solar energy utilization (Data)
- Bioenergy R&D

- Safe product development
- Industrial effluent management
- Air quality and water quality surveys
- GLP Test Facility
- NABL accredited laboratories
- Technology Development and Innovation Centre
- Centre for Innovation and Translational Research
- National Facilities: Nanotoxicology and Food Safety



- Environmental Bioremediation
- Protect and restore contaminated land
- Effluent treatment
- Water quality testing
- Greenhouse gas reduction
- Air pollution assessment and abatement
- DSIR-IITR-CRTDH Environmental Monitoring and Intervention Hub

- International collaborations
- Public outreach and awareness programs
- Knowledge dissemination

Highlights

Global Burden of Disease Study 2017

The Global Burden of Disease Study (GBD) is a worldwide observational epidemiological study to understand the mortality and morbidity from major diseases, injuries and risk factors to health at global,national and regional levels. The study explores the trends from 1990 to 2017 with comparisons across populations. GBD study has enabled a better understanding of the changing health challenges facing people across the world for framing policies in the healthcare sector.

CSIR-Indian Institute of Toxicology Research, Lucknow, as a GBD collaborator, provided critical feedback on the drafting of work or revising it critically as a part of important intellectual content to prepare the final draft of the following GBD studies of 2017.

GBD 2017 SDG Collaborators: Measuring progress from 1990 to 2017 and projecting attainment to 2030 of the health-related Sustainable Development Goals for 195 countries and territories: a systematic analysis for the Global Burden of Disease Study 2017. Lancet, 2018, 392(10159): 2091-2138.

GBD 2017 Risk Factor Collaborators. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet, 2018, 392(10159): 1923-1994.

GBD 2017 Causes of Death Collaborators. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet, 2018, 392(10159): 1736-1788.

Cover story: Review article by the student attendees of JNC-ISN Flagship School

The International Society for Neurochemistry (ISN) in collaboration with The Journal of Neurochemistry (JNC) organizes neuroscience schools to support young scientists in their career by boosting their scientific knowledge, international network and visibility in the field. In order to strengthen the multi-institutional collaboration and to foster a spirit of team work between international students coming from different parts of the world, it was decided that joint publications in the form of review articles be prepared by students. This would serve as a small token of intellect which the attendees would cherish for a lifetime. This joint global venture will enable the students to remain in touch and network for decades. Since the articles were a summary of the school it also indirectly pushed the students to be attentive throughout all the scientific sessions, discuss the lectures and further interact with all the other attendees. It has also served as a small reward for all the participating students who shall not only take back fond memories, network opportunities, participation certificates but also a publication in a well known journal "Journal of Neurochemistry". These initiatives are very valuable for young researchers as they get the opportunities to be mentored by peers and senior scientists outside their home institutions. Here are the two publications, that are an outcome of the efforts and contributions of Ph.D. students of CSIR-Indian Institute of Toxicology Research Lucknow, India

Shripriya Singh

Richa Gupta

Anuradha Yadav

The energetic brain - A review from students to students

Journal of Neurochemistry, 2019, 151: 139-165.

The past 20 years have resulted in unprecedented progress in understanding brain energy metabolism and its role in health and disease. In this review, which was initiated at the 14th International Society for Neurochemistry Advanced School, we address the basic concepts of brain energy metabolism and approach the question of why the brain has high energy expenditure. Our review illustrates that the vertebrate brain has a high need for energy because of the high number of neurons and the need to maintain a delicate interplay between energy metabolism, neurotransmission, and plasticity. Disturbances to the energetic balance, to mitochondria quality control or to glia-neuron metabolic interaction may lead to brain circuit malfunction or even severe disorders of the CNS. We cover neuronal energy consumption in neural transmission and basic ('housekeeping') cellular processes. Additionally, we describe the most common (glucose) and alternative sources of energy namely glutamate, lactate, ketone bodies, and medium chain fatty acids. We discuss the multifaceted role of non-neuronal cells in the transport of energy substrates from circulation (pericytes and astrocytes) and in the supply (astrocytes and microglia) and usage of different energy fuels. Finally, we address pathological consequences of disrupted energy homeostasis in the CNS.

Construction and reconstruction of brain circuits: normal and pathological axon guidance

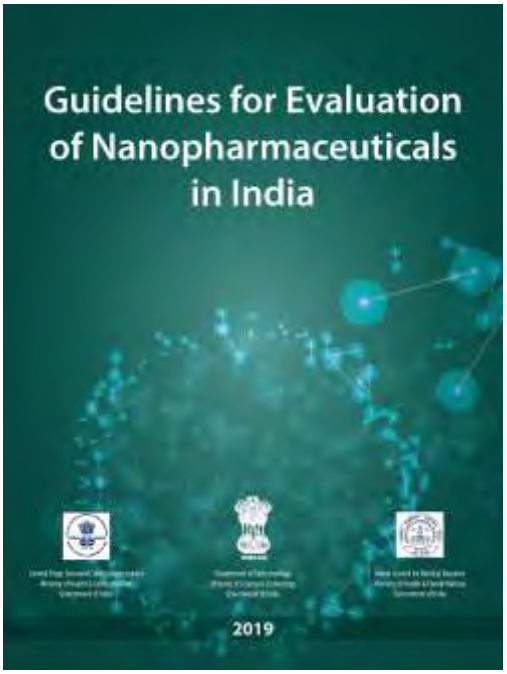
Journal of Neurochemistry, 2019, doi:10.1111/jnc.14900

Perception of our environment entirely depends on the close interaction between the central and peripheral nervous system. In order to communicate each other, both systems must develop in parallel and in coordination. During development, axonal projections from the central nervous system (CNS) as well as the peripheral nervous system (PNS) must extend over large distances to reach their appropriate target cells. To do so, they read and follow a series of axon guidance molecules. Interestingly, whilst these molecules play critical roles in guiding developing axons, they have also been shown to be critical in other major neurodevelopmental processes, such as the migration of cortical progenitors. Currently, a major hurdle for brain repair after injury or neurodegeneration is the absence of axonal regeneration in the mammalian CNS. By contrasts, PNS axons can regenerate. Many hypotheses have been put forward to explain this paradox but recent studies suggest that hacking neurodevelopmental mechanisms may be the key to promote CNS regeneration. Here, we provide a seminar report written by trainees attending the second Flagship school held in Alpbach, Austria in September 2018 organized by the International Society for Neurochemistry (ISN) together with the Journal of Neurochemistry (JCN). This advanced school has brought together leaders in the fields of neurodevelopment and regeneration in order to discuss major keystones and future challenges in these respective fields.

Research for Policy

CSIR-IITR contributed to the formulation of Guidelines for Evaluation of Nanopharmaceuticals in India

CSIR-IITR Contributed to Formulation of Guidelines for Evaluation of Nanopharmaceuticals Guidelines for Evaluation of Nanopharmaceuticals in India released today (24 October 2019) by Dr Harsh Vardhan, Hon'ble Union Minister for Science & Technology, Earth Sciences and Health & Family Welfare at Prithvi Bhavan, New Delhi. Nano based interventions are playing a significant role in developing affordable health care for the country. Dr. Renu Swarup, Secretary, DBT said that major motivation for developing the guidelines on Nanopharmaceuticals was to enhance our capability to generate and commercialize Nanopharmaceuticals. This is an inter-ministry effort and the Department of Biotechnology (DBT), Indian Council of Medical Research (ICMR) and Central Drug Standard and Control Organization steered the effort along with other departments including Council of Scientific and Industrial Research (CSIR). CSIR-Indian Institute of Toxicology Research (IITR), Lucknow, a constituent laboratory of CSIR has contributed significantly in the area of Nanotoxicology, including pharmaceuticals. Based on the expertise available, CSIRIITR was a part of the committee for developing Guidelines for Evaluation of Nanopharmaceuticals. Professor Alok Dhawan, Director, CSIR-IITR represented CSIR in the committee. Dr. Harsh Vardhan, Hon'ble Union Minister in his address said that the potential of the Biotechnology sector to solve the problem and contribute to human

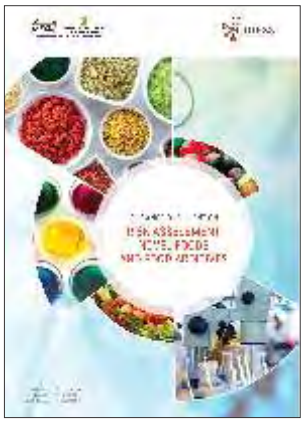


well-being through recent discoveries and innovations based on nanotechnology is immese. Dr Balram Bhargava, DG-ICMR also said that the country has to respond to newer therapies/ technologies like nanopharma for which the formulated guidelines on nanopharma is an important step forward. This is yet another step of CSIR-IITR towards enabling innovation and ensuring safer products to market for the benefit of masses.

Dr Harsh Vardhan, Hon'ble Union Minister for Science & Technology, Earth Sciences and Health & Family Welfare, Govt. of India, releasing the guideline document

CSIR-IITR contributed to formulation of guidance document for Novel Food Safety Assessment

Novel foods and food ingredients are evolving to meet the consumers nutritional requirement, food supply for the growing population, health & disease management and lifestyle changes. Novel foods are being introduced into the market at a very fast pace due to the advancement in science and technology and the global food supply chain. The regulatory bodies need to take a proactive approach for the safety assessment of novel foods to ensure consumer safety. Currently, in India, there is no guidance document available to assist the stakeholders in the safety assessment of novel foods and food additives. FSSAI and Confederation of Indian Industry (CII) and Hindustan Unilever (HUL) Initiative on Food Safety Sciences (CHIFSS) organized 6th Stakeholder Forum on “Scientific Advances in Food Safety and Food Security" on 26th July 2019. Ms Rita Teaotia, chairperson, FSSAI and Professor Alok Dhawan, Director, CSIR-Indian Institute of Toxicology Research, Lucknow released the guidance document on “Risk Assessment -Novel Foods and Food Additives”. CSIR-IITR is a part of the Scientific Advisory Committee for formulating novel food safety assessment guidance document. CSIR-IITR, a leader in toxicology research and with the experience of more than 5 decades in the area of food safety assessment participated in the forum. Dr Sheelendra Pratap Singh, Scientist, CSIR-IITR contributed as an expert in formulating novel food safety guidance document to provide step by step procedure to be adopted for the risk assessment of novel foods. During the 6th Stakeholder Forum, Professor Alok Dhawan spoke on the "Food Safety and Food Security challenges of India and he highlighted the CSIR-Mission Programme on Food and Consumer Safety Solutions which is providing technology solutions to many such challenges faced by the common man in the country. Professor Dhawan, chaired the panel discussion on various aspects of food safety and how newer risk assessment methods could help the regulators to assess the safety of food. Professor Dhawan summarised the essence of the released guidance document and need of safety assessment. Any foods or ingredients which do not have a history of human consumption or obtained by new technology with innovative engineering process should be placed under Novel food category. Dr SP Singh added that novel foods should undergo a standardized safety assessment process before they can be marketed in India. Some examples of novel foods are fruit and vegetables juice products with added phytosterols (plant based cholesterol regulating substance) or food produced using new methods such as apple cider treated with UV light. This guidance document on novel food safety assessment provide advanced science-based food safety decision making and risk assessment to the regulatory authorities.

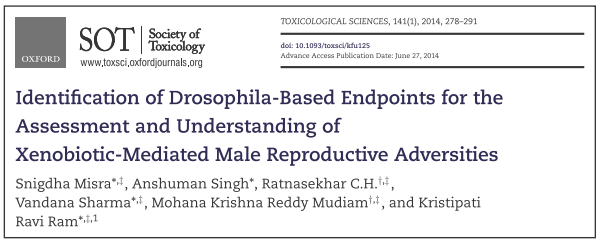


Dignitaries releasing the guideline document

CSIR-IITR work featured in OECD publications

The findings from the CSIR-IITR research publication titled “Identification of Drosophila-based endpoints for the assessment and understanding of xenobiotic-mediated male reproductive adversities (Toxicological Sciences. 2014; 141:278-291. doi: 10.1093/toxsci/kfu125) by Dr. Ravi Ram Kristipati and his group have been included in the OECD Environment, Health and Safety Publications [ENV/JM/MONO(2016)46 and ENV/JM/MONO(2016)46/ANN1] on the "PROPOSAL FOR CLASSIFICATION AND LABELLING (C&L) OF DIBUTYL PHTHALATE". IITR study highlighted that males of Drosophila melanogaster (Fruit fly, an invertebrate) exposed to Dibutyl Phthalate (DBP, which is a plasticizer) had reduced fertility, sperm counts, seminal proteins, increased oxidative modification/damage in reproductive tract proteins and altered hormone receptor (Estrogen Related Receptor) activity, as in higher organisms (vertebrates). Further, DBP is metabolized to monobutyl phthalate (MBP) in exposed Drosophila males and that MBP is more toxic than DBP as observed in higher organisms (human, rat, mouse and other mammals). These findings reflected the adverse reproductive effects of DBP even on flies, ultimately prompting the OECD to conclude that DBP causes similar effects on the sexual function and male fertility across a range of species. Both documents (ENV/JM/MONO(2016)46 and ENV/JM/MONO (2016)46/ANN1) have been published by Environment Directorate, OECD, as a part of The Inter-Organisation Programme for the Sound Management of Chemicals (IOMC). The IOMC was established in 1995 following recommendations made by the 1992 UN Conference on Environment and Development to strengthen co-operation and increase international co-ordination in the field of chemical safety. The Participating Organisations are FAO, ILO, UNDP, UNEP, UNIDO, UNITAR, WHO, World Bank and OECD to promote co-ordination of the policies and activities to achieve the sound management of chemicals in relation to human health and the environment.

Research publication



OXFORD SOT Society of Toxicology www.toxsci.oxfordjournals.org

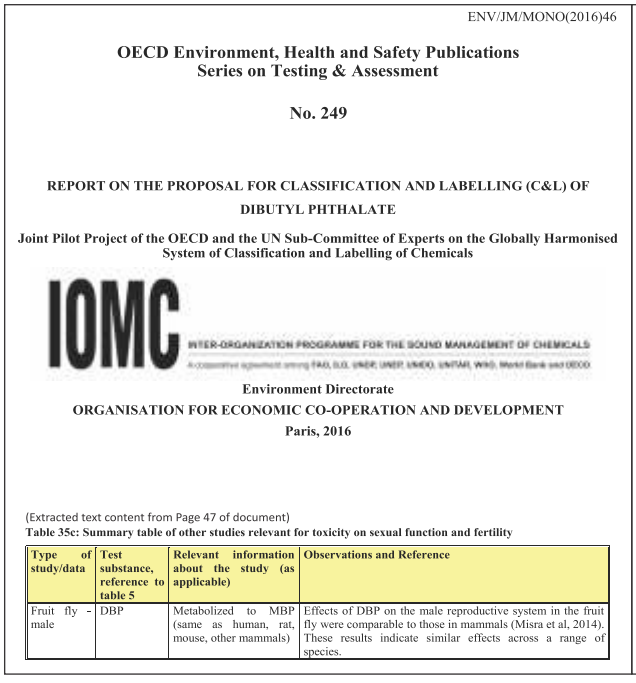
TOXICOLOGICAL SCIENCES, 141(1), 2014, 278–291

doi: 10.1093/toxsci/kfu125
Advance Access Publication Date: June 27, 2014

Identification of Drosophila-Based Endpoints for the Assessment and Understanding of Xenobiotic-Mediated Male Reproductive Adversities

Snigdha Misra*,‡, Anshuman Singh*, Ratnasekhar C.H.†,‡, Vandana Sharma*,‡, Mohana Krishna Reddy Mudiam†,‡, and Kristipati Ravi Ram*,‡,1

OECD publications



ENV/JM/MONO(2016)46

OECD Environment, Health and Safety Publications
Series on Testing & Assessment

No. 249

REPORT ON THE PROPOSAL FOR CLASSIFICATION AND LABELLING (C&L) OF DIBUTYL PHTHALATE

Joint Pilot Project of the OECD and the UN Sub-Committee of Experts on the Globally Harmonised System of Classification and Labelling of Chemicals

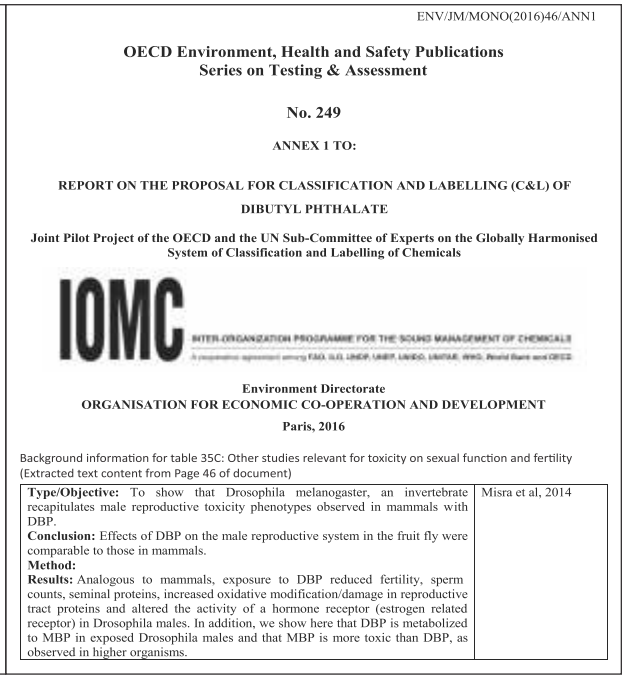
IOMC INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS

Environment Directorate
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
Paris, 2016

(Extracted text content from Page 47 of document)

Table 35c: Summary table of other studies relevant for toxicity on sexual function and fertility

Type of study/data	Test substance, reference to table 5	Relevant information about the study (as applicable)	Observations and Reference
Fruit fly - male	DBP	Metabolized to MBP (same as human, rat, mouse, other mammals)	Effects of DBP on the male reproductive system in the fruit fly were comparable to those in mammals (Misra et al, 2014). These results indicate similar effects across a range of species.



ENV/JM/MONO(2016)46/ANN1

OECD Environment, Health and Safety Publications
Series on Testing & Assessment

No. 249

ANNEX 1 TO:

REPORT ON THE PROPOSAL FOR CLASSIFICATION AND LABELLING (C&L) OF DIBUTYL PHTHALATE

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Environment Directorate
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
Paris, 2016

Background information for table 35C: Other studies relevant for toxicity on sexual function and fertility
(Extracted text content from Page 46 of document)

Type/Objective: To show that Drosophila melanogaster, an invertebrate recapitulates male reproductive toxicity phenotypes observed in mammals with DBP. **Conclusion:** Effects of DBP on the male reproductive system in the fruit fly were comparable to those in mammals. **Method:** **Results:** Analogous to mammals, exposure to DBP reduced fertility, sperm counts, seminal proteins, increased oxidative modification/damage in reproductive tract proteins and altered the activity of a hormone receptor (estrogen related receptor) in Drosophila males. In addition, we show here that DBP is metabolized to MBP in exposed Drosophila males and that MBP is more toxic than DBP, as observed in higher organisms.	Misra et al, 2014

Field remediation of a hexachlorocyclohexane (HCH)-pesticide dump site

Hexachlorocyclohexane (HCH) pesticide was widely used for pest management on varieties of crops. During the production four major isomers are formed and after extraction of gamma-isomer (lindane), rest of the three isomers has been dumped as waste 'muck'. Contaminated sites with HCH are present throughout the world and one such hazardous dump site has been found at Ummari Village, Dewa road, 30 km away from Lucknow. To restore the site, bacterial bioremediation is employed and the site was prepared according to international (US-EPA) guidelines. The bacterial cultures able to biodegrade available at Delhi University and at IITR are used in phased manner. Sample for residue analysis was collected before and after site preparation. Culture inoculum and nutrient addition was done in different field segments of 'Bioaugmentation, Phyto-bioaugmentation and Biostimulation fields. HCH residues are being analyzed after bioremediation treatment by collecting the sample every month since September 2018. A significant reduction in HCH residues was achieved until August 2019. Ecotoxicity evaluation of HCH contaminated soil during the process of microbial remediation is carried out using the earthworm, *Eisenia fetida*. This species is recommended by US EPA and OECD regulatory bodies as a suitable indicator organism representing soil matrix indicating their inhabitability after restoration. As large areas of soils contaminated with hexachlorocyclohexane (HCH) isomers spread across the world these sites can be restored by employing bioremediation as a economically viable and ecofriendly approach.

Bioremediation of Hexachlorocyclohexane-a chlorinated pesticide, from dump site at Ummari Village, Dewa Road, Barabanki District, Uttar Pradesh

Pilot-scale (2000 L) bioreactor for the pulp and paper mill effluent treatment

This technology may also be applied to reduce, recycle and reuse of effluents which are generated from textile and leather-industries, diary distilleries and community sewage

Scientific Social Responsibilities (SSR)

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CSIR INDIA

CSIR-IITR participation at Eat Right Program

Mrs Sanyukta Bhatia, Mayor of Lucknow, inaugurating the function by lighting of lamp

CSIR-IITR organized “Eat Right” event as a part of FSSAI 'Swasth Bharat Yatra,' on January 02, 2019. Mrs Sanyukta Bhatia, Mayor of Lucknow, was the Chief Guest of the function and inaugurated the event. Professor Alok Dhawan, Director, CSIR-IITR, welcomed the gathering and emphasized that food is an essential part of human well-being and health. In her remarks, Mrs Sanyukta Bhatia stated that ensuring quality food to people for keeping them healthy is very important since street food plays a major role in food culture in our country and many people are not aware what they should eat, when and where to eat.

The 'Eat Right India' movement is an initiative of the Food Safety Standards Authority of India (FSSAI) which is aimed at mass mobilization of both supply-side and demand-side interventions to change the way India eats. The FSSAI in partnership with the National Association of Street Vendors of India (NASVI), Delhi State Food Safety Department, NDMC, IGNCA (Ministry of Culture) and Tasting India Symposium, has organized the 'First National Eat Right Mela' during December 14-16, 2018, at Indira Gandhi National Centre for the Arts, (IGNCA), India Gate, New Delhi. CSIR-IITR participated in this event and displayed and demonstrated four technologies at its stall, namely, Oneer-water purification unit, argemone oil and mustard oil adulteration kit and milk adulteration kit. Eat Right Mela provides the platform to know everything about safe food and healthy diet. The main highlight of the event was that various street

Dignitaries on the dais (L-R): Dr Nirmal Gupta, Dr Harmesh S. Chauhan, Mrs Sanyukta Bhatia, Professor Alok Dhawan

Professor Alok Dhawan presenting pamphlets in hindi published from CSIR-IITR to Mrs Sanyukta Bhatia

food vendors from different parts of the country attended and participated in this event. As part of the initiative, FSSAI has already launched the 'Swasth Bharat Yatra which is perhaps the world's largest and longest public outreach programme of its kind. It has been launched with the aim of engaging with people in the remotest parts of the country on safe food and healthy diets. The three day mela provided a complete food experience for the entire family to know everything one needs to know about safe food, healthy diets including tests for adulterants, health and nutrition benefits of different types of food, dietary advice by experts and many more things. About 700 people visited CSIR-IITR stall and appreciated the work carried out and technologies developed on safe water and food by CSIR-IITR. The Chairperson of FSSAI, Mrs Reeta Teaotia, Dr Dinesh Sharma, Deputy Chief Minister, Uttar Pradesh, Ganesh Kandwal, Food Safety Officer, Uttarakhand State and few Food Safety Officers from Chandigarh State Authority also visited the CSIR-IITR stall. Anganwadi (Rural child care centre) also showed interest in installing water purification unit, Oneer developed by CSIR-IITR, at their centres across India. Many other start-ups also showed interest in technologies developed by CSIR-IITR.

Professor Alok Dhawan, Director, CSIR-IITR receiving the certificate for National Reference Laboratory, FSSAI from Dr Harsh Vardhan, Hon'ble Union Minister of Science & Technology, Govt. of India

Kisan Mela at CIMAP

(Clock wise) Farmers and visitors interacting with Dr K. C. Khulbe, Senior Principal Scientist & Head, RPBD, CSIR-IITR and having drinking water from "Puraneer". Dr K. C. Khulbe, Senior Principal Scientist & Head, RPBD, CSIR-IITR interacting with Dr Mangal Rai, Former DG, ICAR; also seen is Professor Anil K. Tripathi, Director, CSIR-CIMAP

The CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow participated in the Kisan Mela – 2019 organized by CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP) on January 31, 2019 at CIMAP campus. The event was inaugurated by Dr Mangala Rai, former Director General of Indian Council of Agricultural Research. Over 3000 farmers from Uttar Pradesh, Bihar, Punjab, Haryana, Madhya Pradesh, Gujarat, Rajasthan, Jharkhand, Chhatisgarh, Tamil Nadu and other states attended the Kisan Mela. The technologies developed by CSIR-IITR on safe water and food was displayed at the event. A fully functional unit of "Puraneer" commercialized by SS Maser which is based on the water disinfection technology developed by CSIR-IITR (Oneer) was installed at the event. It was one of the major attractions at the Kisan Mela. More than 2500 farmers consumed water from Puraneer and gave extremely affirmative feedback.

Sutram for Easy Water

CSIR-Indian Institute of Toxicology Research, Lucknow is one of the partnering institutions in the DST-IIT Madras Innovation Centre for Sustainable Treatment, Reuse and Management for Efficient, Affordable and Synergistic solutions for water (SUTRAM for EASY WATER). Dr Harsh Vardhan, Hon'ble Minster for Science & Technology, Health and Family Welfare and Earth Sciences, launched the DST Technology Mission Centre on Solar energy and water treatment at IIT Madras on January 25, 2019. In his address, Dr Harsh Vardhan said that scientists and technocrats should aspire to achieve breakthroughs through cutting edge research which could position India at the frontiers of global innovations. He further stated that development and application of advanced tools and techniques by leading Indian institutions for water and energy is of utmost importance to address the critical scientific challenges involved. The current endeavours are few such steps in this direction. The DST–IITM Water IC for SUTRAM of EASY WATER is coordinated by Professor Ligy Philip, Department of Civil Engineering, IIT Madras. It has been established with an aim to undertake synchronized research and training programs on various issues related to wastewater management, water treatment, sensor development, storm water management and distribution and collection systems. The multi institutional Virtual Centre will provide a unique opportunity for the various groups in different premier organizations working in the above areas to collaborate and work in a synergized manner to ensure adequate, safe, reliable and sustainable sources of drinking water for rural and urban India and process water for highly polluting and water intensive industries through research, technology development and capacity building. CSIR-IITR plays a significant role in water treatment, such as, disinfection and new clean water technology development, commercialization and outreach. Other partnering institutions are CSIR-CLRI, Chennai, Anna University, Chennai, VIT, Chennai, PRIST University, IIT Tirupati, Kumaon University, and IISER, Bhopal.

CSIR-IITR's participation in KUTUHAL

The CSIR- Indian Institute of Toxicology Research (CSIR-IITR), Lucknow, participated in the Mega event named "KUTUHAL" (Know, Understand, Test, Use Healthcare Appliance & Learn) - Revealing journey from pre-birth to rebirth held at Visvesvaraya National Institute of Technology (VNIT), Nagpur, during February 9-11, 2019. The event was jointly organized by Vigyan Bharati, Indian Medical Association (IMA), National Cancer Institute (NCI) and VNIT, Nagpur. The event was inaugurated by Hon'ble Union Minister, Shri Nitin Gadkari and Nagpur Mayor, Mrs Nanda Jichkar, Dr Shekhar C. Mande, Director General, CSIR and Secretary, DSIR, delivered a plenary talk emphasizing on human microbiome and health. Dr Mande also visited the CSIR-IITR stall in which technologies developed by the institute including "Oneer"- a water disinfection system, argemone oil adulteration detection kit, Butter Yellow adulteration detection kit, etc. were displayed and demonstrated. Additionally, the team CSIR-IITR distributed informative brochures to the public for raising awareness on health and environmental safety issues. The aim for setting-up the stall was to communicate information and to spread awareness regarding safe water, safe food and healthy environment. Team CSIR-IITR successfully met their objectives as thousands of students, medical aspirants, professors and doctors visited the stall of CSIR- IITR and highly appreciated the work.

Dr Shekhar C. Mande, Director General, CSIR along with Mrs Preeti Chaturvedi, Senior Scientist, CSIR-IITR and participants in front of CSIR-IITR Stall

Dr Shekhar C. Mande, Director General, CSIR being presented brochures developed by CSIR-IITR on food, safe drinking water and health by Mrs Preeti Chaturvedi, Senior Scientist, CSIR-IITR

School students and other participants visiting CSIR-IITR stall and interacting with the scientists

CSIR-IITR stall being visited by school and college students and dignitaries

CSIR Technology Showcase at CSIR-IITR

CSIR-Indian Institute of Toxicology Research (CSIR-IITR) organized the CSIR Technology Showcase on April 18, 2019. This CSIR Technology Showcase event is the first of its kind conducted along with NASI, INSA, UP Academy of Science, Club of Lucknow, and Indian Academy of Neurosciences to promote technologies and innovation for the benefit of masses. Dr Anup Chandra Pandey, Chief Secretary, Government of Uttar Pradesh and Chairman, Club of Lucknow was the Chief Guest at the event. Numerous dignitaries associated with the Club of Lucknow attended the event including Padma Shri Dr Mansoor Hasan, Professor P.K. Seth, Justice Vishnu Sahai, Shri Mukul Singhal (IAS), Shri Navneet Sehgal (IAS), Shri R.N. Bhargava, Shri Sharat Pradhan, and many more eminent personalities. Padma Shri Dr Nitya Anand also graced the occasion.

Dr P.K. Seth, Dr Nitya Anand, Professor Alok Dhawan

Dr. Anup Chandra Pandey, Chief Secretary, Government of Uttar Pradesh, releasing the brochure on CSIR's Technology Showcase and its Role in Socio-Economic Development

Professor Alok Dhawan, Director, CSIR-IITR highlighting the CSIR technologies

Dr. Anup Chandra Pandey, Chief Secretary, Government of Uttar Pradesh addressing the gathering


CSIR-IITR


CSIR-CDRI


CSIR-CFTRI


CSIR-CIMAP


CSIR-CLRI


CSIR-NBRI


CSIR-NBRI

Dr Anup Chandra Pandey, Chief Secretary, Government of Uttar Pradesh, inaugurating the CSIR Technology showcase exhibition and visiting the technology exhibits of CSIR laboratories - CSIR-IITR, CSIR-CDRI, CSIR-NBRI, CSIR-CIMAP and regional centres of CSIR-CFTRI and CSIR-CLRI, Kanpur

The event started with an exhibition in which UP-situated CSIR laboratories including CSIR-Indian Institute of Toxicology Research, CSIR-Central Drug Research Institute, CSIR-National Botanical Research Institute, CSIR-Central Institute of Medicinal and Aromatic Plants and Regional Centres of CSIR-Central Food Technological Research Institute, Lucknow and CSIR-Central Leather Research Institute, Kanpur, displayed the technologies developed by their institutions. Scientists from the respective laboratories explained in details their innovations and technological developments to the visitors.

After the exhibition, Shri R.N. Bhargava, Secretary General, Club of Lucknow inaugurated the forum and addressed the audience. Professor P.K. Seth, Former Director, CSIR-IITR highlighted the vision of CSIR. Professor Alok Dhawan enlightened the audience about the socio-economic impact made by CSIR and how millions of countrymen have been benefitted by technological advancements made by CSIR since decades. In his concluding remarks, Dr Anup Chandra Pandey, Chief Secretary, Government of Uttar Pradesh and Chairman, Club of Lucknow, appreciated the efforts. Further, he asserted that in establishing India as global leader in Science and Technology, instead of slow and steady progress, we need a quantum leap which is only possible by innovation and technology. He emphasized that the CSIR laboratories of Uttar Pradesh will continue to play the pivotal role in empowering citizens of the state and the nation. The audience participated in a lively interactive session.

Dr. Anup Chandra Pandey, Chief Secretary, Government of Uttar Pradesh, being felicitated by Professor Alok Dhawan, Director, CSIR-IITR

CSIR-IITR on the biggest rafting expedition ever on National Mission for Clean Ganga Program

The flag off ceremony of Ganga Aamantran Abhiyan was performed by Hon'ble Minister of Jal Shakti, Government of India, Shri Gajendra Singh Shekhawat. The flag was handed over to Wing Commander Paramvir Singh, team leader of the expedition and other team members. CSIR-Indian Institute of Toxicology Research, Lucknow, has been playing a major role in assessing the water quality throughout the length of the river which is almost 2500km. Scientists and researchers of CSIR-IITR have participated in public awareness programs at various places during the expedition. This is the biggest rafting expedition ever to be undertaken on the river Ganga from Devprayag to Gangasagar. Professor Alok Dhawan, Director, CSIR-IITR who had attended the launching of river rafting expedition event on October 07, 2019 and said that it is a proud privilege for team CSIR-IITR to be a part of this month long expedition.

The flag off ceremony of Ganga Aamantram Abhiyan by Shri Gajendra Singh Shekhawat, Hon'ble Minister of Jal Shakti, Government of India along with the dignitaries

Wing Commander Paramvir Singh being handed over the flag for Ganga river rafting by Hon'ble Minister Shri Gajendra Singh Shekhawat (left) and Professor Alok Dhawan, Director, CSIR-IITR and Wing Commander Paramvir Singh displaying the flag (right)

Dr N. Manickam, Senior Principal Scientist, CSIR-IITR participating in Ganga river rafting

Reduction in environmental burden of green house gas (GHG) emission and energy conservation at CSIR-IITR: A case study

Global warming is a key concern due to anthropogenic green house gas (GHG) emission. Carbon footprint (equivalent amount of carbon-di-oxide, kg of CO_2) has been used as a reference measure for global warming potential as well as a traditional belief that kg of CO_2 equivalent is a useful concept for the explanation about energy conservation. CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow, has initiated pragmatic approaches by utilizing solar photovoltaic (PV) system for electricity and fixation of LED lamps by replacing incandescent/CFL fittings and florescent tube light lamps towards conservation of electricity and subsequent reduction in carbon footprint to support towards sustainable environment.

Table 1 (a): Solar power plant electricity generation

Month-Year	Solar PV power generation in Main campus, kWh	Solar PV power generation in Gheru campus, kWh
Jul-2018	2025	--
Aug-2018	1864	--
Sep-2018	2410	8510
Oct-2018	2691	12400
Nov-2018	2100	9983
Dec-2018	1877	11363
Jan-2019	1972	11018
Feb-2019	2092	10708
Mar-2019	3299	15477
Apr-2019	3172	12814
May-2019	3349	14639
Jun-2019	2752	11900
Total	**29603**	**118812**

Inventory was developed for monthly solar power generation over a year (i.e., July, 2018 to June, 2019) and LED lamps were fixed in both Main campus and Gheru campus of CSIR-IITR. Inventorization is presented in Table 1(a) for solar power and Table 1(b) for the usage of LED lamps and the same database was used to calculate the reduction in carbon footprint, saving of carbon price and relative number of trees saved through energy conservation by the institute for the benefit of environment.

Table 1 (b): Details about the LED lamps fixation

Wattage rate per mercury/ CFL tube light fitting	Wattage rate of each LED fitting (replaced)	Number fixtures in the institute
Main campus		
36	18	766
72	36	174
22	12	105
28	23	11
18	9	23
250	120	11
Gheru campus		
72	36	37
125	23	44

Electricity generated by the solar PV systems in CSIR-IITR has been fully utilized for the institution need and therefore, the power consumption load from Uttar Pradesh Power Corporation Limited (UPPCL) transmission grid was lowered. Further, adding LED lamps in the institute also contributed towards significant reduction in electricity load. The reduction in electricity usage load corresponds to the reduction in carbon emission burden on the atmosphere. It has been calculated by multiplying the amount of electricity consumption with the carbon emission factor, which is reported as 0.82 kg of CO_2/kWh electricity consumption for grid electricity. The calculation was done for monthly and annual saving against carbon emission.

Kg of CO_2 = Consumption of electricity (kWh) X 0.82 kg of CO_2 / kWh

For this study, it has been considered that the LED lamps were in use on an average of 12 h/day over 250 days in a year by excluding the weekend off and national holidays. As per UPPCL, electricity charge for the institute at a commercial rate is Rs. 8.00/kWh. Keeping that in

consideration, there is a significant saving on electricity bill. Further, the reduction in total carbon footprint of CSIR-IITR has been expressed in environmental beneficiary monetary value parallel to minimization in cutting trees for the demand on tree sequestration carbon. Thirty five percent of green mass of a tree is water, so 65% is solid dry mass. The carbon content is about 50% in the total dry volume of the tree. Below ground level, tree biomass (roots) is 20%. So a multiplication factor of 120% was used. Further, the amount of CO_2 sequestrated in the tree was expressed as carbon stored in the tree. The multiplication factor is 3.67. For this study, the information was used to estimate the number of trees that have been protected indirectly from the energy demand. **Table 2 (a)** and **Table 2 (b)** illustrate the detailed calculation outcome for the reduction in carbon footprint and relative number of trees saved.

Kg of CO_2 /year = [Kg of fresh biomass x 65% (dry mass) x 50% (carbon %) x 3.67 x 120%]

Then,

Number of trees saving = [Reduction in total carbon footprint] / [kg of CO_2 /year] [Minimization in demand on trees sequestration carbon]

Table 2 (a): Reduction in carbon footprint and minimization in demand on trees sequestration carbon by the activity of Solar PV electricity usage by CSIR-IITR

Campus	Month-Year	Solar PV generation, kWh	Reduction in carbon footprint, kg of CO_2	Saving amount by utilization of institute's solar power (Rs.) [Electricity charge @ Rs. 8.00/kWh]	Minimization in demand on trees sequestration carbon [i.e., number of trees saved from demand]
Main campus	Jul-2018	2,025.0	1,660.5	16,200.0	23.1
	Aug-2018	1,864.0	1,528.5	14,912.0	21.2
	Sep-2018	2,410.0	1,976.2	19,280.0	27.4
	Oct-2018	2,691.0	2,206.6	21,528.0	30.6
	Nov-2018	2,100.0	1,722.0	16,800.0	23.9
	Dec-2018	1,877.0	1,539.1	15,016.0	21.4
	Jan-2019	1,972.0	1,617.0	15,776.0	22.5
	Feb-2019	2,092.0	1,715.4	16,736.0	23.8
	Mar-2019	3,299.0	2,705.2	26,392.0	37.6
	Apr-2019	3,172.0	2,601.0	25,376.0	36.1
	May-2019	3,349.0	2,746.2	26,792.0	38.1
	Jun-2019	2,752.0	2,256.6	22,016.0	31.3
Gheru campus	Aug-2018	--	--	--	--
	Sep-2018	8,510.0	6,978.2	68,080.0	96.9
	Oct-2018	12,400.0	10,168.0	99,200.0	141.2
	Nov-2018	9,983.0	8,186.1	79,864.0	113.7
	Dec-2018	11,363.0	9,317.7	90,904.0	129.4
	Jan-2019	11,018.0	9,034.8	88,144.0	125.5
	Feb-2019	10,708.0	8,780.6	85,664.0	122.0
	Mar-2019	15,477.0	12,691.1	1,23,816.0	176.3
	Apr-2019	12,814.0	10,507.5	1,02,512.0	145.9
	May-2019	14,639.0	12,004.0	1,17,112.0	166.7
	Jun-2019	11,900.0	9,758.0	95,200.0	135.5
	Jul-2019	--	--	--	--
Total		**1,48,415.0**	**1,21,700.3**	**11,87,320.0**	**1,690.3**

Table 2 (b): Reduction in carbon footprint and minimization in demand on trees sequestration carbon by the activity of LED bulbs fixation at CSIR-IITR

Campus	Total power consumption of mercury tube light/ CFL fitting (kWh/ year)	After replacing with LED lamp fitting/fixation, the power consumption of LED lamps (kWh/ year)	Total annual saving on electricity in Rs.[Electricity charge @ Rs. 8.00/kWh]	Reduction in carbon footprint (Kg CO_2 /kWh) / year	Minimization in demand on trees sequestration carbon [number of trees saved]
Main campus	137658	69276	547056	56073	779
Gheru campus	24492	7032	139680	14317	199
Total	**162150**	**76308**	**686736**	**70390**	**978**

The reduction in electricity consumption by CSIR-IITR positively impacted on carbon footprint contribution to the environment. The total reduction in carbon emission through energy saving in the institute was found to be 192090.3 kg of CO_2 over a year cycle. The study is an ideal paradigm to initiate measure at commercial and residential premises to reduce the carbon emission burden from the effect of green house gas emission.

Functional solar power plant at Gheru campus of the institute

International Agri and Food Product Expo

Associated Chambers of Commerce & Industry of UP organized a Road Show on May 15, 2019 in Lucknow. Professor Alok Dhawan, Director, CSIR-IITR was the Chief Guest of the event held in Lucknow and he shared CSIR's contributions in the area of food safety and a glimpse of S&T of CSIR-IITR. This event was associated with the Vibrant TamilNadu: An International Agri and Food Product Expo in August 2019.

Ms Rita Teaotia and Professor Alok Dhawan – Releasing the brochure

CSIR-IITR Portfolio

- Basic, Applied and Translational Research in Toxicology
- Research for Policies

- Sophisticated Analytical Facilities & Services (NABL)
- GLP Toxicology Testing Safety Assessment

- Human Resource Development
- Skill Development Program

- R&D Partnerships, Consulting and Services to Industries, Academia and Startups
- Technology Development & Innovation Centre, Centre for Innovation and Translational Research, National Facilities for Nanotoxiclogy and Food Safety National Referral and Food Reference Laboratories (FSSAI) and DSIR-IITR-CRTDH Environmental Monitoring and Intervention Hub

- Scientific Social Responsibilities
- Outreach Programs, Awareness, Jigyasa, Students Connect Programs, Workshop, Symposia, Media Coverage
- Air and Water Quality Assessment

Environmental Toxicology

Dr N. Manickam
Area-Coordinator

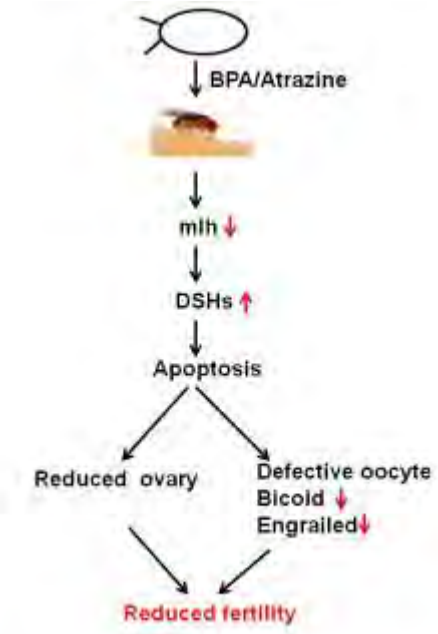
The significant challenge in environmental toxicology area is to create efficient ways to predict toxic potential and exposure levels for chemicals that lack toxicological and exposure data in environmental settings. The demand is to assess large numbers of chemicals for hazard identification in a cost- and time-efficient manner. The need for high-throughput toxicity assays coupled with ethical concerns over animal testing necessitated the pursuit of better tools for ecotoxicological studies. Hence, the development, validation and application of high throughput alternate models as well as alternative to animal models for ecotoxicity studies are of high priority in ecotoxicology. The information on usage, exposure and effects obtained from quantitative structure–activity relationships, read-across methods, thresholds of toxicological concern and *in vitro* tests prior to *in vivo* testing are ideal routes for more rapid, efficient and cost effective risk assessment of chemicals. A major challenge is the development of diagnostic capabilities to precisely determine the cause–effect relationships within impaired ecosystems. This will help in determining the extent to which existing remediation strategies/technologies are effective and the refinements needed for risk management. In this context, a mojor program has been initiated to clean a large section of pesticide contaminated site where other institutes/ organizations are also involved. Further, technologies for the treatment of industrial effluents have also been developed towards cleanup of environment. Both these programs are part of Environmental Intervention Hub supported by DSIR-Common Research and Technology Development Hubs (CRTDHs) in 2019. The hub will cater the need of MSMEs for technology related issues pertaining to environment and health.

Keeping these issues in view, the environmental toxicology group at CSIR-IITR aims to generate knowledge/tools useful for the protection as well as management of ecosystem integrity and to advance the understanding of ecotoxicological problems across different ecological strata at cellular, genetic and organismal levels in order to assess ecological risk assessment and to mitigate environmental pollution. The issues addressed by the group are : (i) mechanism of toxicity of environmental pollutants; (ii) remediation of hazardous and persistent chemical substances from soil, water and industrial wastes and (iii) ecotoxicity and environmental monitoring.

L-R (First row) : Dr Aruna Satish, Dr Ravi Ram Kristipati, Dr Natesan Manickam, Dr Debapratim Kar Chowdhuri, Dr Shyamal Chandra Barman
(Second row) : Dr Ramakrishna Parthasarathi, Dr Abhay Raj, Dr Sadasivam Anbumani, Er Altaf Husain Khan, Dr Ganesh Chandra Kisku

Atrazine or bisphenol A mediated negative modulation of mismatch repair gene, *mlh1* leads to defective oogenesis and reduced female fertility in *Drosophila melanogaster*

The study reports the effects of an herbicide (atrazine) and a plasticizer (Bisphenol A, BPA) on the transcriptional modulation of a mismatch repair gene (*mlh1*) and its adverse consequences on female fertility using Drosophila as a model. Through a chemical screen, it was shown that exposure to atrazine or BPA significantly downregulates *mlh1* and the exposed flies had reduced fertility with smaller ovaries having reduced number of mature oocytes and abnormal distribution of ovarian follicles with increased apoptosis in them. These females had increased double-strand breaks as well as reduced synaptonemal complex formation in their ovaries suggesting altered meiotic crossing over. The eggs of these females were defective in their maternal transcripts as well as proteins and consequently, after fertilization, these eggs exhibited abnormal embryonic development. Interestingly, these phenotypes parallel those of *mlh1* mutants. Further, exposure of females having reduced Mlh1 levels (*mlh1e00130/CyO*) to atrazine or BPA caused severe defective phenotypes at a higher proportion than normal flies. These findings reveal the critical role of *mlh1* in atrazine and BPA mediated female reproductive toxicity, and raise a possibility of toxicants affecting female fertility by modulating the mis match repair (MMR) genes.



Schematic depiction of molecular/physiological events associated with Atrazine or Bisphenol mediated modulation of mlh1 leading to reduced female fertility

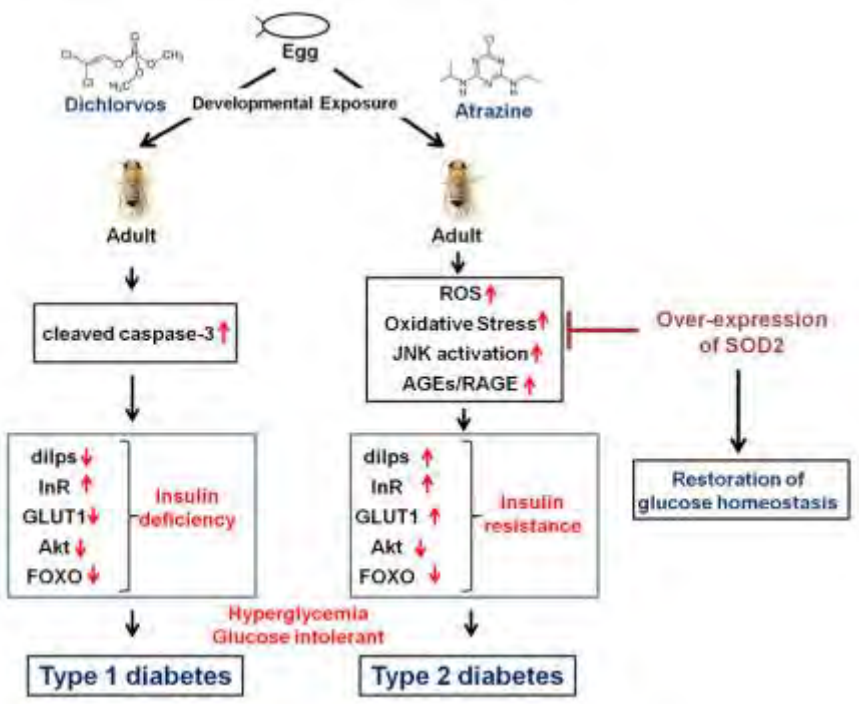
Vimal D, Saini S, Ravi Ram K, Chowdhuri DK, Chemosphere, 2019, 225: 247-258.

Xenobiotic mediated diabetogenesis: Developmental exposure to dichlorvos or atrazine leads to type-1 or type-2 diabetes in Drosophila

The increased incidence of diabetes to the magnitude of a global epidemic is attributed to non-traditional risk factors, including exposure to environmental chemicals. However, the contribution of xenobiotic exposure during the development of an organism to the etiology of diabetes is not fully addressed. Developing stages are more susceptible to chemical insult, but knowledge on the consequence of the same to the onset of diabetes is residual. In this context, by using *Drosophila melanogaster* having conserved Insulin/Insulin growth factor-like signaling (IIS) as well as glucose homeostasis as a model, the study has shown the potential of developmental exposure to dichlorvos (DDVP, an organophosphorus pesticide) or atrazine (herbicide) to cause diabetes in exposed organisms. Flies exposed to DDVP during their development display insulin deficiency or type - diabetes (T1D) while those exposed to atrazine show insulin resistance or type-2 diabetes (T2D), suggesting that exposure to these xenobiotics during organismal development can result in diabetes and that different mechanisms underlie pesticide mediated diabetes. Findings suggested that oxidative stress-mediated c-Jun N-terminal kinase (JNK) signaling activation underlies insulin resistance in flies exposed to atrazine during their development while DDVP-mediated T1D involves activation of caspase-mediated cell death pathway. Mitigation of oxidative stress through over-expression of Super Oxide Dismutase 2 (SOD2) in atrazine (20µg/ml) exposed flies, revealed significantly decreased oxidative stress levels and reduced phosphorylation of JNK. Moreover,

glucose and Akt phosphorylation levels in SOD2 over-expression flies exposed to atrazine were comparable to those in controls, suggesting restoration in insulin sensitivity. Therefore, exposure to xenobiotics during development is a common risk factor for the development of type-1 or type-2 diabetes. Accordingly, the study cautions against the use of such diabetogenic pesticides. Also, mitigation of oxidative stress or anti-oxidant supplementation could be a potential therapy for xenobiotic mediated type 2 diabetes.

Gupta HP, Jha RR, Ahmad H, Patel DK, Ravi Ram K. Free Radical Biology and Medicine, 2019, 141: 461-474.



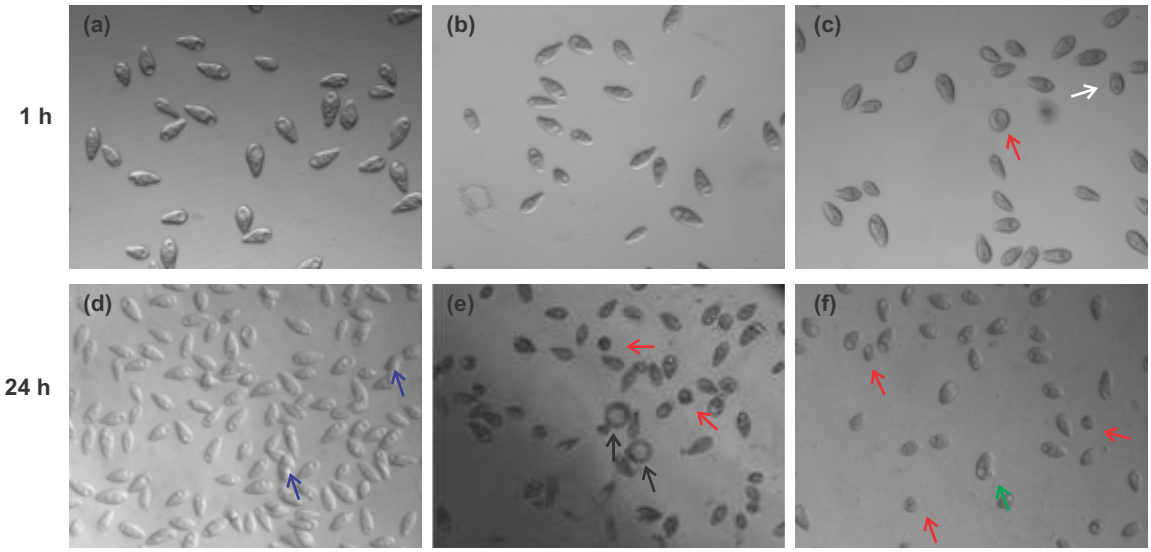
Schematic diagram showing onset of Type-1 or Type-2 diabetes in flies exposed to dichlorvos or atrazine and the mechanisms underlying xenobiotic mediated diabetogenesis.

Effect of difenoconazole fungicide on physiological responses and ultrastructural modifications in model organism *Tetra-hymena pyriformis*

The continuous and extensive use of pesticides, particularly in the field of agriculture, leads to contamination of all ecosystems (water, soil, and atmosphere). Among pesticides, fungicides constitute a larger group whose impact on the environment are still poorly studied. Difenoconazole belongs to triazole group of fungicides having high photochemical stability and have low biodegradability, which makes them persistent in water bodies. The study focused on the physiological and cytotoxic impact of difenoconazole fungicide on ciliated protozoa, *Tetrahymena pyriformis* with reference to growth, morphology, behaviour and its generation time. Morphological studies showed changes in the shape and size of *T. pyriformis***.** Data suggested an inhibitory effect of difenoconazole on the population growth of *T. pyriformis* and the IC_{50} concentration was found to be 6.8 µg/ml. The generation time was found to be extended in a concentration- and time-dependent manner and consequently, the number of generations decreased over time. Difenoconazole caused significant depletion in phagocytic activity and also ultra-structural

changes were observed by transmission electron microscopy (TEM) analysis. The results indicate that the *Tetrahymena* toxicity assay could be used as a complementary system for rapidly elucidating the cytotoxic potential of fungicide.

Maurya R, Dubey K, Singh D, Jain AK, Pandey AK. Ecotoxicology and Environmental Safety, 2019, 182: 109375.



Bright field images of *T. pyriformis* cells after 1 h and 24 h treatment of difenoconazole (Magnification 100x). (a, d) Control; (b, e) Cells treated with 7 µg/ml of fungicide; (c, f) Cells treated with 10 µg/ml of fungicide. Red arrows represent rounding of cells. Blue arrow represents the dividing cell. Black arrow depicts the enlargement of contractile vacuole. Green arrow represents the bulging of the membrane. White arrow shows loss of body part.

Phytotoxicity, cytotoxicity and genotoxicity evaluation of organic and inorganic pollutants rich tannery wastewater from a common effluent treatment plant (CETP) in Unnao district, India, using *Vigna radiata* and *Allium cepa*

The leather industry is a major source of environmental pollution in India. The wastewater generated by leather industries contains very high pollution parameters due to the presence of a complex mixture of organic and inorganic pollutants even after the treatment at common effluent treatment plant (CETP) and disturb the ecological flora and fauna. The nature, characteristics and toxicity of CETP treated wastewater is yet to be fully elucidated. Thus, this study aimed to characterize and evaluate the toxicity of CETP treated tannery wastewater collected from Unnao district of Uttar Pradesh, India. In addition to physico-chemical parameters, the residual organic pollutants were identified by GC-MS analysis and phytotoxicity, cytotoxicity and genotoxicity of treated wastewater was evaluated using *Vigna radiata* L. and *Allium cepa* L. The results showed that treated wastewater contained very high pollution parameters (TDS 3850 mg/l, BOD 680 mg/l, COD-1300 mg/l). GC-MS analysis revealed the presence of various types of residual organic pollutants, such as, benzoic acid, 3-[4,-(T-butyl) Phenyl] furan-2-5-dione, benzeneacetamide, resorcinol, dibutyl phthalate, and benzene-1,2,4-triol, etc. Further, toxicological studies showed the phytotoxic nature of wastewater as it inhibited the seed germination in *V. radiata* L. and root growth of *A. cepa*. Genotoxicity was evidenced in the root tip cell of *A. cepa* where chromosomal aberrations (stickiness, chromosome loss, C-mitosis, and vagrant

chromosome) and nuclear abnormalities like micronucleated and binucleated cells were observed. Thus, results suggested that the discharge of partially treated wastewater into the environment is not safe.

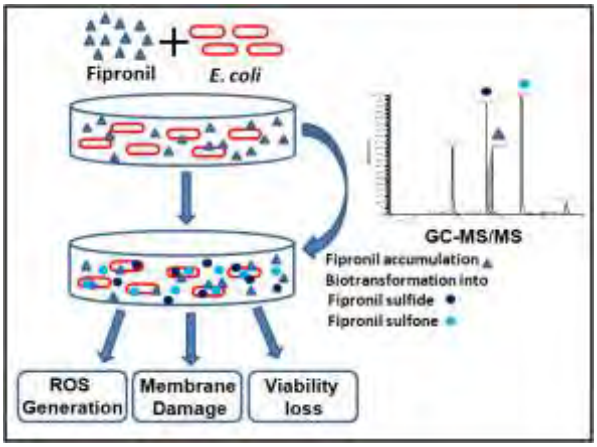
Yadav A, Raj A, Purchase D, Ferreira LFR, Saratele, GD, Bharagava RN. Chemosphere, 2019, 224: 224-324

Schematic presentation for detection of pollutants in tannery waste water and their toxicity

Bioaccumulation and toxic effect of fipronil in *Escherichia coli*

Fipronil, a broad-spectrum insecticide, used in pest control has led to contamination of soil, water, fruits, and vegetables. The global usage of fipronil calls for risk assessment of undesirable effects on non-target microorganisms. In this context, non-pathogenic *Escherichia coli* were exposed to fipronil and the bioaccumulation as well as toxicity of the same was assessed. The study found that fipronil did not cause significant levels of reactive oxygen species (ROS) up to 50 µM concentration, while exposure of 100 µM fipronil led to a significant loss of membrane potential and viability, due to higher ROS level. Further, GC-MS/MS studies reported that *E. coli* accumulates and biotransforms fipronil at non-lethal concentrations. The bioaccumulation of fipronil in bacteria is of concern and should be further explored because it can lead to biomagnification in the higher trophic level and can disturb the ecological balance.

Bhatti S, Satyanarayana GNV, Patel DK, Satish A. Chemosphere, 2019, 231: 207-215.



Graphical representation of the bioaccumulation and toxic effects of fipronil in *Escherichia coli*

Comparative microbiome analysis of two different long-term pesticide contaminated soils revealed the anthropogenic influence on functional potential of microbial communities

Microbial communities play a crucial role in bioremediation of pollutants in contaminated ecosystem. In addition to pure culture isolation and bacterial 16S rRNA based community studies, the focus has now shifted employing the omics technologies enormously for understanding the microbial diversity and functional potential of soil samples. Previous report on two pesticide-contaminated sites revealed the diversity of both culturable and unculturable bacteria. This study observed distinct taxonomic and functional communities in contaminated soil with respect to an uncontaminated soil as control by using shotgun metagenomic sequencing method. Proteobacteria, Actinobacteria, Firmicutes, Bacteroidetes, and Acidobacteria significantly dominated the microbial diversity with their cumulative abundance percentage in the range of 98.61, 87.38, and 80.52 for Hindustan Insecticides Limited (HIL), India Pesticides Limited (IPL), and control respectively. Functional gene analysis demonstrated the presence of large number of both substrate specific upper pathway and common lower pathway degradative genes. Relatively lower numbers of genes were found encoding the degradation of styrene, atrazine, bisphenol, dioxin, and naphthalene. When three bacteria were augumentated with rhamnolipid (20-100 µM) and Triton X-100 (84-417 µM) surfactants in HIL soil, an enhanced degradation to 76 %, 70 %, and 58 % of HCH, Endosulfan, and DDT respectively, was achieved. The overall data obtained from two heavily contaminated soils suggest the versatility of the microbial communities for the xenobiotic pollutant degradation which may help in exploiting their potential applications in bioremediation.

Regar RK, Gaur VK, Bajaj A, Tambat S, Manickam N. Science of the Total Environment, 2019, 681, 413-423.

Biosynthesis and characterization of sophorolipid biosurfactant by *Candida sp.*: Application as food emulsifier and antibacterial agent

Biosurfactants from the yeast strains *Candida albicans* SC5314 and *C. glabrata* CBS138 were isolated and characterized. Surface tension of the cell-free broth was reduced from 72 N/m to 42 N/m and 55 N/m respectively. The biosurfactants showed emulsifying ability as the indices against castor oil were determined to be 51% and 53% for *C. albicans* and *C. glabrata* respectively and were found stable between pH 2-10, temperature 4-120°C and salt concentration 2-14 %. The partially purified surfactants were identified as sophorolipid using Fourier transform infrared spectroscopy. Isolated sophorolipid showed antibacterial properties against pathogenic bacteria and generated reactive oxygen species in *Bacillus subtilis* and *Escherichia coli*. Flow cytometric analysis revealed that 60 mg/l of *C. glabrata* biosurfactant killed 65.8 % *B. subtilis* and 4% *E. coli.* The data obtained here indicate potential antimicrobial and therapeutic applications of the identified biosurfactants.

Gaur VK, Regar RK, Dhiman N, Gautam K, Srivastava JK, Patnaik S, Manickam N. Bioresource Technology, 2019, 285: 121314.

Characterization and properties of the biosurfactant produced by PAH-degrading bacteria isolated from contaminated oily sludge environment

The study aimed to investigate biosurfactant production ability of five different polyaromatic hydrocarbons (PAHs) metabolizing bacteria, such as *Ochrobactrum anthropi* IITR07, *Pseudomonas mendocina* IITR46, *Microbacterium esteraromaticum* IITR47, *Pseudomonas aeruginosa* IITR48, and *Stenotrophomonas maltophilia* IITR87. These bacteria showed biosurfactant production using 2% glucose as the rich substrate. Strain IITR47 yielded a highest of 906 and 534 mg/l biosurfactant in

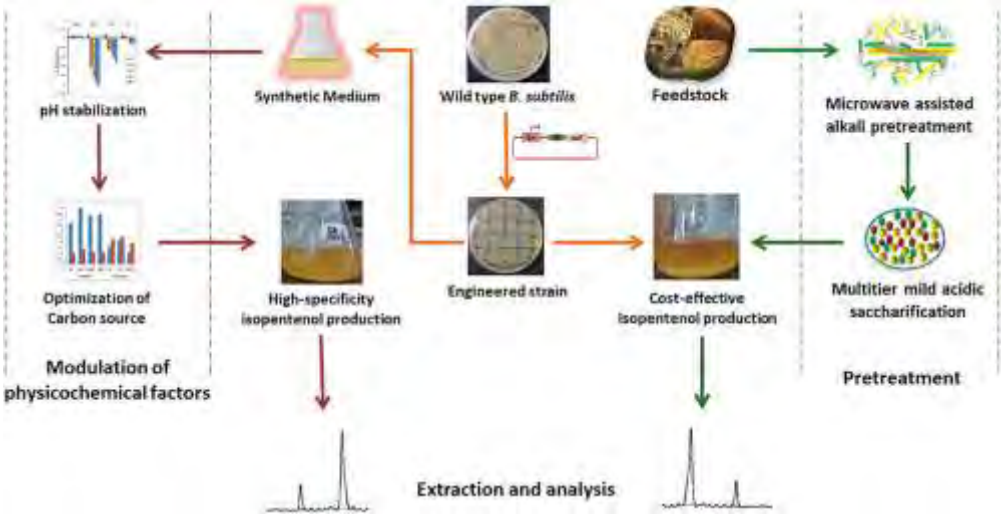
presence of naphthalene and crude oil as the unique carbon sources. *P. aeruginosa* IITR48 showed least surface tension 29 N/m and highest emulsification index of 63 %. The biosurfactants produced were identified as glycolipid and rhamnolipid based on Fourier Transform Infrared Spectroscopy analysis. In particular, the biosurfactant produced by bacteria *S. maltophilia* IITR87 efficiently emulsified mustard oil with an E24 value of 56%. However, all five biosurfactants from these degrader strains removed 2.4, 1.7, 0.9, 3.8, and 8.3 folds respectively, of crude oil from contaminated cotton cloth. Rhamnolipid derived from IITR87 was the most efficient, exhibiting highest desorption of crude oil. These biosurfactants exhibited good stability without significantly losing their emulsification ability under extreme conditions, thus can be employed for bioremediation of PAHs from diverse contaminated ecosystem.

Tripathi V, Gaur VK, Dhiman N, Gautam K, Manickam, N. Environmental Science and Pollution Research, 2019, doi: 10.1007/s11356-019-05591-3.

Modulation of culture medium confers high-specificity production of isopentenol in *Bacillus subtilis*

Enthusiasm for mining isoprenoid-based flavors, pharmaceuticals, and nutraceuticals from GRAS (Generally Regarded as Safe) status microbial hosts has increased in the past few years due to the limitations associated with their plant based extraction and chemical synthesis. *Bacillus subtilis*, a well-known GRAS microbe, is a promising alternative due to its fast growth rate and the ability to metabolize complex carbon sources. The study focused on the high-specificity production of isopentenol in *B. subtilis* by modulating the culture medium. Media modulation led to a 2.5 fold improvement in isopentenol titer in the wild-type strain. In the recombinant strain, optimization of physico-chemical factors, coupled with overexpression of the nudF enzyme resulted in a maximum isopentenol titer of ~6 mg/l in a shake flask. The recombinant strain produced ~5 mg/l isoprenol (~80% of the total isopentenol production) and ~1.8 mg/l prenol (~65% of the total isopentenol production) by utilizing sorbitol and pyruvate as the carbon sources, respectively. Replacement of glucose with sorbitol and pyruvate reduced the production of the undesired metabolites and enhanced high-specificity production of isopentenol. Upon replacement of the carbon source with a low-cost substrate, a non detoxified rice-straw hydrolysate, the engineered strain produced 2.19 mg/l isopentenol. This proof-of-concept study paves the path for the high-specificity production and cost-effective recovery of isopentenol from industrially competent microbial strains with engineered isoprenoid pathways.

Phulara SC, Chaturvedi P, Chaurasia D, Diwan B, Gupta P. Journal of Bioscience and Bioengineering, 2019, 127: 458-464.



Graphical presentation of high-specificity production of isopentenol in *Bacillus subtilis*

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CSIR INDIA

Food, Drug and Chemical Toxicology

Dr Devendra Parmar
Area-Coordinator

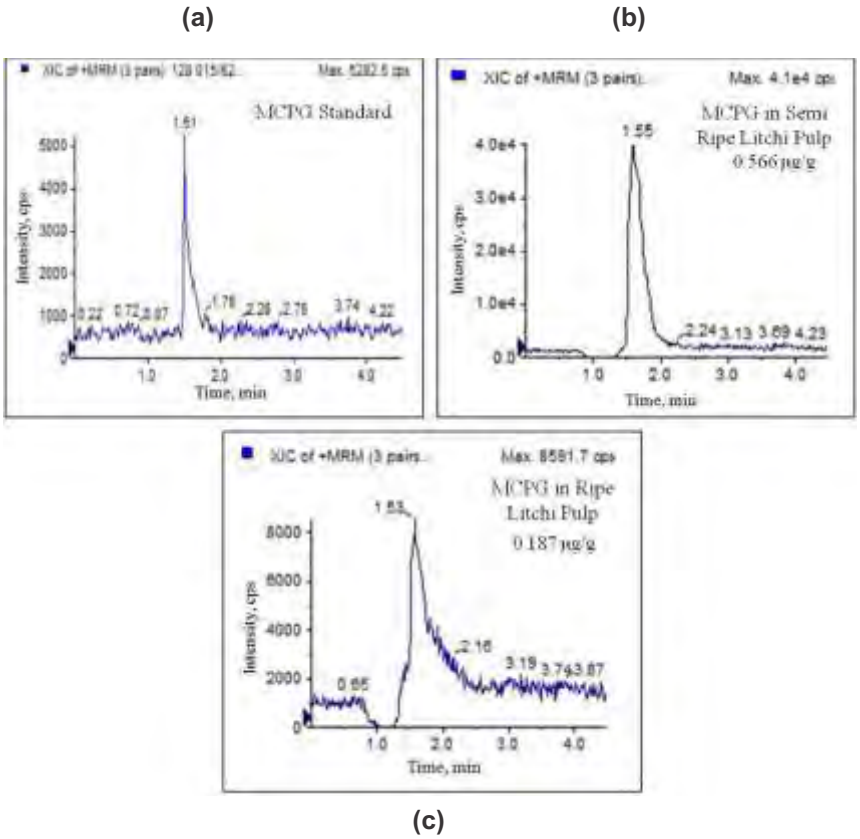
Food is of paramount importance as it is required in sufficient quantity to provide a healthy life. There is an increasing concern about food safety and food contamination either through environmental pollution or adulteration round the globe. To ensure an adequate food supply during non-agriculturally productive periods, it has become necessary to find methods to preserve and process the food. With the fast growth of food processing industries, the trend towards the use of various food additives added for technological purposes has also increased. New chemical entities are being exploited as additives in food. The adulteration of food due to deliberate mixing of inferior grade agents for disguising and to earn undue profits is also a serious problem. Furthermore, unintentional contaminants may creep up during field production or processing and storage. Recombinant DNA technology for the production of GM food needs be exploited for adequate food supply and simultaneously, the safety of GM food/crop has to be established before commercialization. Based on traditional knowledge, the beneficial effects of herbs remain a promising area for the encountering several toxic manifestations. Thus, toxicity/safety data for these chemical moieties along with GM food and traditionally used herbs need to be generated. Since the institute has contributed immensely in the area of food safety, Food Safety and Standards Authority of India (FSSAI) has recognized CSIR-IITR as National Food Reference Laboratory for Toxicological evaluation/risk assessment of neutraceuticals etc. The institute also acts as the nodal laboratory for a CSIR Mission mode program on Food and Consumer Safety Solutions (FOCUS).The issues addressed by the group are (i) development and/or establishment of methodologies to quantify the potential toxic agent in different matrices; (ii) identification of phytochemicals/herbal preparations, which can mitigate the toxicity of above chemical moieties; (iii) to understand the mechanism of toxicity of new chemical entities; (iv) detection of GM food/ crop and their safety/allergenicity assessment and (v) establishment of guidelines for food and chemical safety for regulatory agencies.

L-R (First row) : Dr R. Parthasarathi, Dr Devendra Parmar, Dr Poonam Kakkar, Dr Yogeshwer Shukla
(Second row) : Dr Kausar Mahmood Ansari, Dr Pradeep Kumar Sharma, Dr Anurag Tripathi, Dr Sheelendra Pratap Singh

Development and validation of ultra performance liquid chromatography-tandem mass spectrometer method for quantification of methylenecyclopropyl glycine in litchi fruits using standard addition method

Acute Encephalitis Syndrome (AES) is one of the major health concerns in some districts of Bihar, due to its high fatality and complications Numbers of hypotheses, such as, bat virus, heat stroke, pesticide exposure and the presence of a compound methylenecyclopropyl glycine (MCPG) in Litchi have been proposed for AES. While examining the symptoms, signs and the epidemiological data, involvement of bat virus and heat stroke has been ruled out. However, involvement of exposure to pesticides or MCPG present in litchi is not confirmed so far. Therefore, the study was undertaken to check the presence of both pesticides or MCPG in the samples of ripe and semi ripe litchi fruits collected from Muzzaffarpur. The fruit cover of ripe and semi ripe litchi showed traces of malathion (0.18-0.19 µg/g) and p'-p'-DDT (0.022-0.023 µg/g), while no pesticide residues were detected in the pulp of ripe or semi ripe litchi, thereby, ruling out the possibility of pesticide exposure in children of Muzzaffarpur. However, MCPG was detected in the pulp of semi ripe (0.57 µg/g) and ripe litchi fruits (0.19 µg/g). While the human condition was simulated in animals, there was deprivation in body weight and glucose levels (hypoglycemia) in starved rats exposed to litchi seeds. The results suggest that the cause of hypoglycemic encephalopathy in Muzzaffarpur may be related to the consumption of semi ripe and ripe litchi fruits by undernourished children.

Asthana S, Karsauliya K, Dixit S, Tripathi A, Kumar A, Singh SP, Das M. Food Analytical Methods, 2019, https://doi.org/ 10.1007/s12161-019-01536-1

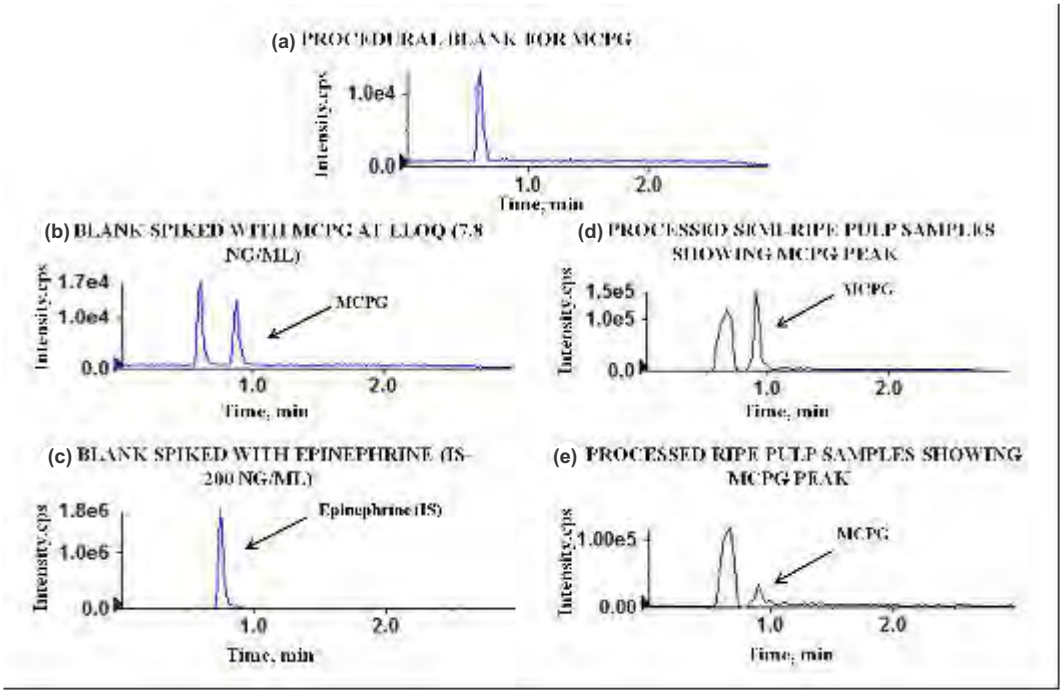


MRM chromatogram of: (a) MCPG standard (b) Ripe litchi pulp (c) Semi ripe litchi pulp

Methylenecyclopropyl glycine, not pesticide exposure as the primary etiological factor underlying hypoglycemic encephalopathy in Muzaffarpur, India

The presence of methylene cyclopropyl glycine (MCPG) in litchi seeds, ripe and unripe litchi fruit pulp has been reported to cause hypoglycemic encephalopathy leading to the death in undernourished/ starved children. The conventional methods for isolation and detection of MCPG in litchi fruit are tedious and time-intensive. The straightforward methodology has been adopted using ultra performance liquid chromatography -tandem mass spectrometer (UPLC-MS/MS) and QuEChERS technique to quantify MCPG without derivatization in litchi samples. UPLC system included thermo C_8 column with the mobile phase 0.1% formic acid in acetonitrile and water (gradient flow) at a flow rate of 0.3 ml/min. MCPG levels were determined using API 4000 mass spectrometer with electrospray ionization (ESI) source. Other parameters have also been determined following the quantitation by multiple reaction monitoring modes. The method was validated for selectivity, specificity, linearity, Limit of Quantification (LOQ), Limit of Detection (LOD), intra-inter day precision and accuracy, stability and ruggedness. Calibration curve ranged 7.8-1000 ng/ml linearly, while the LOD value for MCPG was 0.66 ng/ml. The percent accuracy and precision were found to be in the range of 92.98-105% and 1.78- 8.43%, respectively. The validated method applied for the determination of MCPG in litchi samples has been proved as a better method for the determination of MCPG.

Asthana S, Dixit S, Srivastava A, Kumar A, Singh SP, Tripathi A, Das M. Toxicology Letters, 2019, 301: 34-41

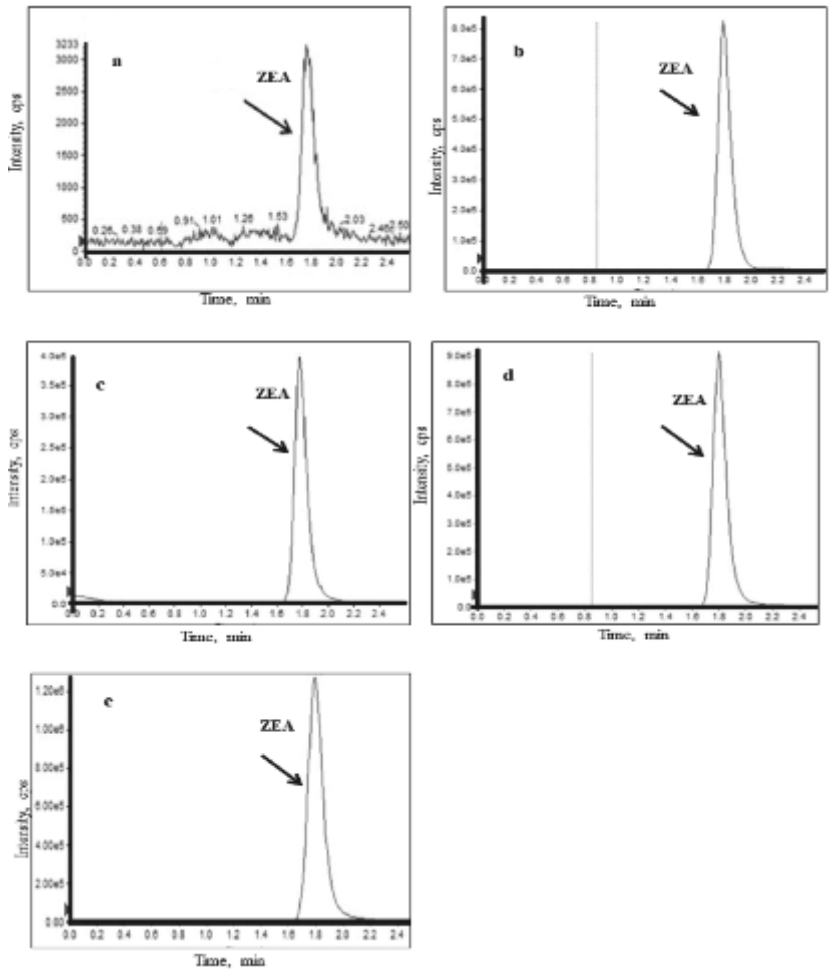


Typical MRM chromatograms of MCPG and epinephrine (internal standard, IS); a) procedural blank chromatogram for MCPG, b) blank spiked with MCPG at LOQ (7.8 ng/ml); c) Blank spiked with Epinephrine (IS); d) processed semi-ripe pulp sample showing MCPG peak; e) processed ripe pulp sample showing MCPG peak.

Presence of zearalenone in cereal grains and its exposure risk assessment in Indian population

Zearalenone (ZEA) is a toxic metabolite of *Fusarium* genera that frequently contaminates cereal grains. India being a tropical country, provides suitable conditions for the fungal invasion to the cereals. In the absence of any regulatory limits for ZEA in India, the present study has been carried out for analyzing the contamination levels of ZEA in different cereal samples routinely used by Indians. Out of 117 cereal samples comprising wheat, rice, corn and oats, 70 (84%) were found to be positive for ZEA contamination, among which 24 (33%) samples exceeded the permissible limits proposed by the European Union when analyzed by HPLC. The positive samples were validated by LC- MS analysis. Based on the quantitative estimation of ZEA contamination in cereals and their daily consumption values, the probable daily intake of ZEA was found to be 16.9 and 7.9 fold higher in rice and wheat samples, respectively, than the tolerable daily intake prescribed by EFSA. Presence of ZEA at high levels indicates a higher exposure risk for the Indian population as wheat and rice are staple foods in India.

Rai A, Dixit S, Singh SP, Gautam NK, Das M, Tripathi A. Journal of Food Science, 2018, 83: 3126-3133.

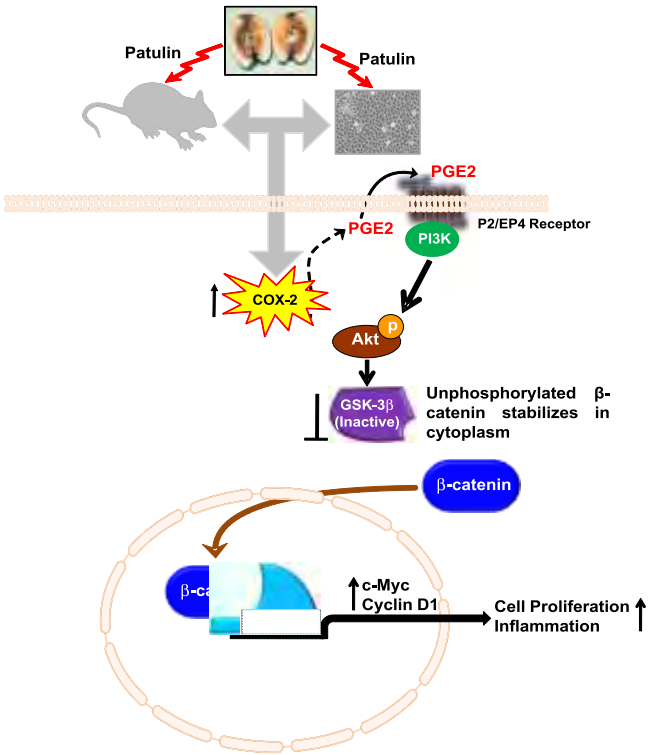


ESI-MS spectra profile of standard ZEA (a) and ZEA contaminated cereal samples, wheat (b), rice (c), maize (d) and oats (e)

COX-2/EP2-EP4/β-catenin signaling regulates patulin-induced intestinal cell proliferation and inflammation

Patulin (PAT) is a mycotoxin produced by certain species of *Penicillium*, *Aspergillus* and *Byssochlamys*. The primary source of PAT contamination is from apple and apple based products. PAT has been reported to induce glutathione depletion, oxidative DNA damage and altered cell proliferation. The *in vitro* studies have shown its association with increased intestinal epithelial permeability, modulation in tight junctions and decrease in transepithelial electrical resistance. Therefore, this study was undertaken to investigate the mechanistic insights of PAT-induced intestinal toxicity and its relevance to the *in vivo* situation. The oral administration of PAT (100 µg/kg b.w. for 3 days) was given to Wistar rats. The parallel group of animals received the identical doses of PAT along with celecoxib (100 mg/kg b.w. for 3 days). It was observed that PAT exposure induces significantly higher levels of PGE_2 in serum and intestinal tissue and high expression of COX-2 and Ki-67 when compared to that of unexposed animals. The PAT induced alterations in the expression of the above genes and proteins were found to be nearing to basal level in celecoxib treated animals. *In vitro* mechanistic studies were also carried out by treating the normal rat intestinal epithelial cells (IEC-6) to non-toxic concentrations (100, 250 and 500 nM) of PAT for 6 h. The exposure to PAT has been found to enhance the cell proliferation, expression of COX-2, EP2, EP4 receptors, and increased PGE_2 secretion. PAT exposure also enhanced Akt expression, which in turn inhibited GSK-3β and stabilized β-catenin. The study demonstrates the involvement of COX-2/EP2-EP4/β-catenin signaling cascades in the regulation of PAT-induced intestinal cell proliferation and inflammation.

Singh N, Bansal M, Pal S, Alam S, Jagdale P, Ayanur A, Ansari KM. Toxicology and Applied Pharmacology, 2018, 356: 224-234.

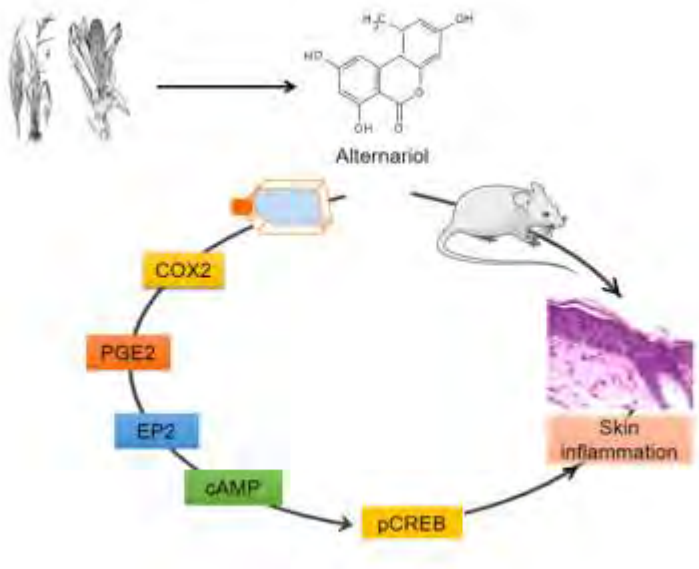


A schematic diagram showing the signal transduction pathways mediating PAT-induced intestinal cell inflammation and proliferation. PAT exposure causes enhanced activation of COX-2 and increased production of PGE2. It activates PI3K/Akt signaling pathway via EP2-EP4 receptor activation. Phosphorylated Akt inhibits GSK-3β that leads to stabilization of β-catenin in cytosol. This stabilized β-catenin translocates to nucleus and activates TCF-4 and LEF-1 transcription factors which lead to enhanced expression of cyclin D1 and c-Myc.

Alternariol induced proliferation in primary mouse keratinocytes and inflammation in mouse skin is regulated *via* PGE_2/EP2/cAMP/p-CREB signaling pathway

Alternariol (AOH) is a mycotoxin contaminant of variety of food and feed materials and is known to lead toxic responses on oral administration. However, dermal toxic potential of AOH has not been explored so far. Therefore, the study was undertaken to decipher the mechanism(s) of AOH induced dermal toxicity following its topical application. Single topical application of AOH at 12.5, 25 and 50 µg/animal concentrations were found to induce inflammatory responses by increasing bi-fold thickness, hyperplasia, prostaglandin E2 (PGE_2) production and cAMP in the skin. Western blot analysis showed that exposure of AOH led to phosphorylation of CREB and increased the expression of COX-2, cyclin D1 as well as prostanoid EP2 receptor. The *in vitro* studies carried out on primary mouse keratinocytes (PMK) revealed that AOH even at low concentrations (50-500 nM) induced significant PMK proliferation. Using specific antagonist or agonist of prostanoid receptors it was further confirmed that EP2 receptor plays a critical role in AOH-induced PMKs proliferation. The study demonstrates that AOH could be a potential dermal toxicant in mice model by activating the EP2/cAMP/p-CREB signaling cascade.

Bansal M, Singh N, Alam S, Pal S, Satyanarayana GNV, Singh D, Ansari KM. Toxicology, 2019, 412: 79-88.



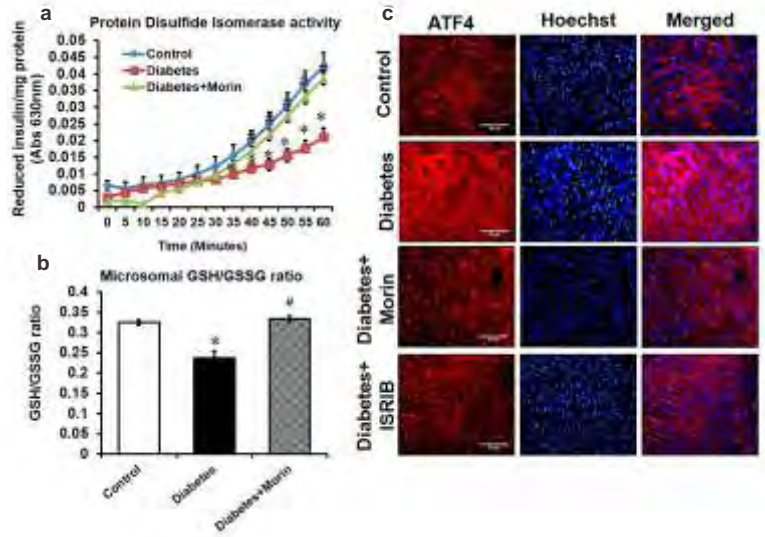
Graphical representation of the number of positive cells in which nuclear translocation of p-CREB occurred after 6h of AOH treatment.

Activation of PERK-eIF2α-ATF4 pathway contributes to diabetic hepatotoxicity: Attenuation of ER stress by Morin

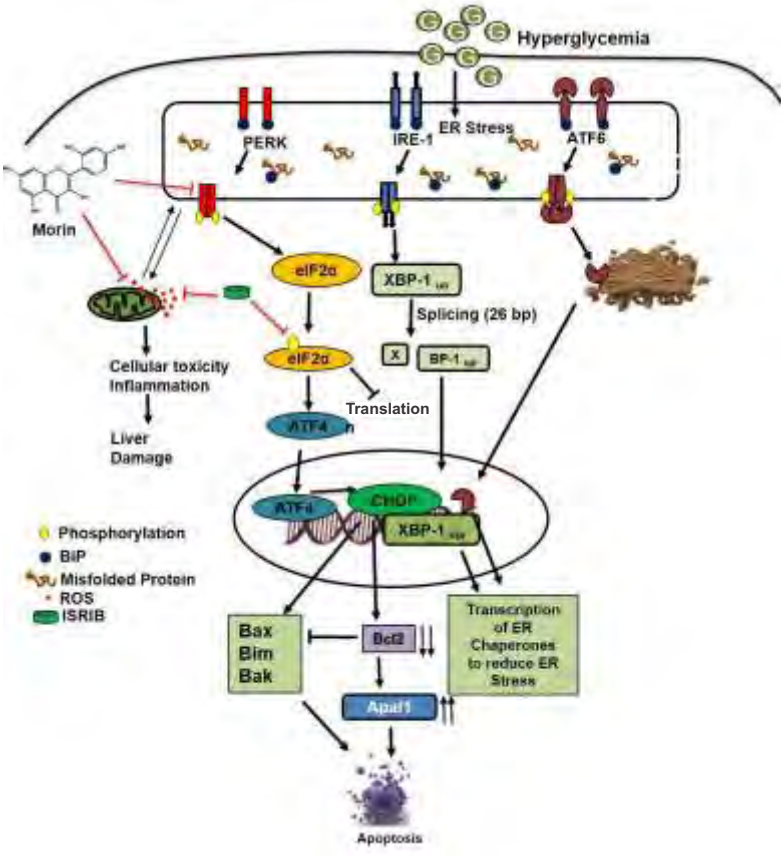
Hyperglycemia associated endoplasmic reticulum (ER) stress has been found as a critical contributor in the pathogenesis of type-2 diabetes mellitus. However, reports regarding the molecular mechanisms involved are limited. This study has been carried out to identify the role of ER stress in regulating hepatic glucose metabolism and its possible linkages with oxidative stress. The study also explored the novel role of Morin, a flavonol, in modulating ER stress in streptozotocin /nicotinamide induced type-2 diabetic male Wistar rats. Results have shown that impaired glucose metabolism in diabetic rats was due to significant induction of ER stress and lowered expression of glucose transporter proteins. The pull-down assay further confirmed the role of Morin in downregulating the PERK-eIF2α-ATF4 pathway by interacting with PERK protein. Morin was also found to

prevent cell death by suppressing the expression of PERK dependent pro-apoptotic proteins, including ATF4 and CHOP. The findings affirmed the role of ER stress in hyperglycemia-induced gluco-metabolic aberrations and liver injury as confirmed by ISRIB, a standard chemical inhibitor of ER stress. Morin was found to promote the deactivation of unfolded protein response (UPR) sensors and upregulation of protein disulfide isomerase (PDI) activity, endorsing its anti-ER stress potential and possible therapeutic avenues to target hyperglycemic hepatotoxicity.

Pandey VK, Mathur A, Khan MF, Kakkar P. Cellular Signalling, 2019, 59: 41-52.



Morin treatment inhibited PERK-eIF2α-ATF4 mediated apoptosis in diabetic rat liver. (a) Protein disulfide isomerase activity was assessed using the insulin reduction method which enhanced in presence of Morin (b) GSH/GSSG ratio was assessed in microsomal fractions of the liver to validate the ER stress inhibitory potential of Morin. (c) Immunohistostaining of ATF-4 (apoptotic protein) on liver tissue section (magnification 20X, scale bar; 50μm) showed protection by Morin.

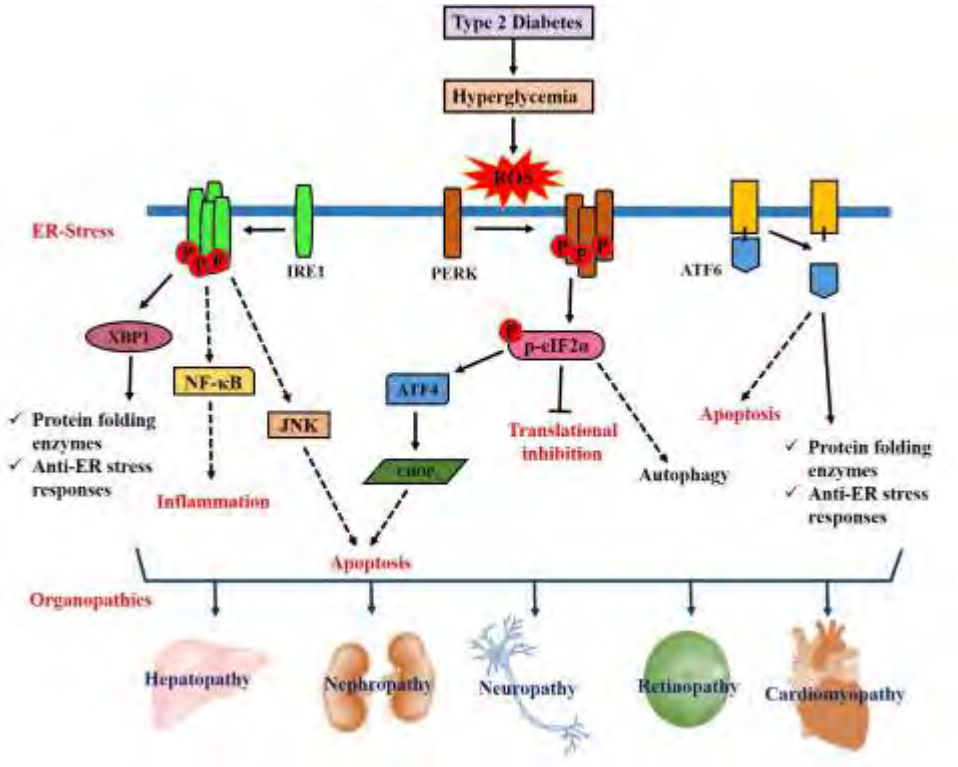


Hyperglycemia induced PERK-eIF2α-ATF4/CHOP mediated proteotoxic cell death in diabetic rat liver. Morin, a flavonol, inhibited ER stress mediated apoptosis by downregulating the PERK pathway.

Emerging role of unfolded protein response (UPR) mediated proteotoxic apoptosis in diabetes

Endoplasmic reticulum (ER) is a crucial single membrane organelle that acts as a quality control system for cellular proteins as it is intricately involved in their synthesis, folding and trafficking to the respective targets. Type-2 diabetes is characterized by enhanced blood glucose level that promotes insulin resistance and hampers cellular glucose metabolism. Hyperglycemia provokes mitochondrial ROS production and glycation of proteins which exert a tremendous load on ER for conventional refolding of misfolded/ unfolded and nascent proteins that perturb ER homeostasis resulting in apoptotic cell death. Impairment in ER functions is suspected to be through specific ER membrane-bound proteins known as Unfolded Protein Response (UPR) sensor proteins. Conformational changes in these proteins induce oligomerization and cross-autophosphorylation which facilitate processes required for the restoration of ER homeostatic imbalance. Multiple studies have reported the involvement of UPR mediated autophagy and apoptotic pathways in the progression of metabolic disorders including diabetes, cardiac ischemia/ reperfusion injury and hypoxia-mediated cell death. The involvement of UPR pathways in the progression of diabetes-associated complications have been reviewed. The primary focus was on the compilation of state of the art currently available on the molecular crosstalks in diabetes-induced neuropathy, nephropathy, hepatic injury and retinopathy. A better understanding of these molecular interventions may reveal advanced therapeutic approaches for preventing diabetic comorbidities. The importance of phyto-chemicals that are emerging as novel ER stress inhibitors and are being explored for targeted interaction in preventing cell death responses during diabetes have also been higlighted.

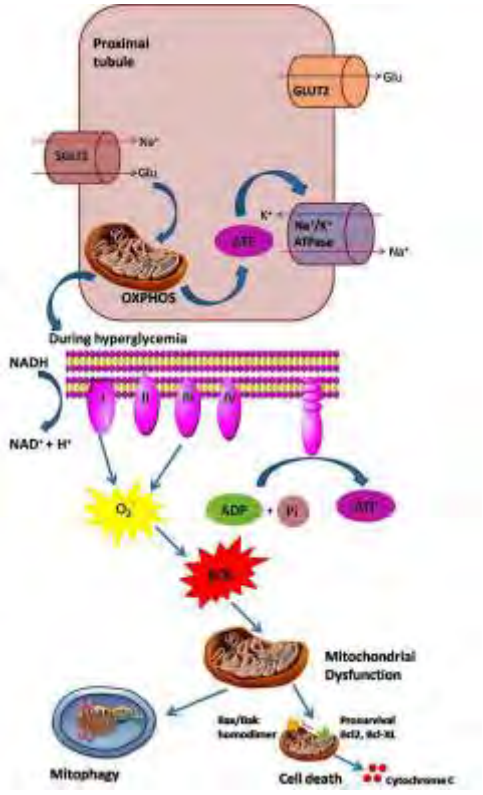
Pandey VK, Mathur A, Kakkar P. Life Sciences, 2019, 216: 246-258



Plausible role of ER stress mediated unfolded protein response pathways in the progression of diabetic organopathies

Critical role of mitochondrial dysfunction and impaired mitophagy in diabetic nephropathy

Mitochondrial dynamics play a critical role in deciding the fate of a cell under healthy and diseased condition. The recent surge of studies indicates their regulatory role in meeting energy demands in renal cells, making them critical entities in the progression of diabetic nephropathy. Diabetes is remarkably associated with abnormal fuel metabolism, a basis for free radical generation, which if left unchecked may devastate the mitochondria structurally and functionally. Impaired mitochondrial function and their aberrant accumulation have been known to be involved in the manifestation of diabetic nephropathy, indicating the perturbed balance of mitochondrial dynamics, and mitochondrial turnover. Mitochondrial dynamics emphasize the critical role of mitochondrial fission proteins such as mitochondrial fission 1, dynamin-related protein 1 and mitochondrial fission factor and fusion proteins including mitofusin-1, mitofusin-2 and optic atrophy 1. Clearance of dysfunctional mitochondria is aided by translocation of autophagy machinery to the impaired mitochondria and subsequent activation of mitophagy regulating proteins PTEN-induced putative kinase 1 and Parkin, for which mitochondrial fission is a prior event. The recent progress in our understanding of the molecular mechanisms targeting reactive oxygen species-mediated alterations in mitochondrial energetics, mitophagy related disorders, impaired glucose transport, tubular atrophy, and renal cell death have been reviewed and discussed. The information pertaining to the molecular crosstalks linking autophagy and renoprotection through an intervention of 5'-AMP-activated protein kinase, mammalian target of rapamycin, and SIRT1 factors have also been highlighted. The detailed exploration of these pathways may help in deriving therapeutic strategies for managing diabetes provoked end-stage renal disease.



Hyperglycemia induced mitochondrial dysfunction mediated cell death during diabetic nephropathy

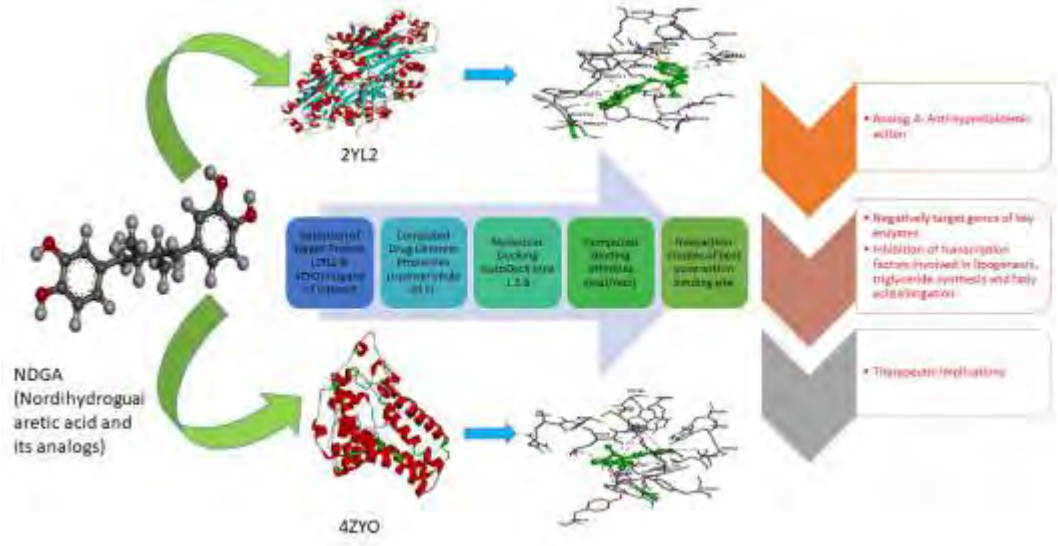
Saxena S, Mathur A, Kakkar P. Journal of Cellular Physiology, 2019, 234:19223-19236.

Anti-hyperlipidaemic effects of synthetic analogues of nordihydroguaiaretic acid in dyslipidaemic rats

Earlier studies have shown that Creosote bush-derived nordihydroguaiaretic acid (NDGA) exerts beneficial actions on the key components of metabolic syndrome including dyslipidaemia, insulin resistance and hypertension in several relevant rodent models. In this study, a total of six anti-hyperlipidaemic analogues of NDGA were synthesized and screened for their efficacy against hepatic lipid metabolism in a high-fructose diet (HFrD) fed dyslipidaemic rat model. HFrD fed Sprague-Dawley rats treated with NDGA or one of the six analogues. Serum samples were analyzed for blood metabolites, whereas liver samples were quantified for changes in mRNA levels by real-time RT-PCR. Oral gavage of HFrD-fed rats for 4 days with NDGA analogues 1 and 2 suppressed the hepatic triglyceride content, whereas the NDGA analogues 2, 3 and 4, like NDGA, decreased the plasma triglyceride levels by 70-75%. qRT-PCR assay revealed that among NDGA analogues 1, 2, 4 and 5, analogue 4 was the most effective at inhibiting the mRNA levels of some key

enzymes and transcription factors involved in lipogenesis. All four analogues almost equally inhibited the key genes involved in triglyceride synthesis and fatty acid elongation. Unlike NDGA, none of the analogues affected the genes of hepatic fatty acid oxidation or transport. The data suggest that NDGA analogues 1, 2, 4 and 5, particularly analogue 4, exert their anti-hyperlipidaemic actions by negatively targeting genes of key enzymes and transcription factors involved in lipogenesis, triglyceride synthesis and fatty acid elongation. The results highlight the therapeutic potential of these NDGA analogues.

Singh M, Bittner S, Li Y, Bittner A, Han L, Cortez Y, Inayathullah M, Arif Z, Parthasarathi R, Rajadas J, Shen WJ. British Journal of Pharmacology, 2019, 176: 369-385.



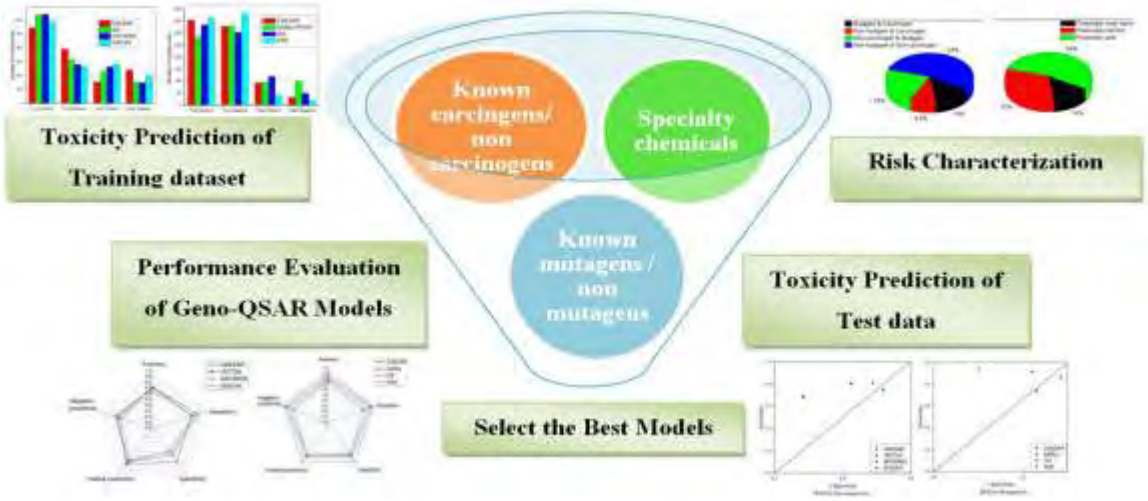
Workflow of designing synthetic analogues of nordihydroguaiaretic acid

Genotoxicity QSAR (Geno-QSAR) models for the safety prioritization of specialty chemicals

Toxicity profiling of specialty chemicals is essential, since several studies have reported their role in acute/chronic health effects. It is voluminous to perform a battery of toxicity experiments on available specialty chemicals. In this study, robust QSAR approaches were employed to predict the carcinogenicity and mutagenicity potential for a dataset of 131 specialty chemicals utilizing machine learning tools. Four predictive approaches were selected to benchmark the reliability and applicability of the suitable genotoxicity QSAR (Geno-QSAR) models each for carcinogenicity (CAESAR, ISS, ANTARES, and ISSCAN) and mutagenicity (CAESAR, SARpy, ISS, and KNN). Five-fold statistical evaluation was performed using an external dataset of more than 2000 compounds with their known genotoxicity potential. KNN/Read across and IRFMN/ANTARES resulted as the best model for mutagenicity and carcinogenicity, respectively. The results obtained from the selected predictive models are narrowed down to the potentially safe compounds and are cross-validated with the experimental details compiled through the literature mining. Geno-QSAR approaches demonstrated in this investigation have widespread applicability for safe compound prioriti-

zation and toxicity prediction of a large number of chemicals in a lucid way.

Sinha M, Pandit S, Singh P, Dhawan A, Parthasarathi R. Journal of Indian Chemical Society, Special Issue, 2019, 96: 957-966.



Workflow for predicting geneotoxicity of specialty chemicals

Focus Database (Focus-DB):

FOCUS-DB is a comprehensive database of food additives, such as, colouring agents, preservatives, flavouring agents, sweeteners and many more. The database currently comprises 2885 food additives serving as a compendium of chemical substances used in food as food additives. The dynamic, user-friendly interface of the resource facilitates exploration of additive molecules for divergent applications. For every chemical, database includes basic physicochemical properties, predicted pharmacokinetic parameters and various toxicity endpoints values, biological pathways as well as the acceptable daily limit in human. The information provided in the database would benefit both the regulatory authorities and the industry in fixing the usage levels of the additive in food, from the perspective of health safety.

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CSIR INDIA

Nanomaterial Toxicology

Dr D. Kar Chowdhuri
Area-Coordinator

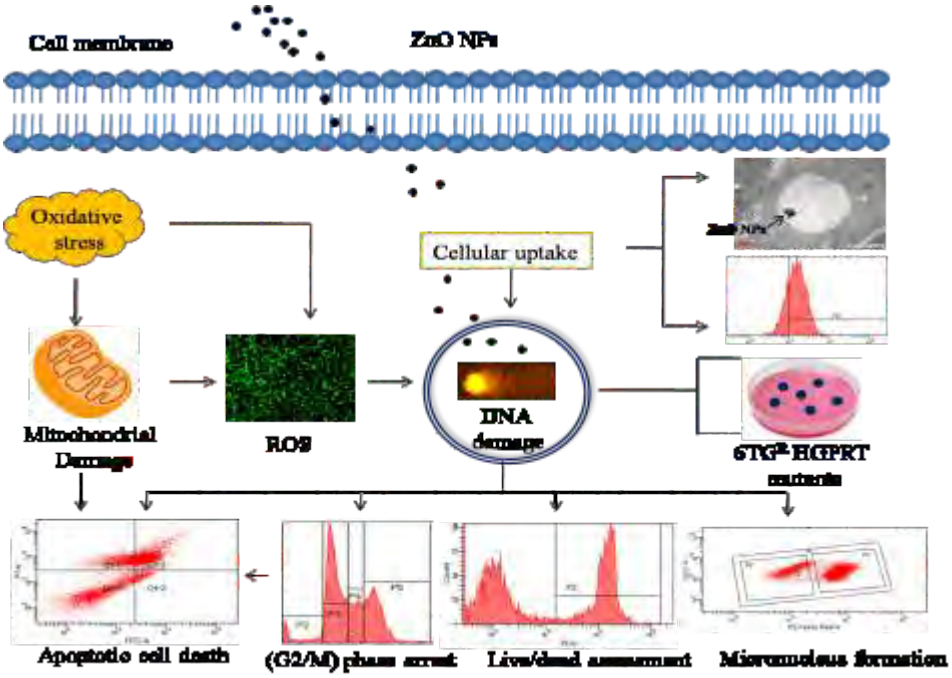
The institute has been working in the area of nanotoxicology for more than a decade and has been able to develop expertise, with a critical mass of its scientific manpower contributing in this emerging area of toxicology. CSIR-IITR spearheaded two major network projects of CSIR on nanotechnology and was a partner in six international flagship projects of EU-FP7, UK, Spain and Japan. The institute took lead in the synthesis and characterization of engineered nanomaterials (ENMs), development of methodology/assays/techniques for toxicity assessment, guidelines for nanosafety, alternate models, and mechanisms of action and interaction of ENMs with biological systems. The institute has created a vibrant network in the area of nanotechnology with IITs, IISc, universities, research institutes and industries. Based on the expertise and capabilities of this institute, CSIR has given its approval to establish a National Facility for nanomaterial toxicology. Further, CSIR-IITR has contributed significantly towards bringing out the National guidelines for evaluation of Nanopharmaceuticals. To assess the safety/toxicity of nanomaterials, some of the most critical issues that are being addressed include: i) effect of shape and size; ii) dosimetry; iii) route of delivery and tracking; iv) development and validation of test models; v) *in vitro* vs. *in vivo* extrapolation; vi) ecotoxicity; vii) computational nanotoxicity and viii) life cycle analysis. The scientists of the nanomaterial toxicology group aim to investigate the health and environmental effects of nanomaterials, to delineate their toxicity and assure safe usage in consumer products, healthcare products and medical devices.

L-R (First row) : Dr Yogeshwer Shukla, Dr Aruna Satish, Dr D. Kar Chowdhuri, Professor Alok Dhawan, Dr Satyakam Patnaik, Dr R. Rajagopal
(Second row) : Dr R. Parthasarathi. Dr Kausar Mahmood Ansari. Dr Vikas Srivastava, Dr Sheelendra Pratap Singh, Dr Anurag Tripathi
Dr Alok Kumar Pandey

Zinc oxide nanoparticles (ZnO-NPs) induced gene mutation at the HGPRT locus and cell cycle arrest associated with apoptosis in V-79 cells

In recent years, the large-scale production of ZnO-NPs for various applications is increasing exponentially and may pose serious health issues when inhaled either during occupational exposure or in consumer settings. The mechanisms underlying the toxicity of NPs have recently been studied intensively. Despite the reported studies, the mutagenicity of ZnO-NPs in the eukaryotic system is still unclear. Therefore, the aim of this study was to investigate the mutagenic potential of ZnO-NPs using Chinese hamster lung fibroblast cells (V-79) as an *in vitro* model. The study demonstrated a significant uptake of ZnO-NPs by the cells by flow cytometry with confirmation by transmission electron microscopy. A reduction in cell viability was observed with a concomitant increase in the level of reactive oxygen species (ROS) ($p < 0.01$, $p < 0.001$) after ZnO-NPs (1-20µg/ml) exposure. Excessive level of ROS induced oxidative stress, which leads to genotoxic insult, and further gene mutation. Apart from measuring the genotoxicity by Comet assay, a change of 2.84-fold in the HGPRT gene mutant frequency was observed by the mammalian gene forward mutation assay. All the genotoxicity endpoints, such as, chromosomal break, DNA damage and mutagenicity were observed after 6 h of ZnO-NPs exposure to these cells. The results also showed that ZnO-NPs manifested cell cycle arrest, ultrastructural modifications and eventually cell death. A significant ($p < 0.01$, $p < 0.001$) increase in the apoptotic cells were detected after annexin V-fluorescein isothiocyanate/propidium iodide double staining by flow cytometry. The study findings clearly emphasize the need for careful regulations of ZnO-NPs.

Jain AK, Singh D, Dubey K, Maurya R, Pandey AK. Journal of Applied Toxicology, 2019, 39: 735-750.

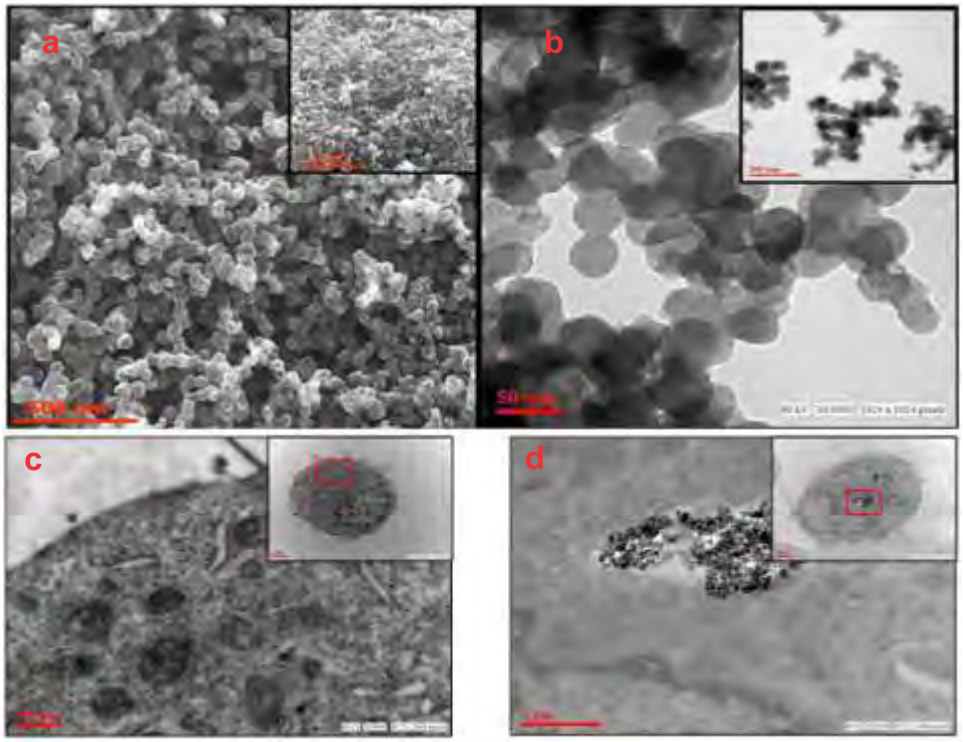


Schematic representation of perturbed pathways in V-79 cells after their exposure to ZnO-NPs

Candle soot derived carbon nanoparticles: Assessment of physico-chemical properties, cytotoxicity and genotoxicity

In this study, an evaluation of physico-chemical properties, cytotoxicity and genotoxicity of candle soot derived carbon nanoparticles (CNPs) was carried out. Several physico-chemical characterizations including scanning electron microscopy, transmission electron microscopy, Brunauer-Emmet-Teller surface area and pore-size distribution, X-ray diffraction, Fourier Transform Infrared and Raman spectroscopy were implemented to characterize the prepared CNPs. Propidium iodide uptake, reactive oxygen species assay and trypan blue exclusion and Comet assay tests were executed to determine the toxicity of CNPs. It was found that the CNPs have insignificant cytotoxicity and genotoxicity and could be used in diverse biological and environmental applications as an alternative to expensive and toxic carbon materials.

Singh S, Singh D, Singh SP, Pandey AK. Chemosphere, 2019, 214: 130-135.



(a) SEM images and (b) TEM images of CNPs. Inset represents low-resolution images. TEM photomicrographs showing accumulation of CNPs in the cytoplasm of V-79 cells (c) Control and (d) 400 mg/ml CNPs exposed cells. Inset represents low-resolution images. The area marked with red square was shown as higher magnification.

Zinc oxide nanoparticles (ZnO-NPs) modified with an amphipathic peptide show improved photoprotection in skin

ZnO-NPs of different sizes were functionalized with an amphipathic peptide, and its effect on nanoparticle stabilization and UV photoprotective activity was studied. The peptide-modified NPs exhibited lower aggregation, significant reduction in Zn^{2+} leaching *in vitro* and even inside the cells for smaller particle sizes, reduced photocatalytic activity, and reduced cellular toxicity under UVB treated conditions. In addition, the peptide-modified 60nm ZnO-NPs showed lower genotoxicity, oxidative stress, DNA damage responses, and immunogenic potential, respectively, than the bare

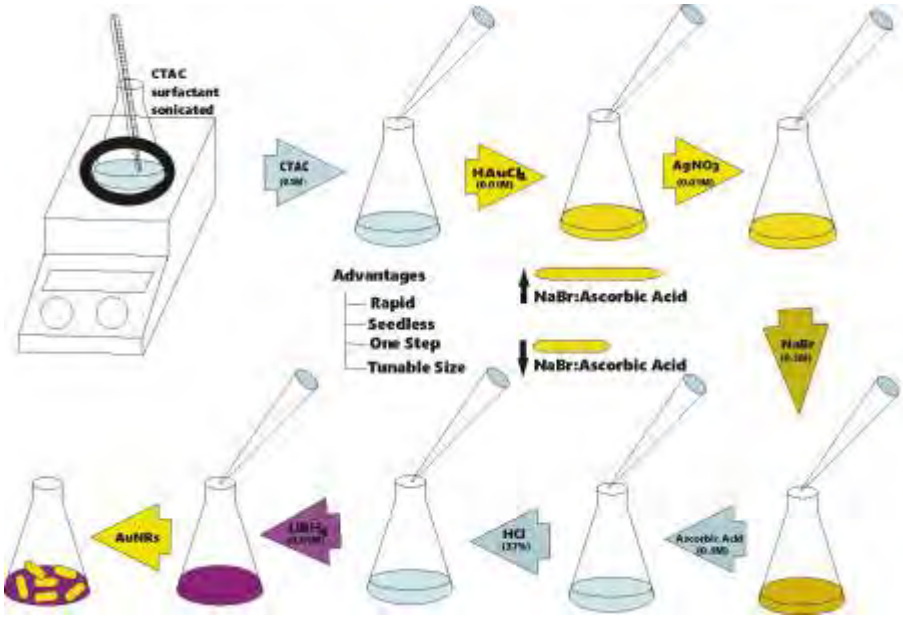
counterparts in the presence of UVB rays. These NPs localized more in the stratum corneum and epidermis *ex vivo*, indicating better retention in epidermis, and demonstrated improved UVB protection and/or skin integrity in SKH-1 mice compared to unmodified NPs and commercial UV-protective agents tested. This is probably the first report on the application of peptide-modified ZnO-NPs for improved photoprotection.

Aditya A, Chattopadhyay S, Gupta N, Alam S, Veedu AP, Pal M, Singh A, Santhiya D, Ansari KM, Ganguli M. ACS Applied Mater Interfaces, 2019, 11: 56-72.

Chloride ions assisted synthesis of tunable gold nanorods: Seedless synthesis, characterization and *in vitro* toxicity studies

Gold nanorods are interesting due to their capability to absorb light in the near infrared (NIR) wavelength range of 600-1200 nm which is ideal for optical therapeutic imaging. Previous reports in synthesis used cetyltrimethylammonium bromide (CTAB) as capping agent via two-step seed-mediated method done in a laborious manner and the major disadvantage was batch to batch variation. Addressing this issue, a modified synthetic procedure was developed for gold nanorods using cetyltrimethylammonium chloride (CTAC) via seedless, one-step method. This process enabled rapid formation of monodisperse gold nanorods with tunable aspect ratios (2–4). Gold nanorods of sizes 40-55 nm in length and width of 12-18 nm were synthesized. Gold nanorods were characterized using optical spectroscopy, zeta potential, NTA analysis, FTIR and electron microscopy. Toxicity of CTAC capped gold nanorods was studied on liver carcinoma cells using MTT assay, propidium Iodide and trypan blue exclusion assay. Size dependent toxicity of gold nanorods was observed on liver cancer cells.

Agrahari K, Raja Gopal R. Vacuum (Elsevier), 2019, 166: 377-384.

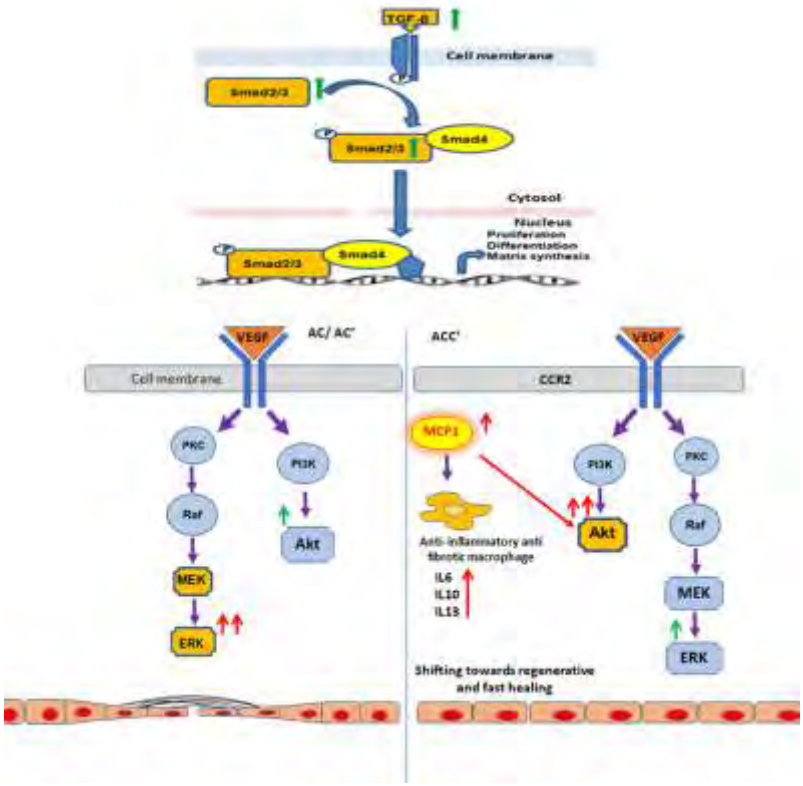


Schematic representation of Seedless wet-chemical method of gold nanorods: Cetyltrimethyl ammonium chloride (CTAC) capped gold nanorods were synthesized via seedless, one-step and one-pot method. The length of nanorods can be tuned using variable ratios of sodium bromide to ascorbic acid.

Accelerated and scarless wound repair by a multicomponent hydrogel through simultaneous activation of multiple pathways

Scarless healing of injury remains a clinical challenge because of its complicated and overlapping phases of inflammation, clearing and regeneration. The study aimed to investigate whether a well-known antioxidant, cerium oxide, in its nanoform (CNP), can potentiate the activity of curcumin to promote a cellular program for scarless healing. A biocompatible poly acrylamide hydrogel (PAGE)-based dressing material comprising CNP and curcumin was developed and tested for its wound healing activity in an animal model of acute wound. Characterization of the CNP and curcumin-entrapped hydrogel dressing (ACC) demonstrated high loading efficiency and sustained release of curcumin. In a full-thickness acute wound healing model of rat, a single application of ACC demonstrated higher wound healing efficacy (78%) and negligible scarring compared to dressings containing only curcumin or CNP in seven days. Enhanced cell proliferation, higher collagen content, advanced wound maturity, re-epithelialization, and granulation tissue formation were observed using the ACC. The study of cellular mechanisms identified MCP-1 and TGF-β as the key drivers of differential and accelerated healing observed in the ACC group. These, coupled with the upregulation of growth-related signaling pathways (HER2/ErbB2, TGF-β-Smad2/3, MAPK/ERK, AKT, and VEGF) promoted almost scarless healing in animals treated with ACC. The optimized combination of curcumin and CNP used in this study showed distinct advantage and could be a better agent for complete wound healing.

Bhattacharya D, Tiwari R, Bhatia T, Purohit MP, Pal A, Jagdale P, Mudiam MKR, Chaudhari BP, Shukla Y, Ansari KM, Kumar A, Kumar P, Srivastava V, Gupta KC. Drug Delivery and Translational Research, 2019, doi: 10.1007/s13346-019-00660-z.



Differential activation of cell signaling pathways drives accelerated wound healing in the ACC treated group. Hyperactivation of Akt pathway selectively drives MCP-1 to promote rapid and scarless healing.

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CSIR INDIA

Regulatory Toxicology

Dr Poonam Kakkar*
Area-Coordinator

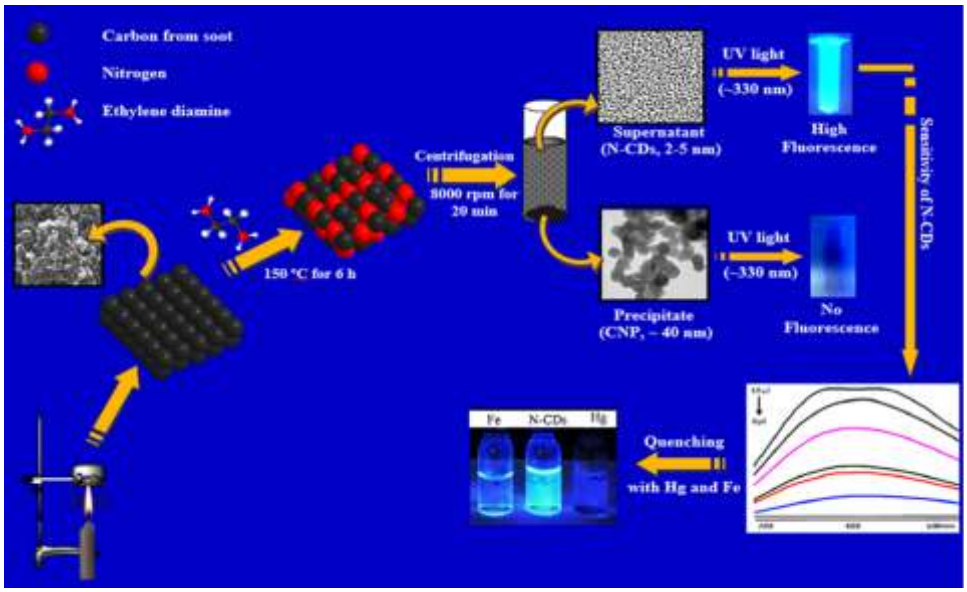
The regulatory toxicology group is involved in the generation of analytical data in different matrices and safety data for products. This endeavour helps regulatory agencies to take decisions for the production, marketing and usage of a vast variety of industrial chemicals, agrochemicals, pharmaceuticals, cosmetic products, food/feed additives, etc. Compliance to Good Laboratory Practices (GLPs) is the key to international acceptance of safety data/reports on industrial and consumer products. A state of the art GLP Test facility for regulatory toxicology studies has been established since 2014. CSIR-IITR is the first CSIR laboratory to get GLP certification for toxicity testing. The constant efforts made by the group to expand the scope of GLP Test Facility resulted in getting certification for "Environmental studies on aquatic and terrestrial organisms" in April 2016 which makes it the only GLP certified laboratory in the government sector to carry out ecotoxicological studies. The facility has further extended its scope for chronic toxicity studies, *in vitro* mutagenicity studies, primary skin irritation and skin sensitization tests during the re-certification of the facility this year. This facility has helped in supporting the cause of "Make in India" by doing safety assessment of chemicals, materials and products developed by small and medium enterprises for their global positioning. The existing facilities are being upgraded following National/International guidelines to provide scientific knowledge to society, forge linkages with industry and for sustainable development around the world. Organic pollutants are ubiquitous contaminants in ecosystems. Most of the contaminants are lipophilic and thus, can be accumulated in higher trophic level organisms, get transferred through the food chain to humans and finally induce harmful effects. It is, therefore, critical from human health perspective to continue monitoring of residues in culinary samples collected from various parts of ecosystem. Also, it is important to develop and validate methods for rapid estimation of large numbers of pollutants so that timely intervention strategies can be planned. The issues addressed by the group are: (i) development of newer analytical methods for characterization and quantification of chemicals and (ii) toxicological/safety evaluation of chemicals and products as per GLP guidelines.

L-R (First row) : Shri Nikhil Garg, Dr Nasreen Gazi Ansari, Dr Beena Vamadevan, Dr Jyotsna Singh, Dr Poonam Kakkar* (up to 30.09.2019), Professor Alok Dhawan, Dr Akshay Dwarakanath, Dr Mahadeo Kumar, Dr Neeraj Kumar Satija, Dr Kailash Chandra Khulbe
(Second row) : Dr Akhilesh Kumar Yadav, Dr Yogeshwer Shukla, Dr Dhirendra Singh, Dr Aditya Bhushan Pant, Dr Alok Kumar Pandey, Dr Vinod Praveen Sharma, Dr Devendra Kumar Patel, Dr Somendu Kumar Roy, Dr Anbumani Sadasivam, Dr Anjenya Ayanur

Waste candle soot derived nitrogen doped carbon dots based fluorescent sensor probe: An efficient and inexpensive route to determine Hg (II) and Fe (III) from water

A simple, facile and economical method was developed for the synthesis of water dispersible carbon dots (CDs) derived from candle soot, which demonstrated high selectivity and sensitivity towards hazardous metal/ions [(Hg (II) and Fe (III))]. CDs were further functionalized with nitrogen (N) using ethylene diamine precursor for the enhancement of targeted action for selective metal/ions. N-CDs duly characterized by transmission electron microscopy, X-ray diffraction, Raman X-ray photoelectron spectroscopy, Furrier transform infrared spectroscopy, UV-visible spectroscopy and fluorescence (FL). The fluorescence ability of N-CDs was observed under the UV lamp (290-365nm, blue FL emission). Negative zeta potential confirmed that N-CDs have negatively charged surface, which is favourable for trapping positively charged metal/ions. The average size of N-CDs was found to be within the range of 3-6 nm which may increase the collision and binding probability with metal/ions. At particular concentration of Hg (II) and Fe (III), the FL activity of N-CDs disappeared because of selective quenching of metal/ions towards N-CDs. Spectrofluorimetry was used for analyzing FL intensity along with metal/ions bonding with N-CDs. Limit of detection (LOD) for Hg (II) and Fe (III) was 80 and 50 ppb respectively. This inexpensive method could be applied for the determination of metal/ions contamination in ground water, waste water and industrial effluents due to its higher sensitivity towards the metal/ions and biocompatibility.

Pankaj A, Tewari K, Singh S, Singh SP. Journal of Environmental Chemical Engineering, 2018, 6(4): 5561-5569.

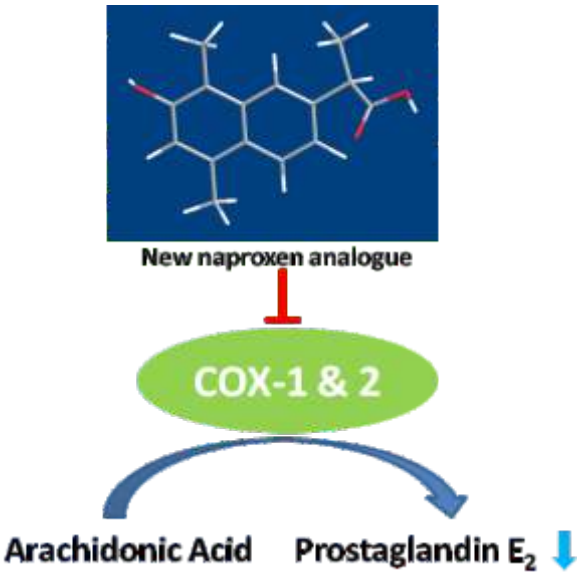


A comprehensive schematic representation of the fabrication and application of N-doped carbon dots (N-CDs) from candle soot

Transformation of santonin to a naproxen analogue with anti-inflammatory activity

Santonin, a natural product, was aromatized and characterized as (S)-methyl-2-(7-hydroxy-5,8-dimethylnaphthalen-2-yl) propanoate based on 2D-NMR spectroscopic data. Structurally, the compound was similar to the naproxen. The new naproxen analog had shown potency against cyclooxygenase 1 and 2 (IC_{50} = 31.0 and 66.1 µM, respectively).

Singh R, Mandrah K, Asati A, Patel DK, Goel B, Vishwakarma RA, Roy S, Jain SK. Journal of Natural Products, 2019, 82:1710-1713.



The anti-inflammatory potential of naproxenanalogue

CSIR HARIT program brought green crackers to reduce air pollution

Union Minister for Science & Technology, Earth Sciences and Health and Family Welfare, Dr. Harsh Vardhan at the launch of green crackers

CSIR – Indian Institute of Toxicology Research has been instrumental in serving the society and has made notable contributions in the realms of occupational, industrial and environmental toxicology as well as time to time air quality assessment of Lucknow city. In addition, new methods are being developed to unravel the intricacies of mechanistic toxicology and to conduct safety assessment of products. CSIR-IITR participation started in developing various environments-friendly fireworks under Harit Program for the development of low noise and smoke emitting firecrackers right from the beginning in response to honourable minister Dr Harsh Vardhan's call in 2018 to initiate R&D on environment-friendly fireworks. The project initiated by eight CSIR institutions, CSIR-NEERI, CEERI, IITR, IICT, NCL, CECRI, NBRI and CMERI. At CSIR-IITR, "toxicity testing: GLP test facility", the two test materials, PANI and PANI polymer (sent by CSIR-NEERI) were tested for there acute toxicity potential through oral, dermal and most importantly inhalation routes as per relevant OECD guidelines.

In the view to address increased air pollution induced adverse health effects, Union Minister for Science & Technology, Earth Sciences and Health and Family Welfare, Dr Harsh Vardhan launched green firecrackers on October 05, 2019. He said that the ban that had been imposed as per the orders of Hon'ble Supreme Court of India, there was a threat of imminent closure of the entire fireworks industry. However, Science has once again come to the rescue of the common man and millions of jobs have been saved due to the interventions made by CSIR scientists.

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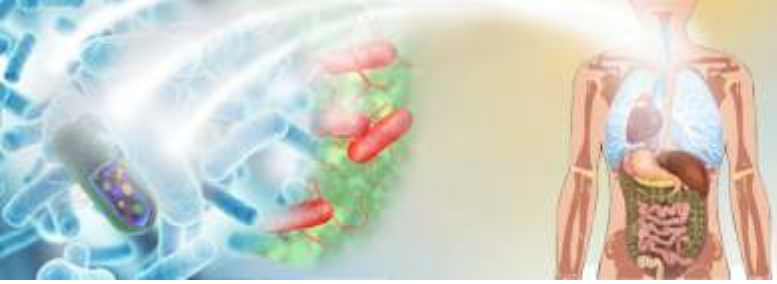


Systems Toxicology and Health Risk Assessment

Dr Devendra Parmar
Area-Coordinator

Humans are exposed to many chemicals through the environment and in the form of drugs. In order to understand the risk to human health of drug and chemical exposure, it is necessary to understand how these xenobiotics may affect normal cellular processes and lead to toxicological consequences. The advent of high throughput genomic screens has led to the possibility of much greater breadth of understanding of the effect of xenobiotics in biological systems. Furthermore, there has been interest in the possibility of using the output of these genomic assays as a signature of xenobiotic exposure, and thus as a test procedure for the recognition of toxicological hazard. The group aims to apply a system biology approach to describe and predict the effects of chemicals and other environmental stressors at different levels of biological organization and identify key events leading to adverse health outcomes. The group also aims to study the perturbation of biological systems by chemicals and stressors, monitoring changes in molecular expression and conventional toxicological parameters, iteratively integrating data to achieve a mechanistic understanding of the specific toxicity and eventually develop and validate biomarkers for predicting these toxicological responses. The development of an integrated framework through the identification of toxicological pathways and data analysis tools is an integral part of the overall attempt to understand the adverse effects of chemicals and other stressors on human health and the environment. Particular focus has been on the development, assessment and application of methods to assess the adverse effects of environmental chemicals. Further, the endeavour has been on the evaluation of Integrated Testing Strategies to describe all the toxicological interactions that occur within a living system under stress and use the knowledge of toxicogenomic responses in one species to predict the mode of action of similar agents in other species. The issues addressed by the group are : (i) study the perturbation of biological systems by chemicals and stressors; (ii) monitoring changes in molecular expression and conventional toxicological parameters and integrating data to achieve a mechanistic understanding of the specific toxicity and (iii) develop and validate biomarkers for predicting the toxicological responses.

L-R (First row) : Dr Smriti Priya, Dr Sanghamitra Bandyopadhyay, Dr Chetna Singh, Dr Devendra Parmar, Dr Vinay Kumar Khanna
Dr Neeraj Kumar Satija, Dr Aditya Bhushan Pant
(Second row) : Dr Rajnish Kumar Chaturvedi, Dr Vikas Srivastava, Dr Chandra Shekhar Nair Kesavchandran, Dr Mahendra Pratap Singh

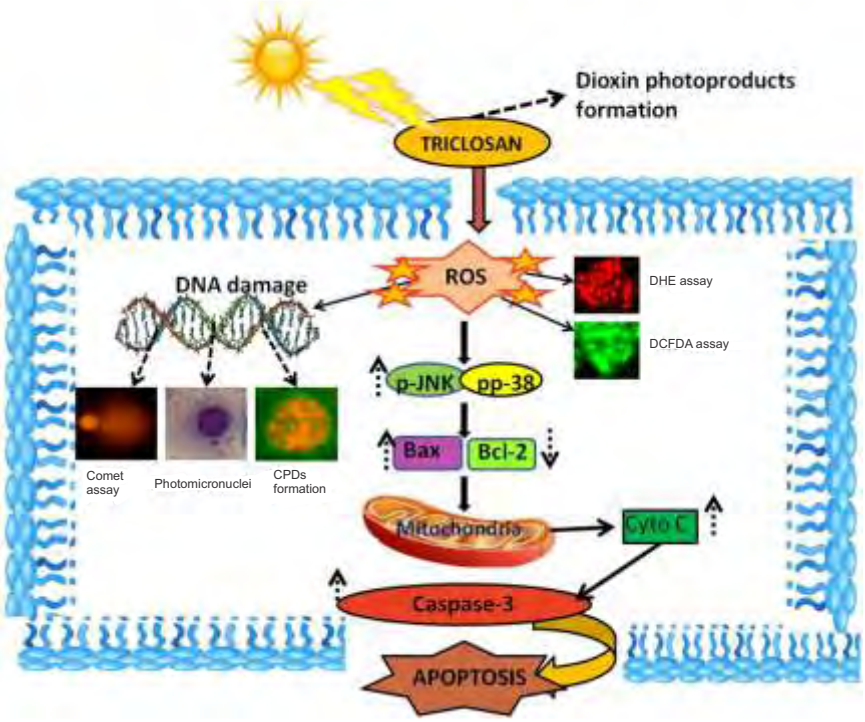
Association between PAHs biomarkers and kidney injury biomarkers among kitchen workers with microalbuminuria: A cross-sectional pilot study

The study was conducted to find out the association between kidney injury biomarkers and urinary OH-PAH metabolites in kitchen workers, with microalbuminuria. A cross-sectional pilot study was conducted among 120 male kitchen workers in a mega kitchen located at Coimbatore, India. Personal and sub-clinical details of study subjects were collected using a questionnaire. Albumin, creatinine, and albumin-creatinine ratio (ACR) were measured using urine dipstick test for the determination of microalbuminuria. Urinary hydroxylated PAHs metabolites (1-NAP, 9-HF, 3-HF, 2-HF, 9-PHN, and 1-OHP) were measured using GC-MS/MS and urinary kidney biomarkers (uNGAL, uCyst-C, uKIM-1, uOPN, and uTIMP-1) were measured using Multiplex Reader. Concentrations of urinary PAHs metabolites (1-NAP, 3-HF, 2-HF, 9-PHN, and 1-OHP) and kidney biomarkers (uKIM-1, uTIMP-1, uCyst-C and uNGAL) were significantly higher among kitchen workers with microalbuminuria (MAU) compared to non-kitchen workers with MAU. Urinary kidney biomarkers viz., uKIM-1, uTIMP-1, uCyst-C, uNGAL, and uOPN had higher median concentration among the kitchen workers with MAU compared to kitchen workers without MAU. A significant positive correlation was observed for 9-HF with uKIM-1 and uTIMP-1 and 1-OHP with uKIM-1. ACR was also well correlated with urinary kidney biomarkers. ROC analysis showed higher sensitivity and specificity for uKIM-1, uCyst-C, and uNGAL as biomarkers for early prediction of acute kidney injury among kitchen workers. The study provides evidence for the possible association of OH-PAHs and kidney injury biomarkers in kitchen workers with microalbuminuria.

Singh A, Kamal R, Tiwari R, Gaur VK, Bihari V, Satyanarayana GNV, Patel DK, Azeez PA, Srivastava V, Ansari A, Kesavachandran CN. Clinica Chimica Acta, 2018, 487: 349-356.

Photoexcited triclosan induced DNA damage and oxidative stress via p38 MAP kinase signaling involving type I radicals under sunlight/UVB exposure

Triclosan (TCS) is an antimicrobial preservative used in personal care products. The phototoxicity and photogenotoxicity studies of TCS involved p38 mitogen activated protein kinase (MAPK) pathway under UVB/sunlight exposure. It was found that TCS showed photodegradation and photoproducts formation under UVB/sunlight. *In silico* study suggested that photosensitized TCS loses its preservative property due to the formation of its photoproducts. Photosensitized TCS induces significant $O_2^{\cdot-}$, OH generation and lipid peroxidation *via* type-I photochemical reaction mechanism under UVB/sunlight exposure. Intracellular study of TCS was carried out on human skin keratinocytes (HaCaT cell line) under the ambient intensity of UVB (0.6 mW/cm^2) and sunlight exposure to assess the integrity of DNA. There was a significant increase in intracellular ROS generation and in cell viability, photosensitized TCS group. Photosensitized TCS was also found to induce endoplasmic reticulum (ER) stress, assessed involving ER-tracker/DAPI staining and Ca^{2+} release. It further induced cell cycle arrest through the sub-G1 phase augmentation and caused lysosomal/mitochondrial destabilization. Formation of significant tail DNA, micronuclei and cyclobutane pyrimidine dimers (CPDs) indicate photogenotoxicity. While understanding the effect on cell signaling mechanism, upregulated levels of cleaved Caspase-3, Bax, phospho-p38, phospho-JNK and cytochrome C, resulting in downregulation of Bcl-2 was clearly evident on exposure to TCS. The results advocate that TCS induces phototoxic effects via type I mediated photodynamic mechanism and activation of MAPK pathway and thus photoexcited TCS may be deleterious to human health at the ambient environmental intensities of sunlight reaching at the earth's surface. It is therefore suggested that TCS may be replaced by alternative safe preservative.



Molecular mechanisms associated with photoexcited triclosan under UVB/sunlight exposure: Photoexcited triclosan enhances ROS generation and apoptosis involving MAPkinase pathway in human skin keratinocytes

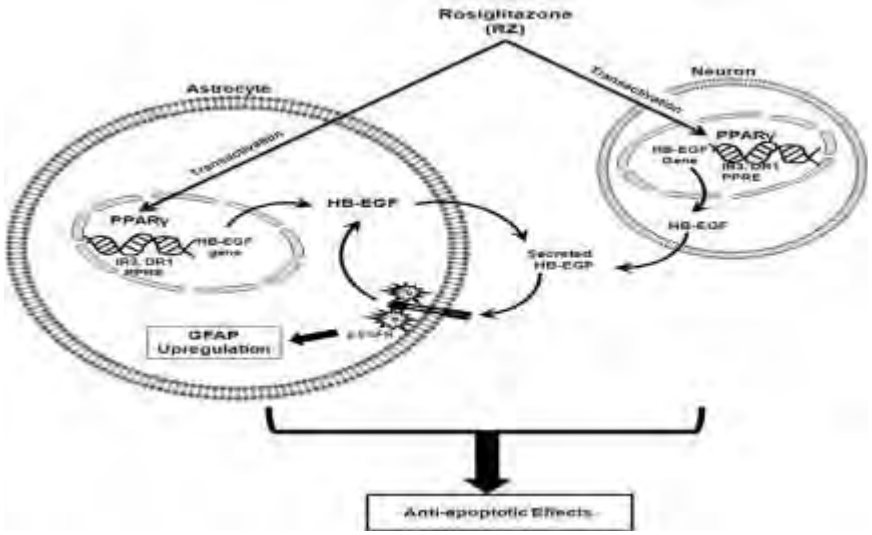
Dubey D, Srivastava AK, Singh J, Chopra D, Qureshi S, Kushwaha HN, Singh N and Ray RS. Ecotoxicology and Environmental Safety, 2019, 174: 270-282.

Rosiglitazone up-regulates glial fibrillary acidic protein via HB-EGF secreted from astrocytes and neurons through PPARγ pathway and reduces apoptosis in high-fat diet-fed mice

The anti-diabetic drug and peroxisome proliferator-activated receptor-gamma (PPARγ) agonist, rosiglitazone, alters astrocyte activation; however, its mechanism is not clearly understood. Based on the hypothesis that participation of epidermal growth factor receptor (EGFR) control astrocyte reactivity, the primary focus was to detect the effect of rosiglitazone on glial fibrillary acidic protein (GFAP) expression in primary astrocytes as well as the mouse cerebral cortex and assess the integrity of EGFR. Screening for EGFR ligands revealed a rosiglitazone-mediated increase of heparin-binding epidermal growth factor (HB-EGF) in astrocytes, resulting in HB-EGF release into culture medium and mouse cerebrospinal fluid. Treatment with HB-EGF-siRNA and EGFR inhibitors showed that the rosiglitazone-induced HB-EGF and p-EFGR were interdependent, which participated in GFAP increase. Interestingly, it was observed that rosiglitazone could induce cellular and secreted-HB-EGF in neurons also, contributing toward the activated EGFR-induced GFAP in astrocytes. Identification of potential PPARγ-responsive elements within HB-EGF gene suggested that these effects of rosiglitazone were probably PPARγ-linked. Moreover, gel-shift, site-directed mutagenesis, chromatin-immunoprecipitation and luciferase-reporter assays demonstrated a PPARγ-dependent HB-EGF transactivation. Subsequently, effects of rosiglitazone were assessed in a high-fat diet-fed mouse model of diabetes, and supporting observations in the normal cortical cells, identified a rosiglitazone-induced GFAP, astrocyte and neuronal HB-EGF and secreted-HB-EGF in the cerebral cortex of diabetic mice. While assessing

relevance of increased HB-EGF and GFAP, an anti-apoptotic role of rosiglitazone in the cerebral cortex, supported by a GFAP-siRNA as well as HB-EGF-siRNA-mediated increase in cleaved-caspase 3 and 9 levels in the rosiglitazone-treated astrocyte-neuron coculture was evident. The results indicate that rosiglitazone may protect the brain, via a PPARγ-dependent HB-EGF/EGFR signaling and increased GFAP.

Kushwaha R, Mishra J, Gupta AP, Gupta K, Vishwakarma J, Chattopadhyay N, Gayen JR, Kamthan M, Bandyopadhyay S. Journal of Neurochemistry, 2019,149: 679-698.



Resiglitazone stimulates PPARγ binding to IR3 and DR1-PPRE sequence within HB-EGF gene, promoting HB-EGF expression in astrocytes and neurons. The increased s-HB-EGF activates EGFR, further enhancing HB-EGF and an ultimate GFAP level in astrocytes. Up-regulated HB-EGF/EGFR signaling and GFAP culminate into reduced astrocyte and neuronal apoptosis

Carbofuran hampers oligodendrocytes development leading to impaired myelination in the hippocampus of rat brain

During the mammalian brain development, oligodendrocyte progenitor cells (OPCs) are generated from neuroepithelium and migrate throughout the brain. Myelination is a tightly regulated process and involves sequential events of OPCs proliferation, migration, differentiation and interaction with axons for functional insulated sheath formation in a time frame. Myelin is essential for efficient and rapid conduction of electric impulses and its loss in the hippocampus of the brain may result in impaired memory and long-term neurological deficits. Carbofuran, a carbamate pesticide is known to cause inhibition of hippocampal neurogenesis and memory dysfunctions in rats. Nonetheless, effects of carbofuran on OPCs proliferation, fate determination, maturation/differentiation and myelination potential in the hippocampus of the rat brain are still completely elusive. The study investigated the effects of sub-chronic exposure of carbofuran during two different time periods including prenatal and adult brain development in rats. Carbofuran was found to hamper OPCs proliferation (BrdU incorporation) and oligodendroglial differentiation *in vitro*. Similar effects of carbofuran were also observed in hippocampus at both the time points. Carbofuran exposure was found to reduce expression of key genes and levels of proteins involved in the regulation of oligodendrocyte development and functional myelination. It also affected the survival of oligodendrocytes by inducing apoptotic cell death. The ultrastructural analysis of myelin architecture clearly depicted carbofuran-mediated negative effects on myelin compaction and g-ratio alteration. Conclusively, the study demonstrated that carbofuran alters myelination potential in the hippocampus, which leads to cognitive deficits in rats.

Seth B, Yadav A, Tandon A, Shankar J, Chaturvedi RK. Neurotoxicology, 2019, 70: 161-179.

Similarities in mRNA expression of peripheral blood drug metabolizing enzymes and cancer marker genes with biopsy samples of head and neck cancer patients

A study was initiated to validate peripheral blood expression profiles of carcinogen-metabolizing cytochrome P450s (CYPs) as a surrogate involving 150 healthy controls and an equal number of cases of tobacco-induced head & neck squamous cell carcinoma (HNSCC). Blood was drawn from the subjects & RNA and genomic DNA was extracted from whole blood. Realtime PCR (RT-PCR) data revealed a significant increase in mRNA expression of the polycyclic aromatic hydrocarbon (PAH)- metabolizing CYPs in the peripheral blood isolated from cases of HNSCC. Cases with variant genotypes of PAH metabolizing CYPs (1A1or 1B1 or 2E1 or 2A6) showed a significantly higher increase in the mRNA expression when compared to the controls with wild-type or variant genotype. Further, cases responding to chemo-radiotherapy (RT) showed a significant decline in the magnitude of induction in the mRNA expression of CYPs (1A1, 1B1, 2E1, 2A6 and 2B6) when compared to the expression profiles observed before the treatment. However, non-responders among the cases showed no significant change in mRNA expression of CYP1B1, CYP2E1, CYP2A6, CYP2B6 after chemo-RT treatment while the increase in CYP1A1 and CYP2D6 mRNA persisted after the treatment. The data validating the blood expression profiles of CYPs as a surrogate further suggested that integrating blood expression profiles of CYPs along with genotyping screens could be effective not only in monitoring reactivity of different polymorphisms in tobacco-induced malignancies but also the treatment response.

Hasan F, Katiyar T, Maurya SS, Yadav V, Yadav S, Pandey R, Mehrotra D, Hadi R, Singh S, Bhatt ML, Parmar D. Biomarkers, 2019, 24: 574-583.

Validation of gene expression profiles of candidate genes using low density array in peripheral blood of tobacco consuming head and neck cancer patients and auto/taxi drivers with preneoplastic lesions

TaqMan Low-Density Array (TLDA) based Real-Time PCR (RT-PCR) of selected genes showed increased expression of polycyclic aromatic hydrocarbon (PAH) metabolizing cytochrome P450s (CYPs), glutathione S-transferases (GSTs) and associated transcription factors in biopsy and peripheral blood samples isolated from head and neck squamous cell carcinoma (HNSCC) patients when compared to the controls. The genes involved in DNA repair, signal transduction pathway, EMT pathway, apoptosis, and cell adhesion/motility were found to be altered in both peripheral blood and biopsy samples of HNSCC patients. Transcription profiles in blood isolated from auto/taxi drivers, with pre-neoplastic lesions and history of tobacco use, also showed similar alterations. The TLDA data thus demonstrated that low-density array of selected genes in peripheral blood has the potential to be used as a surrogate for providing insight into cancer progression pathways and possibly as an early biomarker for monitoring tobacco induced HNSCC.

Hasan F, Yadav V, Katiyar T, Yadav S, Pandey R, Mehrotra D, Hadi R, Singh S, Bhatt ML, Parmar D. Genomics, 2019, pii: S0888-7543: 30632-3

A proteomic approach to investigate enhanced responsiveness in rechallenged adult rats prenatally exposed to lindane

Proteomic analysis was carried out in substantia nigra (SNi) and hippocampus (Hi) isolated from rat offspring born to mothers exposed to lindane (p.o; 0.25 mg/kg) from gestation day (GD) 5 to GD 21 and subsequently rechallenged (p.o; 2.5 mg/kg for 21 days) at adulthood (12 weeks). 2D gel electrophoresis revealed no

significant differences in the expression of proteins in brain regions isolated from prenatally exposed offspring at adulthood. Significantly greater magnitude of alterations was observed in the expression of proteins related to mitochondrial and energy metabolism, ubiquitin-proteasome pathway, structural and axonal growth leading to increased oxidative stress in Hi and SNi isolated from rechallenged offspring when compared to control offspring treated postnatally with lindane. Western blotting and DNA laddering showed a greater magnitude of increase in apoptosis in the Hi and SNi of rechallenged offspring. Ultrastructural analysis demonstrated disrupted mitochondrial integrity, synaptic disruption and necrotic structures in the brain region of rechallenged offspring. Neurobehavioral studies also demonstrated a greater magnitude of alterations in cognitive and motor functions in rechallenged rats. The data suggest that prenatal exposure to lindane induces persistent molecular changes in the nervous system of offspring, which are unmasked leading to neurodegeneration following rechallenge at adulthood.

Srivastava A, Srivastava AK, Mishra M, Shankar J, Agrahari A, Kamthan M, Singh PK, Yadav S, Parmar D: Neurotoxicology, 2019, 19, 74:184-195.

Postnatal exposure to poly (I:C) impairs learning and memory through changes in synaptic plasticity gene expression in developing rat brain

Viral infection during early stage of life influences brain development and results in several neurodevelopmental disorders such as schizophrenia, autism and behavioral abnormalities. However, the mechanism through which infection causes long-term behavioral defects is not well known. To elucidate this, synthetic polyinosinic-polycytidylic acid [poly (I:C)] which acts as a dsRNA molecule and interacts with toll-like receptor-3 (TLR-3) of microglia cells was used to evoke the immune system, thus mimicking the viral infection. Rat pups of postnatal day (PND) 7 were infused with a single dose of poly (I:C) (5 mg/kg BW) and vehicle alone to controls. When these pups grew to 3, 6 and 12 weeks, their spatial and fear conditioning memory were impaired as assessed by Morris water maze and passive avoidance test, respectively. Poly (I:C) exposure elevated the number of TNF-α positive cells in hippocampus immediately after 12 h of infusion in one week rat reflecting the immune activation. Increased number of TNF-α positive cells in hippocampus persisted up to the postnatal age of 3 and 12 weeks. Moreover, poly (I:C) significantly decreased the binding of 3H-QNB to the muscarinic-cholinergic receptors in the frontal cortex and hippocampus of rat pups at 3 and 6 weeks as compared to control. However, no significant change in the binding was observed in any of the brain region of rats at the age of 12 weeks as compared to respective controls. RT-PCR and immunoblotting results showed that poly (I:C) exposure upregulated the expression of memory associated genes (BDNF, Arc, EGR1) at mRNA and protein level in frontal cortex and hippocampus of 3 weeks rats as compared to control. However, long-time persistence of poly (I:C) effects significantly decreased the expression of these genes in both brain regions of 12 weeks rats. The results exhibit that early life exposure to poly (I:C) has a long-term effect and impairs learning and memory, probably through TNF-α mediated neuroinflammation and alteration in the expression of memory associated genes in frontal cortex and hippocampus of rats.

Baghel MS, Singh B, Dhuriya YK, Shukla RK, Patro N, Khanna VK, Patro IK, Thakur MK. Neurobiology of Learning and Memory, 2018, 155: 379-389.

Research Publications

Total Publication	**70**
Average Impact Factor (IF)	**7.05**
IF NA	**03**
IF < 3	**18**
IF 3-5	**22**
IF 5-7	**18**
IF 7-12	**6**
IF < 40	**3**

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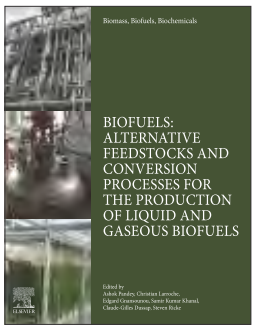
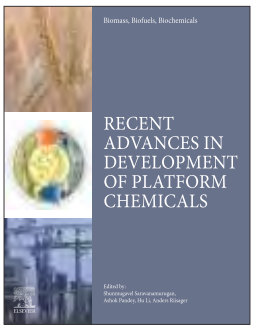
Books edited by CSIR-IITR Scientists



Dr Ashok Pandey



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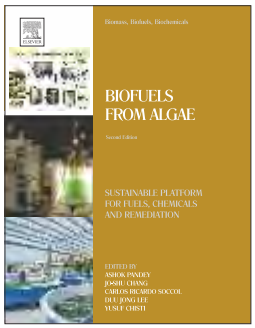

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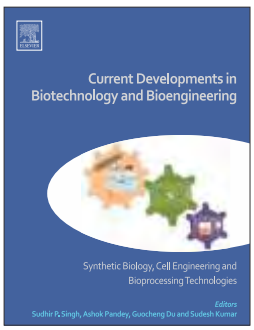

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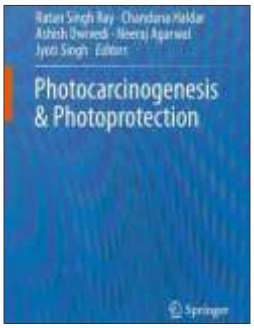
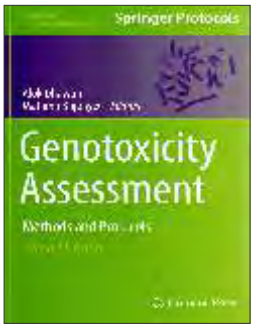
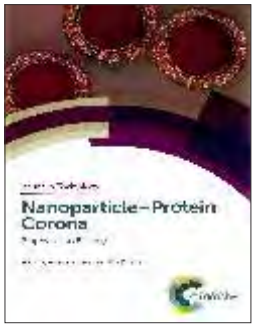


Dr Ratan Singh Ray



Professor Alok Dhawan



Professor Alok Dhawan

Chapters in book

- Bansal M, Singh N, Pal S, Indradev, Ansari KM. Chemopreventive role of dietary phytochemicals in colorectal cancer ***In*** "Advances in Molecular Toxicology (Vol. 12)" Editor: Fishbei JC, Academic Press, Elsevier Inc., 2018, USA. ISBN: 978-044-46-4198-4.

- Kumar D, Anand S, Poonam, Tiwari J, Kisku GC, Kumar N, Removal of inorganic and organic contaminants from terrestrial and tquatic ecosystems through phytoremediation and biosorption, ***In*** "Environmental Biotechnology: For Sustainable Future" Editors: Sobti RC, Springer Nature Singapore Pvt. Ltd., 2018, pp 45-71. ISBN: 978-981-10-7284-0.

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- Laubenthal J, Gdula MR, Dhawan A, Anderson D. Multicolor Laser Scanning Confocal Immunofluorescence Microscopy of DNA Damage Response Biomarkers, *In* "Protocols in Genotoxicity Assessment" Editors: Dhawan A, Bajpayee M. Humana, New York, NY, 2019, 287-300. ISBN: 978-1-4939-9646-9.

- Sinha M, Dhawan A, Parthasarathi R.. *In silico* Approaches in Predictive Genetic Toxicology, *In* "Protocols in Genotoxicity Assessment" Editors: Dhawan A, Bajpayee M. Humana, New York, NY, 2019, 351-373. ISBN: 978-1-4939-9646-9.

- Srivastava A, Srivastava P, Khanna VK, Pant AB. Molecular diagnostics in melanoma: An update ***In*** "Molecular diagnostics in cancer patients" Editors: Shukla KK, Sharma P, Misra S. Springer Inc., 2019 pp. 73-88, ISBN: 978-981-13-5877-7.

- Srivastava A, Srivastava P, Khanna VK, Pant AB. Phytomedicine: A potential alternative in the management of neurological disorders ***In*** "New Look to Phytomedicine: Advancements in Herbal Products as Drug leads", Editors: Khan, MSA, Ahmad I, Chattopadhyay D. Academic Press, Elsevier Inc., 2019, pp 625-655. ISBN: 978-012-81-4620-0.

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S. No.	Title	Names	Copyright registration number	Date
1.	FOCUS	Professor Alok Dhawan, Dr Sandeep Kumar Sharma, Dr Amol Bhondekar and Mr Ali Kausar	A-128489/2019	February 18, 2019
2.	Delivering technological solutions for food safety	Professor Alok Dhawan, Dr Sandeep Kumar Sharma and Dr Amol Bhondekar	L-80282/2019	January 23, 2019

Patents Filed in India in 2018-19

S. No.	Title	Inventors	Filing Date	Application Number
1.	A novel assay system for reverse transcription of circular RNAs leading to detection and quantification of specific circular RNAs	Sanjay Yadav, Anuj Pandey, Nishant Singh and Devendra Parmar	July 02, 2019	0110NF2019
2.	An automatic system for staining and immunolabeling of biomolecules on gels, membranes, slides or similar surface in cool mist phase	Sanjay Yadav, Sana Sarkar, Nishant Singh and Abhishek Mishra	July 16, 2019	0117NF2019
3.	A process for detection of urea, boric acid and detergent in aqueous sample and product thereof	Srishti Mehrotra, Gayatri Bagree, Pawankumar Rai, Sandeep Kumar Sharma and Alok Dhawan	September 12, 2019	0148NF2019

Ph.D Awarded

Fellow	Thesis Title	Stream	Supervisor	University /Academy	Year
 Abhishek Mishra	Cypermethrin-induced changes on the mitochondrial dynamics and autophagy: effect of melatonin.	Biological Sciences	Dr Mahendra Pratap Singh, Senior Principal Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2018
 Ajay Kumar	Development of Drosophila based model(s) for the assessment of female reproductive toxicity potential of xenobiotics.	Biological Sciences	Dr Ravi Ram Kristipati, Principal Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2018
 Brashket Seth	Effect of carbofuran on neural stem cell proliferation and differentiation in the rat brain: cellular and molecular mechanism(s).	Biological Sciences	Dr Rajnish Kumar Chaturvedi, Principal Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2018
 Hafizurrrahman	Understanding the developmental toxicity of mercury and its role in progression of adult onset kidney disorders.	Biological Sciences	Dr Vikas Srivastava, Senior Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2018
 Jyoti Singh	Assessment of phototoxicity mechanism of fluoroquinolones drugs under ultraviolet radiation.	Biological Sciences	Dr Ratan Singh Ray, Senior Principal Scientist, Co-supervisor: Dr Rajnish Kumar Chaturvedi, Principal Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2018
 Parul Singh	Studies on role of microRNAs in ethanol induced apoptosis of brain cells.	Biochemistry	Dr. Sanjay Yadav, Senior Scientist, CSIR-IITR, Lucknow	Babu Banarasi Das University, Lucknow	2018
 Saurabh Bhatti	Bioaccumulation, trophic transfer, and toxicity of fipronil: studies using *Escherichia coli* and *Caenorhabditis elegans*.	Biological Sciences	Dr Aruna Satish, Senior Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2018

 Mahaveer Purohit	Development of selenopolymeric nanocomposites for combinatorial cancer therapy.	Chemical Sciences	Dr Satyakam Patnaik, Senior Scientist, CSIR-IITR, Lucknow Co-supervisor: Dr Debabrata Ghosh, Senior Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2019
 Megha Bansal	Evaluation of dermal toxic potential of alternaria mycotoxin, alternariol and its detection in commonly consumed edible oils.	Biological Sciences	Dr Kausar Mahmood Ansari, Senior Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2019
 Payal Mandal	Assessment of immunological response in the pathogenesis of argemone oil toxicity.	Biological Sciences	Dr Anurag Tripathi, Senior Scientist, Co-supervisor: Dr Mukul Das, Former Chief Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2019
 Rakesh Roshan Jha	Development of analytical methods using microextraction techniques for the analysis of multiclass compounds from environmental, biological and food matrices.	Chemical Sciences	Dr Devendra Kumar Patel, Principal Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2019
 Rukmani Pandey	A study on toxic effect of arsenic in hippocampal neurons of adult rats and the neuroprotective role of estrogen.	Biological Sciences	Dr Sanghamitra Bandyopadhyay, Principal Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2019
 Sachin Sharma	Allergenicity assessment of *Buchanania lanzan* (Chironji).	Biological Sciences	Dr Premendra Dhar Dwivedi, Former Senior Principal Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2019
 Shripriya Singh	Detection of organ specific responses against xenobiotics in one go: a stem cell based study.	Biological Sciences	Dr Aditya Bhushan Pant, Principal Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2019

 Smita Kumari	Studies on biodegradation of high molecular weight polycyclic aromatic hydrocarbons by bacteria and characterization of metabolites and genes.	Biological Sciences	Dr Natesan Manickam, Senior Principal Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2019
 Vivek K. Pandey	Redox homeostasis and associated molecular signaling events in ER stress during hyperglycemic hepatotoxicity.	Biological Sciences	Dr Poonam Kakkar, Former Chief Scientist, CSIR-IITR, Lucknow	AcSIR, Ghaziabad	2019
 Abhishek K. Jain	Mechanism of *in vitro* and *in vivo* toxicity induced by metal oxide nanoparticles	Biochemistry	Dr Alok Kumar Pandey, Senior Scientist, CSIR-IITR, Lucknow	Babu Banarasi Das University, Lucknow	2019
 Divya Dubey	Ultraviolet radiation induced phototoxicity mechanism of cosmetic preservatives	Biochemistry	Dr Ratan Singh Ray, Senior Principal Scientist, CSIR-IITR, Lucknow	Babu Banarasi Das University, Lucknow	2019
 Madhavi Sonane	Evaluation of antioxidants in amelioration of toxic effects of engineered nanoparticles using *Caenorhabditis elegans* as a basic *in vivo* alternative model	Biochemistry	Dr Aruna Satish, Senior Scientist, CSIR-IITR, Lucknow	Babu Banarasi Das University, Lucknow	2019
 Pokhraj Sahu	Study of fluoride contaminated ground water quality and health risk assessment owing to bioaccumulation of fluoride in cultivated crops and fodder plants.	Environmental Science	Dr. P.K. Singh, BBAU, Lucknow Co-supervisor: Dr Ganesh Chandra Kisku, Chief Scientist, CSIR-IITR, Lucknow	Babasaheb Bhimrao Ambedkar University (BBAU), Lucknow	2019
 Pratibha Tripathi	Effect of ibuprofen on cypermethrin-induced alterations in the mitochondrial function, dendritic arborization and spine density associated with Parkinsonism	Biochemistry	Dr Mahendra Pratap Singh, Senior Principal Scientist, CSIR-IITR, Lucknow	Babu Banarasi Das University, Lucknow	2019

 Sharad Kumar	Functional characterization of thermostable xylanases for toxicity reduction in pulp and paper industry wastes	Biological Science	Dr Abhay Raj, Senior Scientist, CSIR-IITR, Lucknow	Amity University, Lucknow	2019
 Sushil Bharti	Source apportionment of particulate matter and its probable consequences in urban area of Lucknow.	Environmental Science	Dr Narendra Kumar, BBAU, Lucknow Co-supervisor: Dr Shyamal Chandra Barman, Chief Scientist, CSIR-IITR, Lucknow	Babasaheb Bhimrao Ambedkar University (BBAU), Lucknow	2019
 Vinay Kumar	Contamination and environmental health risk assessment of Gomti river water quality at Lucknow city area.	Environmental Science	Dr Ganesh Chandra Kisku, Chief Scientist, CSIR-IITR, Lucknow Co-supervisor: Dr P.K. Singh, BBAU, Lucknow	Babasaheb Bhimrao Ambedkar University (BBAU), Lucknow	2019

Visits

Name of the scientist	Country to visit	Duration/ period	Purpose	
Dr Amit Kumar	Germany, France, Italy, Spain	October 12-November 02, 2018	Brainstorm the progress of project and explore avenues for bilateral project formulation.	
	Spain	August 05-25, 2019	To discuss project progress with Professor Marco Foiani, Scientific Director, IFOM, Milon (Italy) and visit to Professor Ana C. Carrera from CNB, CSIC, Madrid, Spain and to deliver lecture and discuss possibilities for fostering bilateral collaboration	
Dr Anbumani Sadasivam	Nanjig, China	October 28-31, 2018	1st International conference on water resources and sustainability (ICWRS) & 3rd International conference on alternative fuels, energy and environment: Future and challenges.	
Dr Abhay Raj	Yangling, China	November 5-8, 2018	To deliver a talk in the forum on ecological agriculture: Green, quality and efficiency at Northwest A&F University, China.	
Dr Sheelendra Pratap Singh	Singapore	January 08-10, 2019	To attend the workshop on GFSP food safety training and workshop on detection of mycotoxins.	
	Japan	January 26-May 26, 2019	Indo-Japanese joint project on establishment of young researcher fellowship programme, 2018-19.	
Dr Kausar Mahmood Ansari	Vienna, Austria	January 08-July 05, 2019	Visit to Department of Food Chemistry and Toxicology, Vienna.	
Dr Rajnish Kumar Chaturvedi	Boston, USA	April 22 - 24, 2019	To participate in the Nanoworld Conference, Boston-2019	

Mrs Preeti Chaturvedi	Yangling, China	May 6-9, 2019	International conference on sustainable solid waste treatment and management (SWTM-2019)	
	Switzerland	October 01-31, 2019	To visit Swiss Federal Institute of Technology Lausanne (EPFL), Bioenergy and Energy Planning Research Group	
Dr Vikas Srivastava	Hong Kong	June 12-15, 2019	3rd International conference on bioresources, energy, environment and materials technology, 2019 at Hong Kong Polytechnic University	
Dr Sandeep Kumar Sharma	Switzerland	October 01-31, 2019	To attend conferences, symposia; Research work related meeting with Professor Edgard Ganansounou at EPFL, Lausanne, Switzerland.	
Mr Jai Shankar	Japan	October 06-12, 2019	To participate in the workshop "Research on molecular biology of stress, aging and cancer using cell culture based assays:- Interventions by natural compounds	
Dr C Kesavachandran	Germany	October 22-24, 2019	To participate in 11th International Joint Conference on occupational health for health workers.	

Aparna Singh Kushwaha	San Fransisco, USA	June 19-29, 2019	Poster presentation in International conference "ASM Microbe 2019" Organized by American Society for Microbiology	
Jagriti Shukla	San Fransisco, USA	June 19-29, 2019	Poster presentation in International conference "ASM Microbe 2019" Organized by American Society for Microbiology	
Shweta Devi	Seattle, WA, USA	June 30- July 03, 2019	Poster presentation in 33rd Annual Symposium of The Protein Society	
Tulika Srivastava	Montreal, Canada	August 4-8, 2019	To present a poster in ISN-ASN-2019 Biennial Meeting	
Shweta Goyal	Montreal, Canada	August 4-8, 2019	To present a poster in ISN-ASN-2019 Biennial Meeting	
Sangh Jyoti Singh	Montreal, Canada	August 4-8, 2019	To present a poster in ISN-ASN-2019 Biennial Meeting	
Minal Chaturvedi	Porto, Portugal	September 1-4, 2019	Synuclein Meeting, 2019	
Nida Moin	Queensland, Australia	October 23-25, 2019	Platform presentation in Australian C. elegans symposium	

Agreements

- A secrecy agreement was signed between CSIR-IITR and M/s IKAN Innovations & Technologies, Lucknow, on February 05, 2019, for supplying the technical data and information of the technologies developed by CSIR-IITR to the party.
- An agreement for recognition of National Reference Laboratory of FSSAI was signed between CSIR-IITR, Lucknow and FSSAI, New Delhi, on May 21, 2019.

MoU

A MoU was signed between CSIR-IITR, Lucknow and

- State Mission for Clean Ganga (SMCG), Uttar Pradesh, on January 11, 2019, for mutual cooperation of research and development in the areas of mutual interest.
- Gujarat University, Ahmedabad, on March 08, 2019, for mutual cooperation of research and development in the areas of mutual interest.
- Gujarat Technological University, Ahmedabad, on March 08, 2019, for mutual cooperation of research and development in the areas of mutual interest.
- University of Lucknow, Lucknow, on May 02, 2019, for mutual cooperation of research and development in the areas of mutual interest.
- AIIMS, Bhopal, on May 02, 2019, for mutual cooperation of research and development in the areas of mutual interest.

Professor Sanjeev Misra, Director, AIIMS, Jodhpur and Professor Alok Dhawan, Director, CSIR-IITR with MoU document

Dr Shailesh Kharkwal, CEO, H_2O Mantra Pvt. Ltd., Ghaziabad, Professor Alok Dhawan, Director, CSIR-IITR and Dr K.C. Khulbe, Head RPBD, CSIR-IITR with MoU document

Dr Praveen Mehrotra, Principal, SPPGIDMS, Raebareily Road, Lucknow and Professor Alok Dhawan, Director, CSIR-IITR with MoU document

Dr V.K. Upadhyay, Director, Ground Water Department, Government of Uttar Pradesh and Dr K.C. Khulbe, Head RPBD, CSIR-IITR with MoU document. Also seen are Professor Alok Dhawan, Director, CSIR-IITR, Ms Preeti Chaturvedi, Senior Scientist, CSIR-IITR along with officials from the Ground Water Department.

- Dr A.P.J. Abdul Kalam Technical University, Lucknow, on May 02, 2019, for mutual cooperation of research and development in the areas of mutual interest.
- Ground Water Department, Uttar Pradesh, on June 07, 2019, for mutual cooperation of research and development in the areas of mutual interest.
- H_2O Mantra Private Limited, Ghaziabad, Uttar Pradesh, on June 17, 2019, for mutual cooperation of research and expansion in the areas of mutual interest.
- AIIMS, Jodhpur, on June 21, 2019, for mutual cooperation of research and development in the areas of mutual interest.
- Flora Fauna Science Foundation, Lucknow, on July 02, 2019, for achieving synergetic research goals, and industrial development with mutual interest.
- Vikram Sarabhai Space Centre and CSIR-Institute of Microbial Technology, Chandigarh, on July 07, 2019, for mutual and synergetic research goals.
- Telemachus High Tech Private Limited, Mumbai, on August 03, 2019, for achieving synergetic research goals, and industrial development with mutual interest.
- Telemachus High Tech Private Limited, Mumbai, on September 5, 2019, for providing technical consultancy by CSIR-IITR in optimizing the process of treatment for different drains as per their individual characteristics.
- Sardar Patel Post Graduate Institute of Dental and Medical Sciences, Raebareily Road, Lucknow, on September 14, 2019, for sharing a common desire to extend and strengthen the functional relationship between the two institutes.

Externally Funded Research Projects

S. No.	Title	Sponsor	Principal Investigator	Start Date	Total Value (INR)
1.	Sample collection and testing of stack emission PM, SO_x, NO_x and Hg analysis of 2x250 MW Harduaganj Thermal Power Station and 2x210 MW and 2x250 MW PTPS of UPRVUNL for one time.	UPRVUNL, Lucknow	Dr S.C. Barman	August 29, 2018	454300.00
2.	Lake water quality monitoring of Ramgarh Lake, Gorakhpur	UP Jal Nigam, Gorakhpur	Dr Satyakam Patnaik	September 01, 2018	1534000.00
3.	Development of photosensitive biomarkers for hair dye ingredients phototoxicity and protection through antioxidants/ nanotized antioxidants for human safety	SERB, New Delhi	Dr R.S. Ray	September 04, 2018	4681000.00
4.	Analysis of fibre count in 10 slides	Assam Roofing Pvt. Ltd. Guwahati	Er A.H. Khan	September 12, 2018	118000.00
5.	Potability test of GRP pipes as per IS 12709:1994 - Clause 16	Graphite India Ltd., Nasik	Dr V.P. Sharma	September 15, 2018	973500.00
6.	Development of new generation of acetabular socket liner and femoral head prototypes with unique 3D microstructures and better fracture reistance for osteoporosis and osteoarthritis treatment (IMPRINT)	SERB, New Delhi	Professor Alok Dhawan	October 12, 2018	1380000.00

7.	Specialized training programme in the field of air and water pollution monitoring for 30 candidates	CPCB, Regional Directorate, Lucknow	Er A.H. Khan	November 01, 2018	1384000.00
8.	Analysis and collection of inlet and outlet water samples of sewage of Pilot Project, Lucknow (Nagaria Nala, Kukrail Nala and Jiamau Nala)	Temporary Gomti Pollution Control Unit, UP Jal Nigam, Lucknow	Dr Satyakam Patnaik	November 15, 2018	500000.00
9.	Analysis of heavy metals, pesticides and anitibiotics in water samples from different sites of river Godawari	ICAR-National Bureau of Fish Genetics Resources, Lucknow	Dr D.K. Patel	December 05, 2018	382320.00
10.	Third party inspection (TPI) of Bioremediation/ Modular Treatment of drains in Uttar Pradesh	State Mission for Clean Ganga, Lucknow	Mrs Preeti Chaturvedi	December 11, 2018	4409000.00
11.	Centre for Sustainable Treatment, Reuse and Management for effluent, affordable and synergistic solutions for water (Water-IC for Sutram of Easy water)	DST, New Delhi	Professor Alok Dhawan (Co-PI: Dr Satyakam Patnaik)	December 14, 2018	4853000.00
12.	Role of mixed-lineage kinase domain-like protein (MLKL) as a cell death-associated molecular pattern in drugs/xenobiotic-induced inflammatory liver diseases and its therapeutic implications	SERB, New Delhi	Dr P.K. Sharma	December 15, 2018	2854080.00
13.	Role and mechanism of the PARP-I-ATR-Chk I signaling axis in modulating ligand-induced NF-kB transativtion by arsenic in microglia	SERB, New Delhi	Dr Debabrata Ghosh	December 19, 2018	3588200.00

14.	Application of human iPSCs derived 3D neuronal niche: A high throughput system to screen the development neurotoxicity potential of chemicals/drugs	SERB, New Delhi	Dr A.B. Pant	December 26, 2018	1670000.00
15.	Safety evaluation of two surfactant (i) 2-Hexyl-1-Decyl methoxy carboxylate sodium salt: (ii) Lauryl methoxy carboxylate sodium salt	Gujarat Fluoro-chemicals Limited, Bharunch, Gujarat	Dr Poonam Kakkar	December 26, 2018	1062000.00
16.	Inspection and monitoring of Industries (GPI), STPs and CETPs by Third Party Technical Institutions.	UP Pollution Control Board, Lucknow	Mrs Preeti Chaturvedi	January 01, 2019	233640.00
17.	Creation of DSIR-Common Research Technology Development Hub (CRTDH) in the area of environmental intervention under DSIR-BIRDerf-CRTDH Programme	DSIR, New Delhi	Dr R. Parthasarathi Professor Alok Dhawan	January 10, 2019	1920000.00
18.	Preparation of adequacy report of emission control measure implementation for achieving applicable standard of Unit 4 and 5 (B-|TPS only) and monitoring of stack emission, water, effluent testin "B" and "D"Anpara in January 2019	Anpara Thermal Power Station P.O. Anpara Distt. Sonebhadra	Dr S.C. Barman	February 01, 2019	200000.00
19.	Performance assessment of air pollution control device of Continental Carbon India Limited, Ghaziabad	Continental Carbon India Limited, Ghaziabad	Dr S.C. Barman	February 01, 2019	265500.00

20.	Inlet and outlet water analysis of 345 MLD STP water of Bharwara STP for Physicochemical parameters and metals	Gomti Pollution Control Unit, UP Jal Nigam, Lucknow.	Dr Satyamkam Patnaik	February 01, 2019	361080.00
21.	Designing and printing of hardbound book brochures and creation of web portal for "Pesticide Map of India"	Crop Care Federation of India, Mumbai	Dr S.P. Singh / Dr R. Parthasarthi	February 25, 2019	1000000.00
22.	Engineered bioremediation approaches for onsite treatment of soil contaminated with crude oil	DBT, New Delhi	Dr N. Manickam	March 19, 2019	1746000.00
23.	Analysis of water samples for physicochemical parameters metals and bacteriological parameters	Gramin Development Services, Lucknow	Dr D.K. Patel	March 19, 2019	148680.00
24.	Analysis of fibre count in 10 slides	Assam Roofing Limited, Guwahati	Er A.H. Khan	April 01, 2019	118000.00
25.	Analysis of fibre count in 10 slides	North-East Roofing Pvt. Ltd. Guwahati	Er A.H. Khan	April 01, 2019	118000.00
26.	Technical consulting supervision of the study sub-chronic and genotoxicity	SHEFEXIL, Kolkata	Dr Akshay Dwarkanath	April 01, 2019	620680.00
27.	FSSAI-Food Safety referral Laboratory	Food Safety and Standards Authority of India, New Delhi	Professor Alok Dhawan	April 02, 2019	27200000.00
28.	Third party monitoring / testing of stack emission, ambient air, water, effluents and preparation of annual environmental audit report of PTPP, Parichha, Jhansi	PTPP, UPRVUNL, Parichha, Jhansi	Dr S.C. Barman	April 02, 2019	1508300.00

29.	Monitoring of Grossly Polluted Industries (GPIs) discharging in to the river Ganges and its tributaries for compliance verfication of 82 GPIs	CPCB, New Delhi	Mrs Preeti Chaturvedi	April 24, 2019	2990592.00
30.	Repeated dose (90 days) oral toxicity study in rats (Post weaning, dosing starting after 3 weeks of age)	SHEFEXIL, Kolkata	Dr Poonam Kakkar	April 25, 2019	4130000.00
31.	Analysis of SO_2, NO_2, NO, CO, CO_2, noise level and $PM_{2.5}$ in green firecracker samples	Director, NBRI, Lucknow	Er A.H. Khan	May 10, 2019	177000.00
32.	Analysis of BOD, COD, DO, TSS, MPN, total nitrogen and total phosporus in inlet and outlet water of Arts College Nala near Mankameshwar Mandir	M/s Telemachus Hightech Pvt. Ltd., Mumbai	Dr Satyakam Patnaik	May 13, 2019	407100.00
33.	Monitoring of environmental parameters in and around M/s Grasim Industries Ltd, Renukoot	Grasim Industries Ltd. (Chemical Div), Renukoot, Distt. Sonebhadra	Dr G.C. Kisku	May 15, 2019	1961040.00
34.	Development and clinical validation of markers for a point of care diagnostic kit for diabetic nephropathy	BIRAC, New Delhi	Dr Vikas Srivastava	May 23, 2019	894000.00
35.	Monitoring of environmental parameters of Meja Thermal Power Project, Allahabad	Meja Urja Nigam Limited, Meja, Allahabad	Er A.H. Khan	June 01, 2019	3524800.00

36.	Third party testing and monitoring of stack emission, ambient air monitoring, and water effluent, drinking water testing (on quarterly basis) noise with preparation of environmental audit statement and the testing of coal, button, ash, fly ash samples	Anpara Thermal Power station, Anpara, Distt. Sonebhadra	Dr S.C. Barman	June 01, 2019	1625700.00
37.	Preparation of analytical report on monitoring and mapping the quality of ground water resources	Director, Ground Water Department, Uttar Pradesh, Ashok Marg, Lucknow	Mrs Preeti Chaturvedi	June 01, 2019	7976800.00
38.	Assessment and certification of existing iron, arsenic and fluoride removal water treatment products/technologies and any other technology related to the water treatment	H_2O Mantra Pvt. Ltd. Ghaziabad, UP	Dr D.K. Patel	July 01, 2019	177000.00
39.	Development of microbial resources/ consortia for biodegradation of ammonium perchlorate	Vikram Sarabahai Space Center, Trivandrum	Dr N. Manickam	July 03, 2019	1560000.00
40.	Toxicity studies of sodium salt and lauryl methoxy carboxylate	Gujarat Flurochemicals Ltd. Bharuch, Gujarat	Dr Poonam Kakkar	July 06, 2019	1770000.00
41.	Third party testing of environmental parameters of NTPC, Shaktinagar	NTPC Limited Vindhyanagar	Er A.H. Khan	July 25, 2019	1924000.00
42.	Environmental monitoring and testing for Tata Motors Ltd. and Tata Macopolo Motors Ltd., Lucknow	Tata Motors Ltd., Lucknow	Dr S.C. Barman	August 01, 2019	2296800.00
43.	CITAR: Scientific intervention in waste water/sewage/effluent treatment	M/s Telemachus High Tech Pvt. Ltd., Mumbai	Mrs Preeti Chaturvedi / Dr K.C. Khulbe	August 01, 2019	708750.00

44.	Five days residential traning programme on "Monitoring of $PM_{2.5}$ and other notified air pollutants as per revised NAAQS 2009	CPCB, New Delhi	Er A.H. Khan	August 09, 2019	506250.00
45.	Training programme on "Analysis of pesticides and other organic chemicals in environmental samples"	CPCB, New Delhi	Dr N.G. Ansari	August 19, 2019	506251.00
46.	Analyse the toxic chemicals and elements in the leachates of cigarette butts and bidi butts using TCLP method	CPCB, New Delhi	Dr D.K. Patel	August 26, 2019	4800000.00
47.	Training programme on Good Food Laboratory Practice (GFLP)	FSSAI, New Delhi	Dr Yogeshwar Shukla	September 19, 2019	396250.00

Honours and Awards

Professor Alok Dhawan, Director

- Professor B.K. Bachhawat Memorial Lecture Award of National Academy of Sciences, India
- Honorary Fellow, Biotech Research Society, India
- Member, Technical Advisory Commmittee under the Child and Adolescent Labour (Prohibition and Regulation) Act 1986. Ministry of Labour & Employment, Government of India. 2019-
- Member, Governing Body, Institute of Pesticide Formulation, (Gurugram, Haryana), Ministry of Chemical & Fertilizers, Government of India, 2019
- Member, Council of Science & Technology, Governement of Uttar Pradesh, Lucknow, 2019-
- Member, Board of Governors, National Institute of Pharmaceutical Education and Research (Ministry of Chemical and Fertilizers, Department of Pharmaceuticals, Govt. of India), Raebareli, 2019
- Member, Regional Advisory Committee (RAC), Central Institute of Plastics Engineering & Technology, (Department of Chemicals and Petrochemicals, Ministry of Chemicals & Fertilizers, Government of India), Lucknow, 2019
- Chairman, Sub-Committee to frame guidelines for Rehabilitation and Reuse of Large Animals post experimentation. CPCSEA, Ministry of Environment, Forest and Climate Change, Govt. of India, Animal Welfare Division, New Delhi, 2019
- Member, CPCSEA, Ministry of Environment, Forest and Climate Change, Govt. of India, New Delhi, 2018
- Chairman, Institutional Committee for Stem Cell Research (IC-SCR), King George's Medical University, Lucknow, Uttar Pradesh, 2018
- Member, Sub-Committee for Scrutiny of Large Animal Research Protocol, Ministry of Environment, Forest and Climate Change, Govt. of India, Animal Welfare Division, New Delhi, 2018
- Member, Evalution and Monitoring Committee (EMC) under 'Under Scheme Scheme of Research and Development Studies for Food Quality and Safety, Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, (RARD Division), New Delhi, 2018
- Member, Scientific Advisory Committee, Tea Research Association, Kolkata, 2016-2019
- President, CSIR-Sports Promotion Board, Council of Scientific & Industrial Research, New Delhi, 2018-2021
- Honorary Fellow of The Biotech Research Society, India
- President, Society of Toxicology, India, 2018

Professor Alok Dhawan, Director CSIR-IITR, was honored as an Honorary Fellow of The Biotech Research Society, India for his distinguished service to the nation in Biotechnology

Dr Aditya Bhushan Pant, Principal Scientist

- Received Toxicology Promotion Award -2018 of National Academy of Sciences, Allahabad

Dr Debabrata Ghosh, Senior Scientist

- Editorial board member of the journal "Scientific Reports".

Dr Kausar Mahmood Ansari, Senior Scientist

- Awarded "CSIR-Raman Research Fellowship (2018-2019)" to visit Department of Food Chemistry and Toxicology, University of Vienna, Währingerstraße 38,1090 Vienna, Austria.
- Editorial Board Member of the journal "Journal of Cancer Prevention".
- Academic Editor of the journal "PLoS ONE".
- Associate Editor of the journal "Cancer Cell International".

Dr Poonam Kakkar, Chief Scientist

- Member, Central Advisory Committee, Food Safety and Standards Authority of India (FSSAI), Ministry of Health & Family Welfare, Government of India.
- Member, Scientific Panel on Methods of Sampling and Analysis, FSSAI, Ministry of Health & Family Welfare, Government of India.

Dr Rajnish Kumar Chaturvedi, Principal Scientist

- Vigyan Ratna Award-2016, U.P. Council of Technology.
- Member, Review Committee of Genetic Manipulation (RCGM), Department of Biotechnology, Government of India.

Dr Rajnish Kumar Chaturvedi, Principal Scientist, CSIR-IITR receiving Vigyan Ratna Award from Shri Yogi Adityanath, Hon'ble Chief Minister, Uttar Pradesh.

Dr Ramkrishnan Parthasarathi, Principal Scientist

- Received Dr A.P.J. Abdul Kalam Cray HPC award
- Elected as a Fellow of Indian Chemical Society
- Member, Proposals Evaluation, Software, Hardware edition, Smart India Hackathon 2019.
- Member, Technical Evaluation Panel for BIRAC 14th BIG call (Biotechnology Ignition Grant) at SIDBI Innovation & Incubation Centre (SIIC), IIT Kanpur.
- Member, Roundtable meeting on S&T led Innovations for Waste to Wealth at The Festival of Innovations and Entrepreneurship [FINE] organized at National Innovation Foundation – India (NIF), Gandhinagar, Gujarat.
- Editorial Board Member of The Journal "Journal of Energy and Environmental Sustainability"

Dr R. Parthasarathi, Principal Scientist, CSIR-IITR receiving Dr A.P.J. Abdul Kalam Cray HPC award from Dr Shekhar C. Mande, DG, CSIR

Dr Sheelendra Pratap Singh, Scientist

- Fellowship from Japan Society for the Promotion of Science (JSPS), under the scheme Indo-Japanese Joint Project on "Establishment of Young Researcher Fellowship Programme 2018-2019" coordinated by INSA and JSPS.

Alina Zehra, Research Fellow

- Best Poster Presentation Award in International Conference on "Bio-Innovation for Environmental and Health Sustainable Developments, BEHSD-2018" at CSIR-IITR, Lucknow, November 27-28, 2018.

Ankita Rai, Research Fellow

- Best Oral Presentation Award for "Surveillance study of Zearalenone (ZEA) in Indian cereal grains and investigation of its dermal toxic potential in swiss mice" at the conference "Advances in Food and Beverage Analysis, India", held at Hotel Orchid, Mumbai October 11-12, 2018

Monika Seth, Research Fellow

- Best Poster Presentation Award in International Conference on "Bio-Innovation for Environmental and Health Sustainable Developments, BEHSD-2018" at CSIR-IITR, Lucknow, November 27-28, 2018.

Sarika Yadav, Research Fellow

- Second Best Poster Presentation Award at 4th International Toxicology Conclave (ITC-2018), held at CSIR-IITR, Lucknow, during November 2-3, 2018.

Somya Asthana, Research Fellow

- Best Poster Presentation Award in Internatinal Conference on "Advance in Biosciences and Biotechnology" held in during January 31-February 02, 2019 at Jaypee Institute of Information Technology, Noida.

Ved Prakash, Research Fellow

- Best Poster Presentation Award in International Conference on "Bio-Innovation for Environmental and Health Sustainable Developments, BEHSD-2018" at CSIR-IITR, Lucknow, November 27-28, 2018.

Zeeshan Arif, Research Fellow

- Best Poster Presentation Award in International Conference on "Bio-Innovation for Environmental and Health Sustainable Developments, BEHSD-2018" at CSIR-IITR, Lucknow, November 27-28, 2018.

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CSIR INDIA

Toxicity Testing – GLP Test Facility

The GLP Test facility at CSIR-IITR established in June 2014 has been growing from strength to strength. Linkages with existing and new clients, has reiterated the commitment of the GLP personnel to the progress of the facility. Strategic Sector partners like the Defence Research and Development Organization (DRDO) and the Border Security Force (BSF) have immense trust on the capability of the GLP team and they continue to send a steady stream of test items for testing.

Continuously striving to put in the best possible effort to fulfil the task given, has resulted in steady progress of the facility. The journey began with a certification for acute toxicity, 28 day repeat dose toxicity, and *in vivo* mutagenicity studies. Expanding the scope of the facility was the challenge from day 1, that the team took on whole heartedly. The GLP facility personnel took up this challenge head-on under the able guidance of a highly accomplished management team. The first expansion obtained in January 2016 included environmental toxicity studies on aquatic and terrestrial organisms. This was further expanded during the recertification of the facility in June 2017 to include: Sub-chronic and chronic toxicity studies, primary skin irritation and skin sensitization studies, *in vitro* mutagenicity assays, earthworm acute toxicity & reproduction test and fish acute toxicity test. The current certification is valid till June 04, 2020.

The state of the art equipment for evaluation of the neuro muscular system of rodents in sub-chronic and chronic toxicity studies is available at the facility. This endpoint can be measured by Grip Strength Meter and Animal Motor Activity Meter. The former automatically measures grip-strength (peak force applied and duration of resistance time) of both forelimbs and hind limbs in rats and mice. The effects of drugs, toxins, muscle relaxants, disease, ageing etc on muscle strength can be assessed. The latter is equipped to differentiate between ambulatory movement and total movement. The sensors can be re-arranged which allows flexibility to cover more cages with fewer axes of measurement, or fewer cages with measurement in more axes per cage.

Metabolic cages procured in the past, for the evaluation of excretory parameters are routinely being used in sub-chronic and chronic toxicity studies. Untainted animal urine collection is challenging, especially with small rodents. The metabolic cages procured, facilitates ease of collection and prevention of contamination while ensuring minimum discomfort to the animals. The cages are modular in nature with facility to keep rats as well as mice. They are also completely autoclavable.

The state of the art inhalation exposure system at the facility consists of multi-port nose only inhalation chamber, whole body exposure chamber and aerosol generators which enable the conduct of pre-clinical tests through inhalation exposure in mice and rats. The whole body exposure unit is also equipped with a nebulizer and air flow controller along with facility for intermittent monitoring of parameters that are required as per OECD Guidelines. Inhalation toxicity studies conducted at the facility have further strengthened our linkages with the strategic sectors. Studies have been conducted for test items from BSF, Ministry of Home Affairs, Government of India.

This is the only Government laboratory accredited to conduct ecotoxicity studies as per the OECD Principles of GLP. At present, the facility maintains three OECD approved models, viz., *Daphnia magna*, zebra fish (*Danio rerio*) and earthworm (*Eisenia fetida*) for carrying out ecotoxicology studies. The OECD recommended model of unicellular algae, *Pseudokirchneriella subcapitata*, for the conduct of environmental toxicity studies on aquatic organisms has also been added. New linkages have been forged with industries manufacturing chemical products used in road stabilizing process, water treatment plants, surfactants in textiles and plant based formulations for use as biopesticides.

Metabolic cages

A view of inhalation toxicology unit

Expansion of Scope of the GLP Test facility at CSIR – IITR

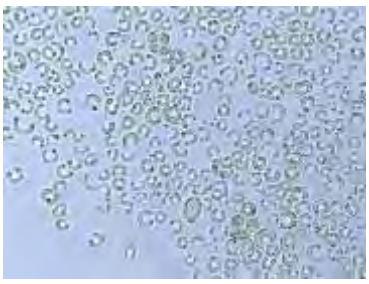
Continuing our endeavor to constantly upgrade and expand the scope of the facility, an application was moved for certification of the following studies during the surveillance inspection in May 2019: Inhalation toxicity studies, Freshwater Alga and Cyanobacteria Growth Inhibition Test, *Daphnia* sp. Acute Immobilization Test, Fish Embryo Acute Toxicity Test and *Daphnia magna* Reproduction Test. This has also resulted in an increase in the test systems under certification at our facility. With this recent scope expansion, the GLP Test Facility at CSIR–IITR now provides almost the entire range of toxicity testing under GLP Certification and included the following tests:

- Acute and sub-acute toxicity studies
- Sub-chronic and chronic toxicity studies
- Primary skin irritation and skin sensitization studies
- Inhalation toxicity studies
- Chromosomal aberration (*in vivo* and *in vitro*)
- Micronucleus studies (*in vivo* and *in vitro*)
- Earthworm acute toxicity test
- Earthworm reproduction test
- Fish, acute toxicity test
- Freshwater Alga and Cyanobacteria growth inhibition test
- *Daphnia* sp. acute immobilization test
- Fish embryo Acute toxicity test
- *Daphnia magna* reproduction test
- Analysis of biological specimens for clinical biochemistry, haematology etc. for toxicity studies
- The certified test systems include:
  - Wistar Rat
  - Balb C Mice
  - New Zealand White Rabbit
  - Dunken Hartley Guinea Pig
  - *Eisenia foetida* (Earth Worm)
  - *Brachydanio rerio* (Zebra Fish)
  - *Daphnia magna*
  - Algae (*Pseudokrichneriella subcapitata*)

Model Systems in Ecotoxicology GLP Test Facility

Earthworm *(Eisenia fetida)*

Crustacean *(Daphnia magna)*



Algae *(Pseudokirchneriella subcapitata)*

Zebra Fish *(Danio rerio)*

Zebra Fish (Embryos *Danio rerio)*


National Good Laboratory Practice Compliance Monitoring Authority

Certificate of GLP Compliance

GOVERNMENT OF INDIA
Department of Science and Technology


National Good Laboratory Practice (GLP) Compliance Monitoring Authority (NGCMA)
Department of Science and Technology
GOVERNMENT OF INDIA

Certificate of GLP Compliance

This is to certify that

Toxicity Testing: GLP Test Facility
CSIR-Indian Institute of Toxicology Research
Gheru Campus, Sarojini Nagar Industrial Area
Kanpur Road, Lucknow - 226008, Uttar Pradesh, India

is a GLP certified test facility in compliance with the NGCMA's Document No. GLP-101 "Terms & Conditions of NGCMA for obtaining and maintaining GLP certification by a test facility" and OECD Principles of GLP.

The test facility conducts the below mentioned tests/ studies:

- **Toxicity Studies**
- **Mutagenicity Studies**
- **Environmental Toxicity Studies on Aquatic and Terrestrial Organisms**
- **Analytical and Clinical Chemistry Testing**

The specific areas of expertise, test items and test systems are listed in the annexure overleaf.

Validity: September 13, 2019 – June 4, 2020

Certificate No. : GLP/C-102A/2019
Issue Date : 13-09-2019

(Dr. Neeraj Sharma)
Head, NGCMA

Standalone System
Zebra Fish Facility at CSIR-IITR

Only GLP Test Facility in the government sector certified to perform inhalation toxicity studies


National GLP Compliance Monitoring Authority (NGCMA)

Annexure to Certificate of GLP Compliance No. GLP/C-102A/2019

Areas of Expertise:

- Toxicity Studies
  - Acute Toxicity
  - Repeated Dose Toxicity
  - Primary Skin Irritation and Skin Sensitization Studies
  - Inhalation Toxicity
- Mutagenicity Studies
  - Chromosome Aberration Test (In-vivo and In-vitro)
  - Micronucleus Assay (In-vivo and In-vitro)
- Environmental Toxicity Studies on Aquatic and Terrestrial Organisms
- Analytical and Clinical Chemistry Testing

Test Items: Industrial Chemicals, Pharmaceuticals (Human), Agrochemicals, Cosmetic Products and Food/ Feed Additives

Test Systems: Rat, Mouse, Rabbit, Guinea Pig, Zebra Fish, Earthworm, V79 Chinese Hamster Lung Cell Line, Daphnia magna and Algae

(Dr. Neeraj Sharma)
Head, NGCMA

Knowledge Resource Centre (KRC)

Knowledge Resource Centre (Library and Information Division) provides critical information and knowledge support to the scientific and technical staff, research fellows, project assistants and users from other organizations. CSIR-IITR KRC is a hub to access current literature in the discipline of toxicology and meets the requirements of the scientific fraternity.

Information Resources: Presently, CSIR-IITR KRC is having collection (As on 31.3.19):

- Books: 9000
- Hindi books: 890
- Bound volumes of journals:14,440

During the last financial year, 24 books in Hindi were procured.

Subscription: CSIR-IITR KRC is a member of National Knowledge Resource Consortium (NKRC) through which many common resources are accessible to our S&T staff. The following e-journal platforms are subscribed by the Centre and NKRC:

1. Science Direct/Elsevier: i) Cell, ii) Free Radical Biology & Medicine, iii) Toxicology, iv) Toxicology Letters
2. Wiley Online
3. Springer Online (Biomedical and Life Sciences; Medicine)
4. Nature Online
5. OUP Online: i) Carcinogenesis, ii) Journal of Analytical Toxicology and iii) Toxicological Sciences
6. ACS journals: 7
7. RSC journals: 8
8. Taylor & Francis journals: 9
9. Science Online
10. Annual Reviews: i) Annual Reviews in Neurosciences, ii) Annual Reviews in Pharmacology & Toxicology

Services: The services provided by the centre are as follows:

- Toxicology updates: Articles appearing in Nature and Science and news related to the subject are being sent to the scientific staff on a regular basis through email.
- Online document search: This service is provided through LIBSYS (Library Management Software) in which KRC staff undertakes literature search for the scientists, research fellows and other users on the subject of their interest. This service is also available to the institutional staff for searching the collection of research articles in KRC using OPAC (On Line Public Access Catalogue) over intranet.
- Newspaper clippings: Nine national newspapers are scanned for newspaper clipping service and relevant information is sent to the competent authority on a daily basis.
- Publication Information Service (PIS): The centre compiles publication information on yearly calendar basis.
- OPACs: Two OPACs are active on the Intranet. KOHA OPAC is available for browsing KRC collection on the Internet. LibSys OPAC is active on the Intranet.

NABL Accredited Services

National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2005

'General Requirements for the Competence of Testing & Calibration Laboratories'

for its facilities at

Vishvigyan Bhawan, 31, Mahatma Gandhi Marg, Lucknow, Uttar Pradesh

in the field of

TESTING

Certificate Number

Issue Date

Valid Until

Signed for and on behalf of NABL

CSIR-IITR has been accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) since 2000 for biological and chemical testing. A number of studies, as desired by the sponsoring agencies, have been carried out. The certificate is valid till March 26, 2020.

FSSAI Certification

NATIONAL REFERENCE LABORATORY

Certificate of Recognition

The Food Safety Authority recognizes

CSIR-Indian Institute of Toxicology Research, Lucknow

as National Reference Laboratory in the area of

Toxicological evaluation/risk assessment of neutraceuticals etc.

for a period of three years from 08-08-2019

Pawan Agarwal
CEO, FSSAI

fssai

Eat Right India

CSIR-IITR has been recognized by FSSAI as the National Reference Laboratory for Toxicological evaluation/risk assessment of neutraceuticals etc for three years from August 08, 2019.

Research, Planning and Business Development

Research Planning and Business Development (RPBD) Division is the focal point to govern and project the overall activities of the institute by planning, monitoring and evaluating the in-house, networked and externally funded project activities. The division also explores the possibilities of business development by liaisoning with industries, private and public sector undertakings, government organizations, research institutions and universities. Other important activities of the division include:

- Interaction with International Scientific and Technology Affairs Directorate (ISTAD) of CSIR and other international and national agencies to organize visits of scientists under various bilateral exchange programmes.
- Preparation of annual future plan, policy and road maps, strategic business plan, etc. of the institute.
- Ensuring proper management of intellectual property in coordination with the scientists for identification of patentable content of the material and coordinating with Innovation Protection Unit (IPU) of CSIR.
- Sending replies to Parliament questions and preparation of audit replies.
- Rendering help for Research Council (RC) meeting, Management Council (MC) meeting and other activities related to extramural human resource development.
- Signing of MOUs/ Agreements between the institute and outside parties.
- With respect to image management of institute, interaction with the media and issuing press notes during various institutional activities for effective science outreach.

Audio visual facility

This division plays an important role in organizing events and showcasing institutional activities. It is well equipped with modern tools for projection and photography, viz., computers, digital interactive screen, multimedia, slides and overhead projectors. SLR and digital cameras are also available to facilitate various scientific and societal activities of the institute. The division plays an important role in exhibiting the institutional achievements at various locations in the country.

Computer Centre

Computer Centre caters to the computational and ICT need of the staff and students of the institute engaged in R&D and S&T activities. The services provided by this centre include, software development, maintenance and troubleshoot of ICT infrastructures, such as Proxy, Gateway, SMTP, Antivirus, Active Directory Servers and Unified Threat Management device. Both campuses of the institute have campus-wide Local Area Network consisting of more than 350 nodes. The network infrastructure is built from the combination of optical fibre, UTP cables and switches. The internet access is provided through a gateway using 100 Mbps NKN and 20 Mbps (1:1) OFC links at the M.G. Marg Campus and 20 Mbps (1:1) OFC link at the Gheru Campus. Multilayered firewall, anti-spam, intrusion prevention system and antivirus solutions have been implemented for network security. Domain controller server is also configured and implemented for policy-based central management of computers within the institutional network.

Institutional bilingual Web Site, Intranet site, websites and web-based applications for all the major conferences and skill India initiative programmes organized by the institute were developed by the staff of this centre. The institute has its presence on the major social media platforms like Facebook, Twitter, Linkedin, WhatsApp and YouTube where current information on R&D activities, events and development are posted on a regular basis. Live posts on various events are posted on the above social media platforms. Live streaming of important events is also broadcasted in real-time.

The staff of this centre continues to participate in the project "Toxicity testing: GLP test facility" and shares responsibilities related to Electronic Data Processing. The tasks performed by the division include document

control and maintenance of hardware, software and network infrastructure available in GLP certified divisions. The staff of the computer centre also runs the Institute's video conferencing and multimedia facilities. The centre provides training to the staff according to their computational needs. Training programs and workshops are organized on a regular basis to promote use of Hindi language on computers.

Animal Facility

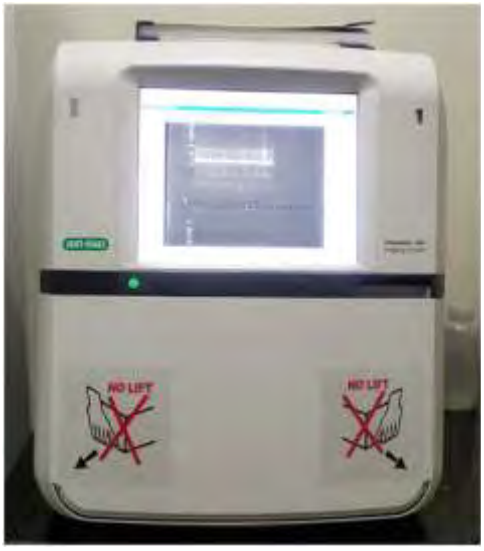
The animal facility of CSIR-IITR is located at the Gheru campus of the institute. Services of the facility are available to the institute and also to other Central/State Government establishments and private organizations. The services offered are broadly classified in the following categories:

- Professional veterinary services provided to all animal users as and when required during experimentation.
- Supply of animals for different R&D projects and sponsored regulatory studies.
- Supply of surplus stock of animals to other institutions as per the guidelines framed by CPCSEA (Ministry of Environment and Forest, Animal Welfare Board), Government of India.
- Maintenance of breeding colony of different mice strains, viz., C57BL/6, BALB/c, swiss, SKH-1 and CD-1.
- Genotyping of Balb/c and SKH-1 mice through microsatellite markers.
- Supply of specific hairless mice-SKH-1 for their use in skin research.
- Hematology, biochemistry and histopathology services for all in-house R&D, regulatory toxicology, collaborative and sponsored projects.
- GLP and other toxicology/safety evaluation studies for oral-,dermal- and reproductive-toxicity etc.

New Facilities

Gel documentation facility: ChemiDoc Imaging System (Bio-RAD)

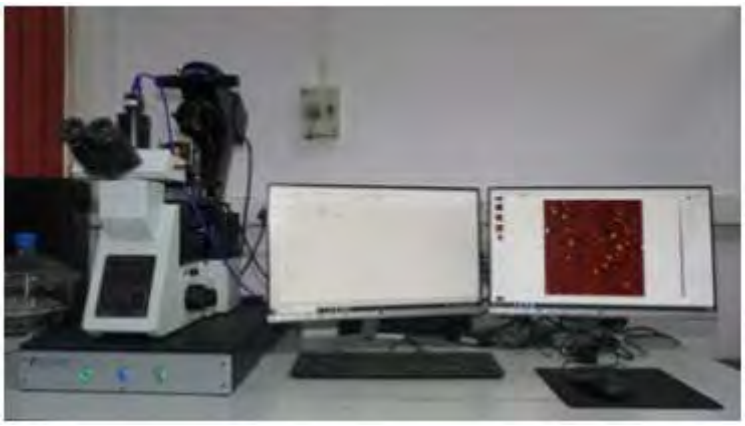
A central facility for the documentation of gels and blots and their analyses has been established in the institute. The ChemiDoc MP imaging system from M/s Bio-Rad was installed in June 2019. The system is meant for imaging and analyzing gels and Western blots. Apart from the routine chemiluminiscence detection, colorimetric gel and blot detection, this system facilitates multiplex fluorescent Western blotting and can detect up to three proteins simultaneously, thereby, eliminating the need for stripping and reprobing. The system can also be used with stain free technology and for general gel documentation applications. The system features include automatic selection of optimal light source by application, auto focus, auto exposure, and preview features ensure optimal images. The installed imaging system is equipped with UV tray and white trays to cover diverse imaging applications and the system automatically recognizes the application-specific trays and adjusts imaging parameters and software options accordingly. The Image Lab Software used for the qualitative and semi-quantitative (densitometry) analysis of the blots/gels is free to download from the Bio-Rad website. Apart from this instrument, the facility is also enriched by keeping the GS900 Calibrated Densitometer (Bio-Rad) for precise densitometry applications and a UV trans-illuminator (Major Science) to assist in general visualization of DNA gels.



ChemiDoc Imaging System (Bio-RAD)

Atomic Force Microscope (AFM): Ntegra Prima, NT-MDT Spectrum instruments

Atomic Force Microscope (AFM), a type of high resolution probe microscope, was installed in December 2018. The equipment facilitates the study of biological samples (Proteins, DNA, viruses, bacteria, tissues and even living cells and/or small organisms) in imaging the structure of cells and cellular components. In the field of chemistry, the equipment will be useful for imaging of polymers, nanostructure or other materials. The AFM head (NTEGRA Prima) is compatible with liquid and air/gas environment. NOVA Px 3.4.0. software is used for imaging surface structure of the sample.



Atomic Force Microscope (AFM): Ntegra Prima, NT-MDT Spectrum Instruments

WMicrotracker Arena System

WMicrotracker Arena, the new 2nd generation patented (# US12515723, EP208640881) non-invasive technology of Phylum Tech, was installed in February 2019. The system is meant for experiments based on motion and viability measurements involving small organisms in function of time and space. The equipment is optimized for motion and viability measurements in 0.5-10 mm organisms cultured in 6 or 24 well plates and 35 mm petri dishes. The equipment is compatible with measurements of organisms, cultured on solid culture media including agar and/or liquid. The movement of the organism is detected based on the interference caused by them in a large array of low power infrared light micro-beams without affecting the organism's behaviour. The equipment has high resolution sensors that allow detection of organisms separated by 0.5 mm, with more than 10,000 independent and simultaneous channels of reading. The device has inbuilt temperature control programmable from 20-37 ºC.

WMicrotracker Arena System

Genome and Cell Integrity Laboratory

The state of the art laboratory was inaugurated by Dr Shekhar C. Mande, Director General of CSIR, on May 02, 2019. The laboratory was established to study genome instability and disease connection. Scientists employ genetic, cell biological, biophysical and biochemical approaches to provide fundamental understanding of biological networks involved in genome integrity maintenance. The laboratory aims to provide end-to-end solutions through integration of basic and applied elements. The laboratory also envisages to provide platform for industry by performing genetic toxicology testing and for the development of sensitive genetic toxicology assays.

Genome and Cell Integrity Laboratory

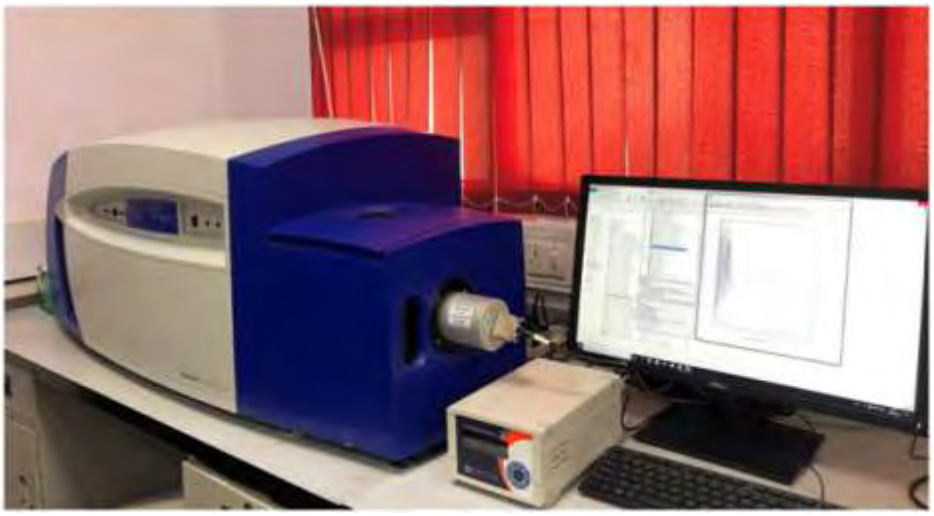
Protein purification facility

This facility was inaugurated by Dr Shekhar C. Mande, Director General of CSIR, on May 02, 2019. At this facility, scientists can perform protein expression, isolation, precipitation and purification involving *Escherichia coli*. For protein purification, a large variety of chromatographic techniques, such as, affinity chromatography, ion exchange chromatography and size exclusion chromatography are available. The facility is placed under temperature controlled condition for temperature sensitive proteins. The facility also harbours high end AKTA-Fast Protein Liquid Chromatography system (GE Healthcare, UK) with live UV temperature and condition measurement capabilities.

Protein Purification Facility

Circular Dichroism Spectropolarimetry: Chirascan Cs/2T qCD (Applied Photophysics, UK)

Chirascan Cs/2T qCD (Applied Photophysics, UK), equipped with temperature controlled stopped flow fast kinetics system, was installed in March 2019. Chirascan qCD can be used for various applications which involve spectral properties like change in absorbance or fluorescence. This equipment will be useful for protein characterization (also in food e.g. gelatin), secondary structure analysis of proteins protein-protein interaction, ligand-binding studies, and for DNA studies where metal binding can change the DNA from Beta to Z. Further, it is useful in measuring fast initial kinetics of proteins folding, unfolding and denaturation at millisecond time scale. The Stopped Flow instrument supports enzyme kinetics, metal chelation, anaerobic reaction kinetics, fluorescence anisotropy and electron transfer.



Circular Dichroism Spectropolarimeter

Liquid Nitrogen Facility

A liquid nitrogen plant with the capacity of 20 litres of liquid nitrogen per day was installed in July 2019. The system is fully automated with an internal tank capacity of 100 litres. This will cater to the day to day need of liquid nitrogen by the scientists, technical staff and students for the storage of cell lines, use in TEM/SEM facility and other uses, such as, isolation of DNA/RNA.

Liquid Nitrogen Plant

X-Ray Diffraction Facility

A SmartLab SE High-Resolution Powder X-ray Diffractometer was installed in May 2019. The equipment is a highly versatile multipurpose X-ray diffractometer with built-in intelligent guidance. It offers automatic alignment, component recognition, cross beam optics and advanced photon counting hybrid pixel array detectors (HPAD). SmartLab Studio II software incorporates a built-in Guidance expert system that provides the optimal hardware configuration and settings for specific application measurements. Additionally, an X-ray data processing computation facility is dedicated for performing structure determination of the samples using software licensed from the manufacturer of the instruments. Cambridge Structural Database and ICDD PDF-4 Database are also available to carry out searches as needed. The state of the art X-ray diffractometer offers a wide range of materials characterization using X-rays for bulk materials, nano materials, liquid sample analysis as well as thin films. The facility offers Sub-zero and high temperature (-180-400°C) powder/polycrystalline diffraction with humidity controller.

High resolution powder X-Ray Diffractometer

Toxicology High Performance Computing and Software Platform facility

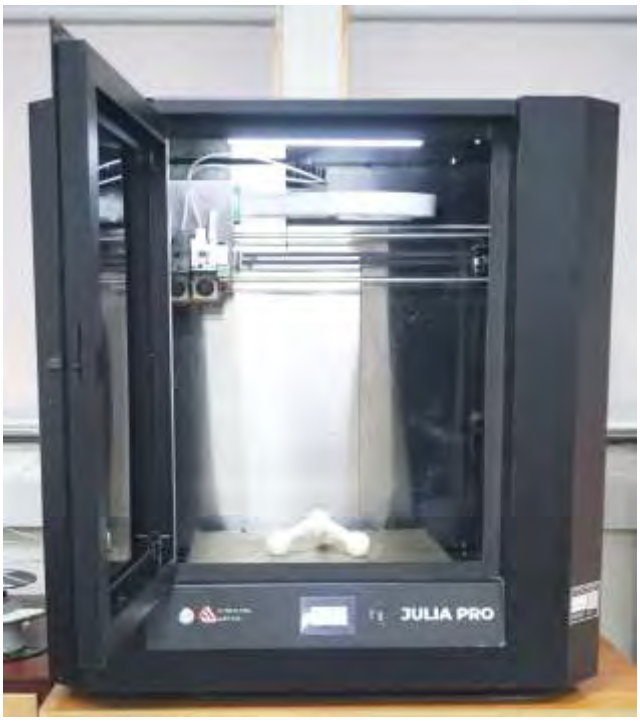
The facility containing the high performance computing clusters, which include 10Tflops Intel core machine with 126 RAM/core & 64 TB disk space was inaugurated by Dr Shekhar C. Mande, Director General, CSIR, on May 02, 2019. The servers have two core AMD machines with 32 Processor and two core Intel machines with 32 processor. With this, the facility is equipped with Linus Windows Workstations and Desktops.

Toxicology High Performance Computing and Software Platform facility

3D printing facility

A 3D printing facility with Juliapro 3D printer equipped with the technology driven features was established in July 2019. The facility provides the state of art features to the researchers to manufacture sophisticated, custom designed, alternative components used in experiments and technology development. Currently, the device uses Poly-Lactic Acid (PLA) filament for the printing purpose.

3D printed materials



3D printing facility

Human Resource Development

AcSIR Ph.D. Program at CSIR-IITR

Coordinator : Dr N. Manickam

Co-coordinators : Dr S. Patnaik and Dr Smriti Priya

Executive Consultant : Miss Swati Shrivastava

Under the aegis of the Academy of Scientific & Innovative Research (AcSIR), the Ph.D. program at CSIR-Indian Institute of Toxicology Research (CSIR-IITR) is aimed to create highest quality researchers with multidisciplinary knowledge in the field of toxicology and associated areas of science and technology. AcSIR Ph.D. program in Biological Sciences and Chemical Sciences at CSIR-IITR provides state-of-the-art research facilities and a unique platform for research and innovation in toxicological sciences. The program aims to strengthen the required skills and capabilities among research professionals under the mentorship of leaders in the field of toxicology. In addition to developing discipline-specific research skills, AcSIR-IITR Ph.D. program is structured to train and support the development of personal and professional competencies. This program offers exciting opportunities to the candidates holding Master's degree with a valid fellowship (such as UGC/CSIR-NET/DBT/ICMR/DST-INSPIRE or any other equivalent fellowship), having a keen aptitude and scientific inquisitiveness for pursuing advanced scientific research of global standards.

The AcSIR Ph.D. program in CSIR-IITR started in January 2011 and since then, 221 students have been enrolled. Total 69 students (58 in biological and 11 in chemical sciences) have completed Ph.D. degree successfully. Every year, several hundreds of young enthusiastic candidates apply for few available seats and undergo rigorous screening and interview process. AcSIR-IITR Ph.D. students are expected to acquire a total of 20 credits (12 credits from the course work, 4 credits from project proposal and review article writing and the remaining 4 credits from CSIR-800 societal program related project work) prior to submission of their thesis.

In the August 2018 and August 2019 session of AcSIR-IITR Ph.D. program, the courses offered in biological and chemical sciences cover various facets of toxicology with an emphasis on both translational and fundamental research. Experienced faculty of CSIR-IITR teaches the courses with great enthusiasm every year. Fifty eight scientists have been recognized as faculty of AcSIR-IITR till August 2019. In January/August 2019, 17 students were enrolled. In the year 2017, AcSIR had established a **Memorandum of Understanding (MoU)** with Royal Melbourne Institute of Technology (RMIT), Australia for a Joint badged Ph.D. program. CSIR-IITR is one of the active participants in this program and has also enrolled two of its AcSIR students to work at RMIT, Australia. These students are the major work force of the institute carrying out research work in areas of national/international importance including societal relevance.

During the last financial year, 22 students completed their course work while 23 finished their comprehensive examinations as well. Further, 16 students submitted their thesis after acquiring the necessary 20 credits. Furthermore, 18 students successfully defended their theses in viva-voce examination and were awarded provisional/final Ph.D. degree. Several IITR graduates have joined reputed US and European universities/ institutes as Post Doctoral researchers and got placements in Government institutions and leading private companies.

In order to promote research in science and technology that has a bearing on social, economic, cultural and intellectual welfare of the people, AcSIR has mandated that the students, aspiring to obtain a Ph.D. degree from the academy, undertake a 6-8 weeks project concerned with societal / rural issues under the 'CSIR-800 societal program'. Some of the targeted issues include deteriorating water quality (drinking water as well as groundwater), over-use of plastics, malnutrition, tobacco usage, groundwater contamination due to exposure to industrial waste (fertilizer industry and pharmaceutical industry), high pesticide usage, poor sanitation facilities, microbial contamination in the water of river Gomti (one of the tributaries of the river Ganga), food adulteration and improper hygiene. Large number of village population have been educated for proper disposal of wastes and used chemical containers, preventing exposure to farm chemicals and general hygiene for better health care.

CSIR-Harnessing Appropriate Rural Interventions and Technologies (HARIT)

CSIR-Indian Institute of Toxicology Research, Lucknow, since its inception, has been working for the rural upliftment through scientific endeavour and technological solutions. During the period of report, AcSIR-IITR students through HARIT (formerly CSIR-800) program had worked for dissemination of knowledge in various regions of the country. AcSIR has mandated that students aspiring to obtain a Ph.D. degree from the academy need to undertake a 6-8 weeks project pertaining to societal/rural issues (4 credits). HARIT has been launched by CSIR with the aspiration of inclusive growth and improved quality of lives of 800 million fellow Indians through S&T interventions that are socially and economically relevant.

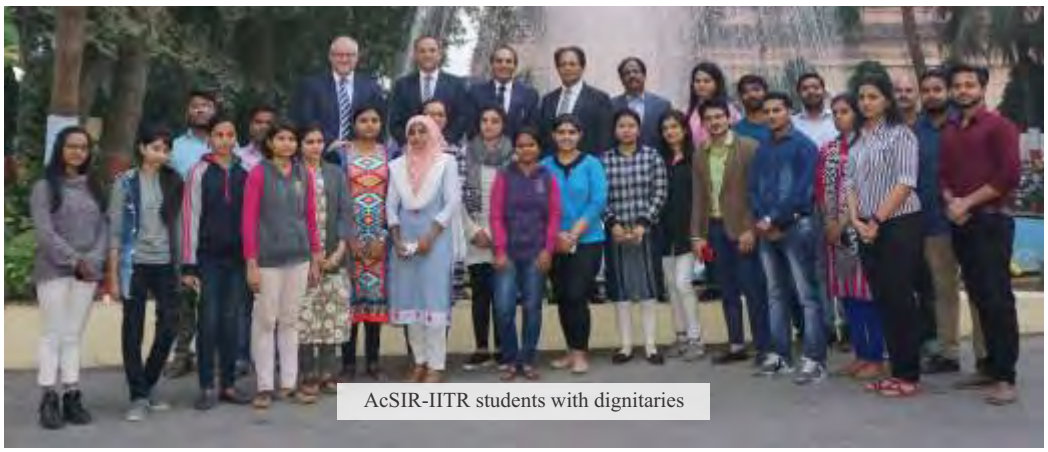
A total number of 15 students have undertaken the above programme in as many as 15 villages covering the states of Uttar Pradesh and Rajasthan. These students primarily focused on conducting awareness campaign on basic sanitation, protection from exposure to toxic chemicals, food safety and about the importance of water quality. Other major education imparted to these rural and semi-urban communities include awareness on use of plastic and its deleterious health effects. The education imparted also was about causes and simple and doable prevention strategy against diseases/disorder, such as, diabetes, diarrhoea and other water borne diseases. Realizing the facts that people are not well educated, students had put an extra effort to educate them using cartoons, pictures and illustrations. The students are continuously encouraged to reach out to rural population to a maximum for awareness on health and environmental issues.

AcSIR-RMIT Workshop

A one day AcSIR-RMIT Workshop was organized at CSIR-IITR, Lucknow, on December 04, 2018. More than 120 AcSIR students enrolled for Ph.D. from the institute attended the workshop. This is a unique program under which AcSIR established MoU with Royal Melbourne Institute of Technology (RMIT), Australia, for Joint Badged Ph.D. program. CSIR-IITR is one the active participants in this program. Dr Suresh Bhargava, Distinguished Professor & Associate Vice Chancellor, RMIT, who is the architect of this CSIR-RMIT initiative, emphasized on various aspects of this joint Ph.D. program and exchange of students between CSIR laboratories and RMIT. He also shared the success story from the inception to the present. He lauded CSIR-IITR, being the first lab of CSIR from Biological Cluster to participate in this program. Two of CSIR-IITR-AcSIR students were selected and enrolled under the joint Ph.D. program. He also delivered a lecture on "Trusted partnership for tomorrow and beyond for Academic Sharp Brain". Professor Calum Drummond, Deputy Vice Chancellor and Vice President, RMIT, Australia, highlighted about multidisciplinary research in Science and Engineering and how to do translation and commercialization of scientific outcome from laboratory research to innovation. In the beginning, Professor Alok Dhawan, Director, CSIR-IITR, welcomed the dignataries and gave a brief account of conducting such a workshop. Professor Dhawan appreciated the efforts of the leadership of RMIT for joining hands with CSIR to open new ways towards enriching young researchers. Professor Rajendra Singh Sangwan, Director, AcSIR and Chairman Senate, AcSIR, insisted about the benefits of AcSIR and RMIT Joint program and shared future plans to be implemented for strengthening AcSIR courses. Vote of thanks was given by Dr N. Manickam, Coordinator, AcSIR-IITR, Lucknow. Dignitaries from RMIT interacted with the students and scientists and also visited Centre for Innovation and Translation Research (CITAR), CSIR-IITR, Lucknow.

Dignitaries on dais

Professor Suresh Bhargava (Middle) and Professor Calum Drummond (Above) being felicitated by Professor Alok Dhawan



AcSIR-IITR students with dignitaries

Skill development programs at CSIR-IITR

CSIR-IITR, a NABL (National Accreditation Board for testing and calibration Laboratory) accredited laboratory in the field of chemical and biological testing has received GLP (Good Laboratory Practices) compliance for toxicity and mutagenicity studies. The institute has been in the forefront in imparting training and generating skilled manpower. Provisional affiliation of CSIR-IITR with Life Sciences Sector Skill Development Council (LSSSDC), under National Skill Development Corporation (NSDC) reflects the commitment and alignment of the institute to the Skill India mission of Government of India. As part of this integrated skill development, CSIR-IITR has conducted multiple training programs in the areas of environmental health & safety and xenobiotic residue analyses.

A certificate course under Green Skill Development Program (GSDP) on "Air and Water Pollution Monitoring" was organized by CSIR-IITR from December 10, 2018 to January 25, 2019. Twenty participants (including 17 unemployed youths) having graduate, post graduate degrees in science/engineering, engineering diploma and Ph.D. in science participated in the 45 days training program. As per the schedule of the program, the 260 h module of training was covered by theory classes (130 h) and practical/ field visits (130 h) on "Air and Water Pollution Monitoring". The trainees were provided hands-on-training on air, stack emission and water sampling and analysis. The field visits to understand river ecosystem, bioremediation of pesticide affected site and functioning of water, sewage as well as industrial effluent treatment plants were conducted in Lucknow and Kanpur. Theory part of the training was covered by faculty from CSIR-IITR and Baba Bhimrao Ambedkar University (BBAU), Lucknow and Central Pollution Control Board (CPCB), Lucknow. The practical sessions for testing of samples were supervised by institutional faculty with one day visit to CPCB laboratory, Lucknow. A written test and viva-voce was conducted by a three member (not involved in training) committee from CSIR-NBRI, Lucknow and BBAU, Lucknow on completion of the training. Certificates from Green Skill Development Council were given to the successful candidates.

Group photograph of trainees and the resource persons of Green Skill Development program (GSDP) on "Air and Water Pollution Monitoring"

At present, CSIR-IITR is affiliated to Life Sciences Sector Skill Development Council (LSSSDC), under National Skill Development Corporation (NSDC). Further, under the CSIR-Integrated Skill initiative, the institute has successfully conducted the Skill Development Program on LSSSDC ratified course on "Environment, Health and Safety Manager (LFS/Q0214)" from February 25-March 15, 2019. Sixteen participants (including 14 unemployed youths) having graduate, post graduate degree in science/engineering have participated in the 3-week training program. The participants were trained in the areas of environmental health and safety related legislation, industrial hygiene, applied ergonomics, occupational health, hazard management, environmental management in industries, environmental monitoring and waste management and Industrial safety, within a 120 h module by the faculty from CSIR-IITR, Lucknow, BBAU, Lucknow and experts on industrial safety from TATA Motors, TATA Morcopolo and NTPC Ltd. Assessment of the trainees was done by assessors deputed by LSSSDC through an online test and practical examination as well as viva-voce on March 16, 2019. The program was highly successful with the pass percentage being absolutely 100%.

Group photograph of participants and the resource persons of LSSSDC certified skill development program on "Environment, Health and Safety Manager (LFS/Q0214)"

Apart from these, two "Training of trainers" programs sponsored by Central Pollution Control Board (CPCB), New Delhi, were conducted. The training program on "Analysis of pesticides and other organic chemicals in environmental samples" was organized from September 23-27, 2019. During inauguration, Professor Alok Dhawan, Director, CSIR-IITR, emphasized on the importance of the quality in the testing of pesticides and organics in environmental samples. Training of trainers is required as methods used for the detection of pesticides and other organics require extensive technical knowledge. Inaugural lecture was delivered by Dr S.K. Raza, Former Director, Institute of Pesticide Formulation Technology (IPFT), Gurgaon, on "Overview of pesticide residues in Indian scenario". Twenty five candidates from ten different states/ union territories (Assam, Himanchal Pradesh, Kerala, Madhya Pradesh, Punjab, Puducherry, Orissa, Uttar Pradesh, Telangana and West Bengal) and few environmental laboratories from private sector were trained during the program. The training included field visits, sample collection, sample storage, standard preparation and sample extraction, apart from class room teaching on principle and application of analytical instruments, quality assurance and quality control, calibration, data acquisition and interpretation and hands-on application with experiments in five different modules.

Group photograph of participants and the resource persons from the training program on "Analysis of pesticides and other organic chemicals in environmental samples"

Subsequently, training of trainers program on "Monitoring of $PM_{2.5}$ and other notified air pollutants as per revised NAAQS 2009" was conducted at CSIR-IITR from October 14-18, 2019. During this program, CPCB and state pollution control board personnel were trained on the state of the art air monitoring and analytical instruments at CSIR-IITR for the detection of $PM_{2.5}$ and other air pollutants in air. Professor Alok Dhawan, Director, CSIR-IITR, inaugurated the training program and emphasized on the importance of assessing $PM_{2.5}$ given the high levels of air pollution in cities of India. Nineteen trainees from pollution control boards of different states (Assam, Nagaland, Tripura, West Bengal, Odisha, Punjab, Madhya Pradesh) central pollution control board, and also representatives of NTPC, Meja, and a few environmental laboratories in the private sector. The course module included sampling instruments and their calibration (used in air sampling) and analysis procedures, sophisticated instrumentation for analysis of metals and organic air pollutants. During the week-long program, the principles and theory part were covered initially and then, more emphasis was given on practical demonstration and hands-on training. Field sampling of 12 air pollutants was demonstrated including preservation and transport of samples to laboratory. In the laboratory, calibration and analysis procedures were demonstrated followed by final estimation of pollutants in ambient air. The training program was successfully completed on October 18, 2019 with the distribution of certificates to the participants.

Group photograph of participants and the resource persons from the training program on "Monitoring of PM2.5 and other notified air pollutants as per revised NAAQS 2009"

National Skills Qualifications framework (NSQF) compliant courses at CSIR-IITR

- EHS manager-Life Sciences (LFS/Q0214)
- Pollution monitors (Air and water)

Other skill development courses offered at CSIR-IITR

- Advance instrumentation for monitoring and analysis of environmental pollutants
- Computational predictive biology and bioinformatics
- Regulatory-preclinical toxicology
- Basic and advanced tools in microbiology and molecular biology

Short-term courses

- Training of trainers:
- Ambient air and stack monitoring techniques-Hands on training for CPCB personnel
- Advanced analytical instrumentation techniques and their application in environmental field-Hands on training for Maharashtra Pollution control board personnel

Jigyasa Activities

One day visit of the students to the campus

An effective way to learn and to do science is by "doing science". It's a way of learning about the world that comes naturally for kids and is easily encouraged. Hands-on experiences may benefit students more than the world of virtual laboratories and online learning. This may be especially true for the initial stages of learning and also for science education. CSIR-IITR organized a series of events for school students' visit to the campus where they are encouraged to take up hands-on experiments and interact with skilled and experienced scientists/ research scholars. The institute engaged more than 1500 students and 100 teachers through CSIR-Jigyasa programme from November 2018 to October 2019. Students and teachers visited Advanced Imaging Facility, Computational Toxicology Facility, Food Toxicology Lab, Molecular Biology Facility, Translational Facility, Genome Cell Integrity Laboratory and Bio-molecular Toxicology Laboratory. Students had hands-on experience on DNA isolation, building and visualizing molecules and structures of chemicals, detecting adulteration/contamination in oil and witnessed model organisms used for research. Research scholars interacted with the students on various aspects of basic and applied science and also explained how science is interdisciplinary which requires different skills and perspective to excel. CSIR-IITR has been actively organizing such awareness programmes regularly at its premises and in nearby villages. The students showed enormous inquisitiveness regarding various aspects of science and their willingness to have science as career option. On the other hand, teachers equally participated in laboratory activities and highly appreciated the CSIR-IITR team effort. CSIR-IITR Jigyasa programme-"Be A Scientist" was highlighted (Page 152) in Science & Technology Led Excellence for Inclusive Development "Brief Account of Four Years Achievements 2014-2018" Ministry of Science and Technology, Ministry of Earth Sciences, Government of India.

CSIR-IITR Jigyasa programme highlighted in Science & Technology Led Excellence for Inclusive Development "Brief Account of Four Years Achievements 2014-2018"

Students and teachers of Kendriya Vidyalaya, Armapur, Kanpur, visiting Advanced Imaging Facility, Food toxicity and Adulteration Lab and Molecular Biology Facility at CSIR-IITR

Students and teachers of Kendriya Vidyalaya, Phulpur, Allahabad with Professor Alok Dhawan, Director CSIR-IITR and Dr Devendra Parmar, Chief Scientist, CSIR-IITR on July 11, 2019

Jigyasa program on Environmental Toxicology

The growing human population and per capita consumption have made natural resources very restrictive. In addition, urbanization, industrialization and modern farming have polluted the world's water resources, air and land. The natural resources are, therefore, not only over-exploited but are also contaminated by toxic chemicals that make it difficult for current and future generations to survive. With the objective to generate interest in environmental safety, CSIR-IITR organized an event as a part of Jigyasa programme for the class XI students of Lamartiniere Boys College, Lucknow, having environmental science in their curricula. Twenty students with two teachers attended a Jigyasa Programme organized by CSIR-IITR on July 22, 2019. Dr S.C. Barman, Chief Scientist, CSIR-IITR with experience of over 30 years in environmental toxicology and air pollution interacted with the students. His team demonstrated the ozone layer analyzer, personal air monitor, noise level meter, aerosol mass monitor. The workshop curricula had of interaction, lab visits and question-answer session related to environment and science. The students were deeply involved in the workshop and showed enthusiasm throughout the programme. The main objective of the workshop was to motivate students and to create awareness about various scientific innovations in the field of environment. Dr R. Parthasarathi, Principal Scientist and Nodal Scientist for CSIR-Jigyasa Programme of CSIR-IITR welcomed the students and teachers and gave a brief overview of the CSIR-Jigyasa programme and CSIR-IITR. Students and teachers visited Advanced Imaging Facility, Computational Toxicology Facility, Translational Facility, Molecular Biology Facility and Flow cytometry Lab and interacted with scientists and research scholars of the institute. The students had hands-on experience on DNA isolation, building and visualizing molecules and chemicals and electron microscopy. During an interactive session with Professor Alok Dhawan, Director, CSIR-IITR, Lucknow, he shared his thoughts on environment and how to save it for a better future. He also stated that humans, though often unintentionally, have the most detrimental impact on the environment. While concluding the programme, Professor Dhawan encouraged the students to save environment and start it from their home.

Professor Alok Dhawan, Director, CSIR-IITR, interacting with students about environmental toxicology

Dr S.C. Barman, Chief Scientist, CSIR-IITR, demonstrating various instruments for measuring environmental pollutants and interacting with the students

Students visiting the laboratory to understand about environmental toxicology

Empowering Pupil Innovation and Creativity (EPIC-2019)

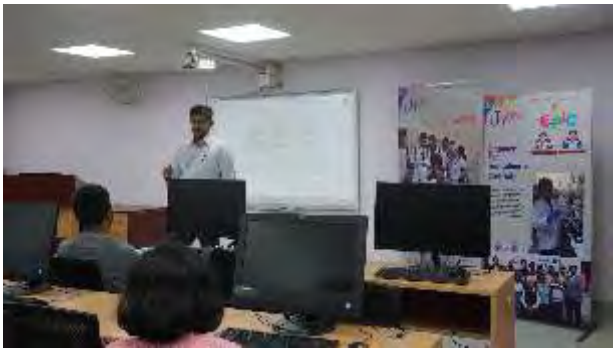
CSIR- IITR conducted a series of events for school students to gain hands-on-experience on different techniques in different CSIR-IITR laboratories used for conducting experiments related to toxicology. The programme under CSIR-Jigyasa programme was focused on how to inculcate scientific temper and sensitize students in scientific research. Young Scientist Competition and Budding Innovator Camp started at the institute on June 03, 2019 for school students under the Empowering Pupil Innovation and Creativity (EPIC). In its third year, EPIC-2019 has been conducted as a part of CSIR "Jigyasa" initiative on science outreach to inspire and motivate the youth to develop innovative scientific thought process and temperament.

Professor Alok Dhawan, Director, CSIR-IITR, chaired EPIC-2019 Student Innovators presentation and Dr D. Kar Chowdhuri, Chief Scientist, CSIR-IITR and Dr K.C. Khulbe, Senior Principal Scientist, CSIR-IITR, were present in the meeting. Sixteen selected students from various schools, such as, Kendriya Vidyalaya Sangathan, Central Hindu Boys Senior Secondary School (BHU) Varanasi, Seth M.R Jaipuria School, Lucknow, La Martiniere College,

Lucknow, La Martiniere Girl's College, Lucknow, City Montessori School, Lucknow, Kendriya Vidyalaya, Chennai, Sadvidya High School, Mysore, Kendriya Vidyalaya, Shahjahanpur, and Delhi Public School, Lucknow presented their innovative ideas before the committee. Four students from Sophia Secondary School Ajmer, Kendriya Vidyalaya, Dehradun, Kendriya Vidyalaya, Madurai and Seth Anandram Jaipuria School, Kanpur, presented their proposal via Skype. These budding scientists pursued their innovation under the training and guidance of the CSIR-IITR scientists from June 10-21, 2019.

The students visited Flowcytometer lab where they have learned the principle and work flow of flowcytometry. They have also learnt how to detect and measure characteristics of a population of cells and engineering of flowcytometer as well as its spectrum. At Genome and Cell Integrity laboratory, students gained knowledge about genomic stability, correlation of cell cycle and interference with cell cycle in relation to different stages of cancer. They also visited Food, Drug and Chemical Toxicology laboratory to have hands-on experience on detecting adulteration/contamination in mustard oil and also gained knowledge on ensuring an adequate food supply during non-agriculturally productive period. They have learned about the working on the safety and allergenicity assessment of Genetically Modified (GM) crops. In Advanced Imaging Facility, they were taught on the basics of Transmission Electron Microscope (TEM), Scanning Electron Microscope (SEM) and Confocal Microscopy. Students had a lengthy interactive session with the faculty, technical staff and research scholars on applications of these techniques in bio-molecular research.

EPIC innovators presenting their ideas before the panel of Professor Alok Dhawan, Director, CSIR-IITR, Dr D. Kar Chowdhuri, Chief Scientist, CSIR-IITR, Dr K.C. Khulbe, Senior Principal Scientist, CSIR-IITR and Dr R. Parathasarathi, Principal Scientist, CSIR-IITR. A panel of scientists and research scholars reviewed the ideas as well as had interactive session with EPIC innovators from various schools.



Dr R. Parthasarathi, Principal Scientist, CSIR-IITR and Nodal Scientist for CSIR-Jigyasa Programme of CSIR-IITR, discussing with the students and reviewed the ideas for implementation.

Dr Sheelendra Pratap Singh, Scientist, CSIR-IITR, delivering his lecture on "How to start drug discovery"

Students visiting various labs and interacting with the research scholars of CSIR-IITR

A group photograph of the students after their felicitation by Professor Alok Dhawan, Director CSIR-IITR upon successfully completing two weeks training camp: Also seen are Dr. Devendra Parmar, Chief Scientist, Head, HR, CSIR-IITR and Dr R. Parthasarathi, Principal Scientist, CSIR-IITR

Jigyasa outreach to schools

CSIR-IITR has been conducting Jigyasa programme regularly to inculcate scientific temperament among the school children. This event is a part of CSIR Jigyasa visits of scientists to Schools/Outreach Programmes for Kendriya Vidyalaya Sangathan and other schools to extend student's classroom learning with well-planned research laboratory-based learning. A team from the University of Bradford, United Kingdom, and Professor Alok Dhawan, Director, CSIR-IITR visited two city based schools, namely, CMS, Gomti Nagar Extension (Campus 2) and Loreto Convent on April 01, 2019. CSIR-IITR has a long association with the University of Bradford and through MoU, this association has been strengthened further. Both these organizations work on a collaborative format towards mitigating problems of human health and environment. In this regard, Professor Diana Anderson, Established Chair Professor in Biomedical Sciences, University of Bradford and Ms Jaishree Chaturvedi, Regional Manager-South Asia, University of Bradford, have visited CSIR-IITR, Lucknow. They addressed the students on science in everyday life, societal impact, health and hygiene and environmental issues. The students showed great enthusiasm by participating in interactive session and expressed interest in the scientific career which will have a longing impact on the future development in science at both national and international level. CSIR-IITR team also visited Kendriya Vidyalaya, CRPF, Bijnor, on August 28, 2019. Fifty two students and five teachers participated in this one-day outreach event. Dr V. P. Sharma, Senior Principal Scientist, CSIR-IITR, apprised the students about CSIR Jigyasa initiatives for school students for strengthening scientific temper and culture of inquisitiveness among them and had an interactive session with the students.

Loreto Convent students and teachers welcoming Professor Alok Dhawan, Director CSIR-IITR, along with Professor Diana Anderson, Professor of Biomedical Science, University of Bradford, UK, and Ms Jaishree Chaturvedi, Regional Manager-South Asia, University of Bradford, UK and Dr R. Parthasarathi, Principal Scientist, CSIR-IITR (inset). An interactive session with the students by the resource persons

Professor Alok Dhawan, Director, CSIR-IITR, Professor Diana Anderson, Professor of Biomedical Science, University of Bradford, UK, and Ms Jaishree Chaturvedi, Regional Manager-South Asia, University of Bradford, UK, addressing the students of CMS, Gomti Nagar, Lucknow, on opportunities for higher studies in different disciplines of science

Dr V P Sharma, Senior Principal Scientist, CSIR-IITR addressing the students of Kendriya Vidyalaya CRPF, Bijnor students on R&D development

International Conference on Bio-Innovation for Environmental and Health Sustainable Developments (BEHSD-2018)

Inaugural function of BEHSD-2018, (L-R): Professor Ashok Pandey, Distinguished Scientist, CSIR-IITR, Professor Alok Dhawan, Director, CSIR-IITR, Professor T. P. Singh, President, BRSI, Professor Duu Jong Lee, President, International Bioprocessing Association, Taiwan, Professor R.D. Tyagi, University of Quebec, Canada and Dr N. Manickam, Senior Principal Scientist, CSIR-IITR

A two day international Conference on "Bio-Innovation for Environmental and Health Sustainable Developments" (BEHSD-2018) during November 27-28, 2018 was organized by CSIR-IITR in association with The Biotech Research Society, India and was sponsored by UP State Bio-Energy Development Board. A total of 200 participants attended the conference from all over the world, which included invited speakers from India, Australia, Belgium, Canada, China, France, Italy, Hong Kong, South Korea, Netherlands, Portugal, South Africa, Spain, Sweden, Taiwan, Thailand, UK, USA. A total of five plenary talks and 40 invited talks were given by the speakers held in 10 parallel sessions along with 157 posters presented by the participants.

The opening session of the BEHSD-2018 on November 27, 2018 began with Dr N. Manickam, Convener, BEHSD-2018 welcoming the delegates. Professor Alok Dhawan, Director, CSIR-IITR, Lucknow, while addressing the gathering, emphasised on the relevance of the theme of the conference and also briefly shared the activities of the institute related to the conference theme. Professor T.P. Singh, President, BRSI, mentioned the growing global concern on the energy and environmental sustainability issues and linked them with the sustainability development goals set by the UN. He spoke about the role of BRSI in this concern and urged the delegates to discuss the burning global issues.

Professor Duu Jong Lee, President, International Bio-processing Association (www.ifibiop.org), addressed the audience and mentioned about the collaboration between BRSI and IBA, which has led to development of several networks and collaboration between the partners. Professor R.D. Tyagi, University of Quebec, Canada, was the Guest of Honour. Professor Ashok Pandey, Distinguished Scientist, CSIR-IITR, also welcomed the invitees and delegates and spoke about the BRSI and its activities, especially about its skill development and entrepreneurship development programs.

The opening session was followed by Plenary lectures by Dr Anjan Ray, Director, CSIR-IIP, Dehradun and Professor M.J. Taherzadeh, Director, Swedish Centre of Resource Recovery, University of Boras, Sweden. Parallel sessions were run on different themes including biological waste treatment, lignocellulose bio-refinery, environmental bioengineering, waste bio-refinery and sustainability and industrial bioprocesses and products in which several invited lectures were delivered by the experts in the field.

Professor T. P. Singh, President, BRSI, being felicitated by Professor Alok Dhawan, Director, CSIR-IITR; also seen are Professor Ashok Pandey, Distinguished Scientist, CSIR-IITR and Professor R. D. Tyagi, University of Quebec, Canada

Poster award winners with Professor Ashok Pandey, Distinguished Scientist, CSIR-IITR, Dr R. Parthasarathi, Principal Scientist, CSIR-IITR and Dr Vivek Agarwal, CMD, CDC India, Jaipur

On the second day, there were three Plenary talks delivered by Professor Rekha Singhal, Institute of Chemical Technology, Mumbai, India, Professor Huu Hao Ngo, University of Technology Sydney, Australia and Professor R.D. Tyagi, University of Quebec, INRS, Quebec, Canada, respectively. Parallel sessions on different themes, i.e., environmental bioengineering, industrial & food technology and toxicology, waste to wealth- resource recovery, nanotechnology: applications in food and health sectors in which several invited lectures were presented. The closing session of the BEHSD-2018 was held at 4.00 pm on 28th November, 2018 in which Dr Vivek Agarwal, CMD, CDC India, Jaipur was the Guest of Honour. Winners of BEHSD poster awards and SLBK Foundation sponsored poster awards were announced and given to the winners by Professor T.P. Singh and Dr Vievk Agarwal. At the end, on behalf of BRSI, Professor Ashok Pandey, thanked CSIR-IITR, especially Professor Alok Dhawan, Dr N. Manickam and Dr R. Parthasarathi for their efforts for the success of BEHSD-2018. He also thanked Professor Singh for his vision and stewardship in managing the BRSI.

A view of the poster session, BEHSD-2018

Participants of BEHSD-2018

National Workshop on Good Laboratory Practice

Lighting of the lamp by the dignataries (L-R): Dr Manish Pande, Joint Director, QCI, Professor Y.K. Gupta, Principal Advisor, THSTI, Faridabad, Dr Akshay Dwarakanath, Principal Scientist, CSIR-IITR, Dr Poonam Kakkar, Chief Scientist, CSIR-IITR and Dr Sucheta Banarjee Kurundkar, Director Training, CDSA-THSTI, Faridabad

A one day "National Workshop on Good Laboratory Practice" for sensitization of faculty and scientists was held at CSIR-Indian Institute of Toxicology Research (CSIR-IITR) on December 07, 2018. This was the second workshop of the national series being conducted by The National GLP Compliance Monitoring Authority (NGCMA), Department of Science & Technology (DST), Government of India. In its efforts to create a GLP ecosystem in the country, the Ministry of Science and Technology, Government of India, in collaboration with Quality Council of India (QCI) and Clinical Development Services Agency (CDSA), an extramural unit of Translational Health Science & Technology Institute (THSTI), Department of Biotechnology, Government of India, has been organizing such sensitization series for faculty and scientists.

Delivering the inaugural address, Professor Y.K. Gupta, Principal Adviser, THSTI and Former Dean (Academics), AIIMS, New Delhi, reiterated the importance of accurate documentation for successful research and reliable data. Reproducibility of experiments is the key to effective scientific outcome. Lectures were also delivered on the genesis of NGCMA by Dr Ekta Kapoor, Scientist E, NGCMA; Role of QCI in creating a quality ecosystem by Dr Manish Pande, Joint Director QCI; OECD Principles of GLP by Dr Poonam Kakkar, Chief Scientist, CSIR-IITR and Importance of Archiving by Dr Sucheta Banerjee Kurundkar, Director Training, CDSA, respectively. Dr A.B. Pant Principal Scientist, CSIR-IITR, spoke about the role of the Test Facility Management and Dr Sharad Sharma, Senior Principal Scientist, CSIR-CDRI, highlighted the role of the Quality Assurance Unit in an ensuring compliance with GLP Principles. An interactive question and answer session with faculty was the highlight of the workshop.

Professor Y.K. Gupta, Principal Advisor, THSTI, Faridabad, interacting with the participants; also seen are (L-R): Dr Akshay Dwarakanath, Principal Scientist, CSIR-IITR, Dr Manish Pande, Joint Director, QCI and Dr Poonam Kakkar, Chief Scientist, CSIR-IITR

Professor Y.K. Gupta, Principal Advisor, THSTI, Faridabad, addressing the gathering (inset)

Professor Y.K. Gupta, Principal Advisor, THSTI, Faridabad, interacting with Dr D.K. Patel, Principal Scientist, CSIR-IITR; Also seen is Dr Sharad Sharma, Senior Principal Scientist, CSIR-CDRI

Workshop on
Characterization of Nanomaterials

A Glimpse of the participants

Dr Alok K. Pandey, Senior Scientist, CSIR-IITR addressing the participants; also seen at the dais are (L-R): Dr R Rajagopal, Senior Scientist, Dr Devendra Parmar, Chief Scientist, Professor Alok Dhawan, Director, CSIR-IITR and Dr D. Kar Chowdhuri, Chief Scientist, CSIR-IITR, respectively

CSIR-IITR organized a National workshop on Characterization of Nanomaterials from February 20-22, 2019. The objective of the workshop was to provide hands-on experience on some of the most relevant methods for the characterization of nanomaterials using state of art techniques and instrumentation and to establish a platform for the participants from different institutes to learn the techniques to characterize some most commonly used nanoparticles. Twenty five participants from various academic and research institutions across India had participated in the workshop.

The inaugural session was held on February 20, 2019 at computational Toxicology class room at CSIR-IITR wherein Dr R Raja Gopal, Senior Scientist, CSIR-IITR welcomed the gathering and Dr Alok Kumar Pandey, Senior Scientist, CSIR-IITR briefed about the genesis of the workshop. Thereafter, Dr D Kar Chowdhuri, Chief Scientist, CSIR-IITR, gave an overview of the workshop and Dr Devendra Parmar, Chief Scientist and Head HR Cell, CSIR-IITR gave his remarks. On this occasion, a protocol manual, containing technical description of sample preparation and characterization methods, was released followed by the Presidential Address by Professor Alok Dhawan, Director, CSIR-IITR. The inaugural session concluded with the vote of thanks given by Dr Satyakam Patnaik, Scientist, CSIR-IITR.

Under the structured schedule, Dr Alok K Pandey, Senior Scientist, CSIR-IITR gave a lecture on 'Introduction to Nanomaterials and Characterization' and then Dr Anand Tadas and Dr Namrata Jain from Malvern Panalytical, gave a brief about ZetaSizer and NanoSight respectively. Wet lab on Nanomaterials characterization using ZetaSizer and NanoSight was conducted by Dr R. Raja Gopal with technical assistance from Dr Anand Tadas and Dr Namrata Jain from Malvern Panalytical.

The workshop manual is being released by (L-R): Dr R Rajagopal, Senior Scientist, Dr Devendra Parmar, Chief Scientist, Professor Alok Dhawan, Director, CSIR-IITR, Dr D. Kar Chowdhuri, Chief Scientist, Dr Alok K. Pandey, Senior Scientist and Dr Satyakam Patnaik, Scientist, CSIR-IITR, respectively

Participants of the workshop with the faculty

One Day GLP Training Workshop

CSIR-Indian Institute of Toxicology Research, Lucknow, is a GLP certified laboratory since June 2014. Beginning with four GLP certified studies, the GLP Test Facility now offers 17 studies under certification. Data generated for the GLP certified studies at the facility is accepted in 90 OECD member countries worldwide.

It has been the institute's endeavour to stay abreast with the latest developments in safety evaluation techniques and constantly upgrade the skills of the GLP staff through regular GLP training programmes. In this connection, a one day GLP training workshop was organized on September 17, 2019. Fifty participants benefited from the workshop. The faculty were current and former GLP inspectors and GLP test facility heads. In his opening remark, Professor Alok Dhawan, Director, CSIR–IITR, emphasised on the importance of GLP certification for toxicity testing. He urged the participants to imbibe the spirit of GLP in all laboratory activities which will result in high quality research. Dr Poonam Kakkar, Deputy Test Facility Management of the GLP Facility, recalled the setting up of the facility, the challenges faced and the collective team effort in overcoming those challenges. Dr Virendra Misra, Former Chief Scientist, CSIR-IITR and Lead GLP Inspector; Dr Sharad Sharma, Senior Principal Scientist, CSIR-CDRI, Dr Anthony Adlagatta, Principal Scientist, CSIR-IICT and Dr A.B. Pant, Principal Scientist, CSIR-IITR, delivered lectures on Inspection of a GLP Toxicity study; Resources and documentation in a GLP environment; Test item control office (TICO) and archiving and conduct of a GLP toxicity study, respectively. Participation certificates were distributed at the end of the workshop.

Participants during the workshop

Symposium on "Safety Concerns and Regulatory Framework of Herbals"

A one day symposium on "Safety Concerns and Regulatory Framework of Herbals" was organized at CSIR-Indian Institute of Toxicology Research, (CSIR-IITR) Lucknow, on September 27, 2019. The symposium addressed current challenges being faced during the development of herbal products. Considering the increasing demand of herbal products globally, it is imperative to understand the complexity of such products as well as the challenges faced in undertaking their safety. To enhance the value of these products, their standardization is becoming more important and hence identification of plants, their chemical fingerprinting, etc. need to be undertaken. The scientific program of this symposium was broadly divided under the following sessions:

- Safety of herbals
- Current regulations and future strategies
- CSIR initiatives on herbals

The symposium begun with lamp lighting and welcome of the Chief Guest, Professor Anil Kumar Tripathi, Director, Institute of Life Sciences, Banaras Hindu University, Varanasi. Dr Akshay Dwarakanath, Principal Scientist, CSIR-IITR, gave the genesis of the symposium and Dr Poonam Kakkar, Chief Scientist, CSIR-IITR, apprised the participants on the relevance of safety concerns and regulatory framework of herbals. Professor Anil K. Tripathi, emphasized on the importance of scientific data validation in the area of herbal research. Professor Alok Dhawan, Director, CSIR-IITR, addressed the scientific fraternity present and enumerated the numerous contributions made by the institute in the area of herbal research. Dr Jyotsna Singh, Senior Scientist, CSIR-IITR, proposed the vote of thanks.

Sitting on the dais (L-R): Dr Jyotsna Singh, Senior Scientist, CSIR-IITR, Professor Alok Dhawan, Director, CSIR-IITR, Professor Anil Kumar Tripathi, Director, Institute of Science, Banaras Hindu University, Dr Poonam Kakkar, Chief Scientist, CSIR-IITR and Dr Akshay Dwarakanath, Principal Scientist, CSIR-IITR

The inaugural lecture by Professor Anil Kumar Tripathi, dwelt upon the initiatives undertaken by CSIR in the area of herbal research and product development. The second lecture by Professor S.K. Barik, Director, CSIR-National Botanical Research Institute, Lucknow highlighted the critical issues in herbal drug regulation. Dr K.S. Rao from Rao Toxicology Foundation, Bengaluru, described the successful strategies for drug development with several examples. Dr Poonam Kakkar summarized her research work at CSIR-IITR during the last 33 years not only in herbal safety research but also in the area of toxicity testing as per OECD Principles of GLP. Dr Ekta Kapoor, Scientist E, National GLP Compliance Monitoring Authority (NGCMA), spoke on the topic entitled "Preclinical studies: OECD GLP perspective" and discussed in details about the GLP certifications programme, various types of inspections carried out by GLP inspectors under the NGCMA program etc. Professor Abbas Ali Mahdi, Head, Department of Biochemistry, King George's Medical University, Lucknow, delivered his talk on "The growing use of herbal medicines: Heavy metal toxicity-related issues and safety concerns". He discussed various cases of lead, arsenic and mercury poisoning due to various chronic exposure. He also highlighted the importance of effective communication with the patient to understand the connection between occupational exposure and disease conditions.

During the post lunch session, Professor Ram Lakhan Singh, Head, Department of Biochemistry, Dr R.M.L. Avadh University, Ayodhya, delivered his talk on "Traditional vis-a-vis modern use and safety of herbals". Dr Viswajanani J. Sattigeri, Head, CSIR Traditional Knowledge Digital Library Unit, New Delhi, gave an overview of "Protection of traditional and indigenous knowledge-CSIR initiatives". Dr A.K.S. Rawat, Former Chief Scientist, CSIR-NBRI, Lucknow, highlighted the importance of developing a standardized and scientifically validated herbal products. The symposium ended with a thought provoking talk on "Research on safety of herbal medicine: Prejudice to evidence" delivered by Dr A.B. Pant, Principal Scientist, CSIR-IITR.

Professor Anil Kumar Tripathi delivering his key note lecture

Dr K.S. Rao being felicitated by Professor S.K. Barik, Director, CSIR-NBRI

Dr A.K.S. Rawat being felicitated by Professor P.K. Seth, Former Director, CSIR-IITR and Dr Poonam Kakkar

Clockwise : Dr Ekta Kapoor, NGCMA, Dr Vishwajanami J Sattegeri, CSIR, New Delhi and Professor Ram Lakhan Singh, R.M.L. Avadh University, Ayodhya, delivering their lectures and Dr A.B. Pant being felicitated by Professor P.K. Seth and Dr Poonam Kakkar

India International Science Festival-2019 Outreach Program

As a prelude to the India International Science Festival 2019, CSIR Laboratories of Uttar Pradesh (National Botanical Research Institute (NBRI), Indian Institute of Toxicology Research (IITR), Central Institute of Medicinal and Aromatic Plants (CIMAP), as well as regional centres of Central Food Technology Research Institute (CFTRI) and Central Leather Research Institute (CLRI) organized a two-day outreach program on October 15-16, 2019, at CSIR-IITR, Lucknow. The program featured lab tours, CSIR-technology showcase, popular lectures, scientist-student/public interactions, interactive activities and quiz competition, video: stories of inspiring scientists, hands-on experimentations, student-innovator meet, etc.

Shri Suresh Khanna, Hon'ble Minister of Finance, Parliamentary Affairs and Medical Education, Government of Uttar Pradesh, inaugurating the exhibition during the IISF-2019 outreach program; Also seen are Professor Alok Dhawan, Director, CSIR-IITR and Professor S.K. Barik, Director, CSIR-NBRI

Welcoming the gathering, Professor Alok Dhawan, Director, CSIR–IITR said that there could not have been a better day than October 15 for the launch of this Outreach Program of IISF-2019 that coincides with the birthday of Bharat Ratna, Dr. A.P.J. Abdul Kalam. Further, the United Nations has declared this day as the "World Students Day". Several events were planned during the two-day program to trigger young minds to take up science as a career option, he said.

Dignitaries on the dais (L-R): Dr S.K. Tewari, Chief Scientist, CSIR-NBRI, Dr Abdul Samad, Director, CSIR-CIMAP, Shri Praveen Ramdas, Secretary, VIBHA, Professor Alok Dhawan, Director, CSIR-IITR, Shri Suresh Khanna, Hon'ble Minister, Finance, Parliamentary Affairs, Medical Education, Government of UP, Dr Denzil Godin, MLA, Government of UP, Professor S.K. Barik, Director, CSIR-NBRI and Dr D. Parmar, Chief Scientist, CSIR-IITR

Dignitaries releasing IISF-2019 brochure, JanChetana- Collation of CSIR-IITR awareness brochures, and a video compilation on "Inspiring Indian Scientists".

Young innovators, Mr Prajjwal Gupta, Young Innovator (Left), Pi Chem, Lucknow, Prince Kumar (Middle) and Arjun sonkar (Right) from Jai Hind Mandir, Ahroura, receiving awards from Shri Suresh Khanna, Hon'ble Minister, Government of Uttar Pradesh.

The Chief Guest, Shri Suresh Khanna, Hon'ble Minister of Finance, Parliamentary Affairs and Medical Education, Government of Uttar Pradesh, inaugurated the event. Dr Denzil J. Godin, MLA, Government of Uttar Pradesh and Shri Praveen Ramdas, Secretary, VIBHA, graced the occasion as the Guests of Honour, respectively. Also present were the Directors of CSIR-IITR, CSIR-NBRI and CSIR-CIMAP and In-Charge, CFTRI-Regional Centre along with Dr Devendra Parmar, Chief Scientist, CSIR-IITR.

On this occasion, Shri Suresh Khanna felicitated the young innovators of Uttar Pradesh, Mr Prajjwal Gupta, Young Innovator, Pi Chem, Lucknow, Prince Kumar, and Arjun Sonkar from Jai Hind Mandir, Ahroura. Shri Khanna also felicitated the science communicators of print and electronic media. He released IISF-2019 brochure, Jan Chetana, a collection of CSIR-IITR awareness brochures, and a video compilation on “Inspiring Indian Scientists”. In his speech, he emphasized that innovation is vital for the growth and progress of a nation citing the example of Japan and encouraged the young participants to innovate since that is the key to the India's success story.

Sri Praveen Ramdas elaborated on the genesis of IISF-2019 and apprised the students about the various sessions and pavilions being organized during IISF-2019 to be held in Kolkata during November 5-8, 2019. He said that the idea of a science festival was to dispel the sense of fear for science that exists in the student community at large. He exhorted the future citizens of the country to enjoy learning and experiencing science and to use science and technology to realize the dream of a New India.

Awardees of excellence in service as science communicators of print and electronic media being honoured by Shri Suresh Khanna, Hon'ble Minister, Government of Uttar Pradesh.

In keeping with the spirit of the IISF-2019, CSIR-IITR opened its door for public on October 15-16, 2019. The event aimed at increasing the scientific understanding and temperament among the citizens. The event also showcased various success stories by displaying videos of the CSIR, IISF, Vijnana Bharati and inspiring videos of Indian scientists.

Professor S.K. Barik, Director, CSIR-NBRI, proposed the vote of thanks. Dr Devendra Parmar, Chief Scientist, CSIR-IITR was the Chairman, Organizing Committee while Dr R. Parthasarathi, Principal Scientist, CSIR-IITR was the Convener.

The second day of IISF-2019 outreach program included popular lectures, scientist-student/public interactions, interactive activities and quiz competition, hands-on experimentation and lab visits. The event was well-received in and around Lucknow and was attended by several students, social leaders, stakeholders and public at large visiting the institute throughout the day. Local schools and colleges, such as, Unity college, Colvin Talukadars College, Swatantra Talim, Goel Institute of Pharmacy and Science, Amity University, Christian College, Shri Ramswaroop Memorial University, Isabella Thoburn College, Kendriya Vidyalaya, Seith Anand Ram Jaipuria School, Kanpur and interested citizens of Lucknow, and MPCOST, Bhopal and selected candidates under Vigyan Manthan, visited the exhibition and witnessed the research highlights of CSIR-IITR. The science quiz was organized on this occasion for school students and prizes were given to the winners. Highlight of the second-day outreach program at CSIR-IITR was the popular lecture session. Professor Alok Dhawan gave a lecture on Nanotechnology and Safety, Professor Ashok Pandey, Distinguished Scientist, CSIR-IITR, on Energy Challenge and Dr Sanjeev Ojha on Medicinal Plants. Overall, 2000 students and citizens from all spheres of the society visited the institute during these two days.

Professor Alok Dhawan, Director, CSIR-IITR, with the school students during IISF-2019 outreach event

Winners of Quiz Compteion held during IISF-2019 outreach event along with the resource persons

Students visiting exhibits showcasing CSIR-IITR R&D and interacting with IITR researchers

Workshop on Chemical Risk Analysis Framework for Food Safety, October 21-24, 2019

Ensuring food safety to protect public health and promote economic development remains a significant challenge in both developing and developed countries. Considerable progress to strengthen food safety systems has been achieved in many countries, highlighting the opportunities to reduce and prevent food-borne diseases. However, unacceptable rates of hazardous food contaminants through food and food products are posing an excessive burden on human health. A need to address these issues was flagged by FSSAI and WHO to strengthen the risk assessment infrastructure in the country. CSIR–Indian Institute of Toxicology Research, Lucknow, has been at the forefront in laying down policy guidelines for national regulatory standards, development of sensitive technologies for the detection of adulterants /

Participants during an interactive session with Dr. Katrin Franke, German Federal Institute for Risk Assessment, Germany

Inaugural session of the workshop (L-R): Professor Alok Dhawan, Director, CSIR-IITR, India; Dr D Kanungo, Former Additional DG of Health Services, Government of India; Dr. Katrin Franke, German Federal Institute for Risk Assessment, Germany; Mr Sanjay Dave, Ex-Advisor, FSSAI, India; Mr Sunil Bakshi, Head Regulations and Codex, FSSAI, India; Dr. Gyanendra Gongal, WHO, Regional Office for South East Asia, India)

Certificate of participation given to Mr Jigme Tenzin, Royal University of Bhutan, Bhutan (L-R: Dr D Kanungo, Former Additional DG of Health Services, Government of India; Mr. Sanjay Dave, Ex-Advisor, FSSAI, India; Dr. N Bhaskar, Advisor, FSSAI; Mr. Sunil Bakshi, Head Regulations and Codex, FSSAI, India; Mr. Jigme Tenzin, Royal University of Bhutan, Bhutan; Dr. Devendra Parmar, Chief Scientist, CSIR-IITR, India

toxins / chemicals. Taking the above into consideration, FSSAI organized a four-day workshop on "Chemical Risk Analysis Framework for Food Safety" in partnership with CSIR-IITR. This inter-country activity was supported by the WHO Codex Trust Fund, a coordinated project between Bhutan, India and Nepal with participants from these countries. Faculty for the workshop included experts from German Federal Institute for Risk Assessment, WHO Collaborating Centre for Food Safety, Hong Kong and Department of Food Risk Analysis and Regulatory Policies, University of Laval, Quebec, Canada. Several Indian experts also delivered lectures during the workshop.

The seven technical sessions covered a diverse range of topics from principles of risk analysis, use of risk analysis in food regulatory decisions, hazard identification and risk characterization, use of data sciences in risk assessment etc, to name a few. Practical group exercises were also conducted covering the risk assessment methods for heavy metals, aflatoxin, food additives, melamine etc. The range of topics addressed during the workshop and the hands-on practical sessions ensured the accomplishment of the workshop objective.

Participants working on the practical exercise of Chemical Risk Analysis (Mentor: Dr. Vijay Pal Singh, FSSAI, India)

Participants working on the practical exercise of Chemical Risk Analysis (Mentor: Dr. Samuel Godefroy, University of Laval, Canada)

National Scientific Hindi Conference on "Khadya Suraksha ke Vibhinn ayam" during October 23-24, 2019

CSIR -Indian Institute of Toxicology Research (CSIR-IITR), Lucknow, organized a National Scientific Hindi conference on "Khadya Suraksha ke Vibhinn ayam". on 23-24 October, 2019.

The Chief Guest of the inaugural function was Dr Anita Bhatnagar Jain, IAS, Additional Chief Secretary, Department of Food Safety and Drugs, Government of Uttar Pradesh. In her inaugural address, Dr Jain spoke about the problem of food security in this country since food is directly related to our health. She stated that food one eats has relevance on the overall health of one's body since many diseases are caused by the consumption of unsafe food. She further emphasized that common man pays very little attention towards expiry date of food stuff/ingredients and packaged drinking water. There is constant need to drive awareness program to educate and sensitize people. She further stated that while her department is working in this direction, the work done by CSIR-IITR is equally commendable.

The two-day conference had more than 150 participants and delegates including several renowned personalities in this food safety domain along with a large number of young scientists and Ph.D. students from different parts of the country. On this occasion, Dr Jain also released a souvenir of the seminar.

The Guest of Honor, Shri Vijay Acharya, President, Associated Chambers of Commerce, Uttar Pradesh and Uttarakhand, said that the food one eats must be checked for safety. It is necessary to implement food security in our country like developed countries. He further said that CSIR-IITR has given guidance to food industry sector in the area of food safety and he wished that the institute would further strengthen this area in future.

Professor Alok Dhawan, Director, CSIR-IITR, in his Presidential Address said that food supplies and drinking water are the basic needs for our survival and the common man be made aware of so that safe food is consumed by our citizens for

Dignitaries releasing the souvenir of the conference

a better and healthy life. He requested the Food Industry to provide quality food and also requested the participants to share their ideas with common man. Earlier, Dr Devendra Parmar, Chief Scientist and Chairman, Organizing Committee, said that the institute over the last five decades has been working in the field of food toxicology and several standards for food colours and additives etc have been provided to the regulators for implementation in the country. He further stated that through Hindi oriented scientific presentations, masses will be reached on what to eat and precautions to be undertaken to get safe food. Dr Pradeep Sharma, Scientist, CSIR-IITR and Shri C.M. Tewari, Hindi Officer, CSIR-IITR, introduced the Chief Guest and Guest of Honour respectively. Dr K.M. Ansari, Senior Scientist, CSIR-IITR, Convener of the conference, proposed the vote of thanks.

The two-day conference had five sessions along with poster and proffered session for young scientists. A Kavi Sammelan was also organized on the first day to raise awareness in this context among the general public.

The valedictory function of the conference was held on October 24, 2019 with Dr N. Bhaskar, Advisor, FSSAI, New Delhi as the Chief Guest. In his address, Dr Bhaskar said that food has a direct effect on health and therefore, it is absolutely essential for food to be safe. Information about food safety standards is very important to reach the general public and in this direction, this seminar on food security organized in the language of the common man is very important. FSSAI is striving hard to ensure safe food reaching the common man.

Dr. D. Kar Chowdhuri, Chief Scientist, CSIR-IITR, in his Presidential Address said that there is a need to organize national seminar on the topic that has direct relevance to everybody to lead better and healthy life through healthy and safe food. He stated that the institute has made significant contribution in this area and through recently launched FOCUS mission program, the institute has been striving hard to develop technologies that would benefit the common man towards having safe food. Dr Kar Chowdhuri further stated the recommendations from the conference would be sent to the concerned agencies/regulators to take stock of the situation and CSIR-IITR should be part of it. He also thanked all the delegates and presenters for active participation and deliberation during this meeting.

Dr. K.M. Ansari said that 40 presentations were made and 11 young researchers gave presentations in a dedicated session. Awards were also given to young researchers for their presentations. Dr Gyanendra Mishra, CSIR-IITR, gave a summary of the conference. Dr Pradeep Sharma proposed the vote of thanks.

Chief Guest of the inaugural function Dr Anita Bhatnagar Jain addressing the gathering

Dignitaries with award winners of young scientist oral presentation

53rd Annual Day

22nd Professor Sibte Hasan Zaidi Oration

(L-R): Dr Yogeshwer Shukla, Professor Alok Dhawan, Dr Anurag Agrawal, Professor R.K. Khandal and Dr A.B. Pant

Dr Anurag Agrawal, (above) and Professor R.K. Khandal, (bottom) being welcomed by Professor Alok Dhawan

As a part of its 53rd Annual Day Celebrations, CSIR–Indian Institute of Toxicology Research, Lucknow, organized the 22nd Professor Sibte Hasan Zaidi Oration. The oration is organized every year to honour the founding Director of the institute and this year, it was delivered by Dr Anurag Agrawal, Director, CSIR–Institute of Genomics and Integrative Biology, New Delhi. Welcoming the gathering, Professor Alok Dhawan, Director, CSIR-IITR reiterated that the institute remembers its founding fathers on the occasion and rededicates itself to fulfilling the motto of the institute i.e., Safety to Environment and Health and Service to Industry. It was indeed a special occasion for the institute and its staff with the presence of several senior CSIR family members, he said. Dr Yogeshwer Shukla, Chief Scientist, introduced the guests, Dr Anurag Agrawal and Professor R.K. Khandal, President of the function. This was followed by the Oration by Dr Anurag Agrawal on "Targeting Mitochondria for Preventing Lung Disease: Being Precisely Imprecise", in which he opined that recent findings suggest molecular similarities between clinically different lung diseases. This linking is an opportunity to develop a 3R Model of mitochondria targeted therapies–repair, reprogramming and replacement to prevent or treat respiratory diseases in pre-clinical models. Delivering the Presidential Address, Professor R.K. Khandal, President, R&D, and Business Development, India Glycols Limited, emphasized on the relevance of translational and problem-solving approaches in research and development. He added that organizations should aim at self-sustainability and work toward fund creation instead of being fund seekers. Dr A.B. Pant, Principal Scientist, CSIR–IITR, proposed the vote of thanks.

Dr Anurag Agrawal, Director, CSIR-IGIB, giving the 22nd Professor Sibte Hasan Zaidi Oration (top) and being felicitated by Professor Alok Dhawan (above)

53rd Annual Day Celebrations

Shri Ram Naik, Honourable Governor, Uttar Pradesh, being welcomed by Professor Alok Dhawan, Director, CSIR-IITR with Tulsi plant (Top) and Shri Ram Naik, Honourable Governor, Uttar Pradesh, lighting the lamp; Also seen are Professor Alok Dhawan, and Dr Anurag Agrawal (Above)

CSIR–Indian Institute of Toxicology Research, the premier toxicology institute in the country, celebrated its 53rd Annual Day on November 01, 2018 at its Mahatma Gandhi Marg, Lucknow campus. Shri Ram Naik, Honourable Governor, Uttar Pradesh, was the Chief Guest of the function. Professor R.K. Khandal, President, R&D and Business Development, India Glycols Limited and Dr Anurag Agrawal, Director, CSIR–Institute of Genomics and Integrative Biology, New Delhi, were the Guests of Honour for the event. Professor Alok Dhawan, Director of the institute welcomed the gathering and presented the annual report of the institute for the year 2017-2018. He apprised the gathering about several success stories of the institute in the year gone by and said that the Foundation Day is an appropriate occasion to cherish the successes of the past and set goals for the future. He reiterated the institute's commitment to the National Mission Programs like Swachh Bharat, Swasth Bharat, Skill India, Namami Gange etc and informed the gathering that, in sync with the Make In India program, the institute has recently transferred the technology for an indigenously developed water purification system named, ONEER. Delivering his Presidential Address, Sri Ram Naik, Honourable Governor, Uttar Pradesh, congratulated the CSIR–IITR family on the important milestone and encouraged the scientists to keep up the good work done while stepping up the pace of meeting targets. He exhorted the scientific community to also work towards finding solutions for current problems that the farming community of the country faces. Dr K.C. Khulbe, Senior Principal Scientist, CSIR-IITR, proposed the vote of thanks.

On the occasion 53rd Annual Day, CSIR-IITR Annual Report in Hindi and English, a compilation of CSIR-IITR in the print media, Assessment of Ambient Air Quality of Lucknow City: Post Monsoon-2018, CSIR-IITR R&D Publications 2017-2018, Zaidi Centenary Book, NABL and Green Good Deed folders and the institute's calendar for the year 2019 were also released.

On this occasion, several staff members of the CSIR-IITR family were felicitated by the Honourable Governor for their distinguished services to the institute.

Professor Alok Dhawan, Director, CSIR-IITR, presenting the annual progress report before the gathering.

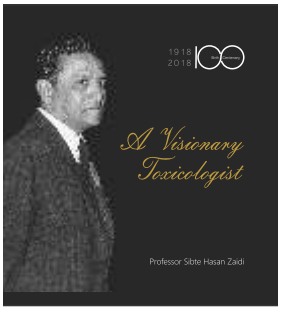
Shri Ram Naik, Honourable Governor, Uttar Pradesh, being presented a Photo Book by Professor Alok Dhawan, Director, CSIR-IITR.

Shri Ram Naik, Honourable Governor, Uttar Pradesh, along with other dignitaries releasing the Annual Report of CSIR-IITR

Honourable Governor Uttar Pradesh, Shri Ram Naik, also released the following documents published by the institute

Research Papers compilation 2017-18

Green Good Deed brochure



Book on 100 years of
Professor S.H. Zaidi:
A Visionary Toxicologist

Transforming Lives through Research &
Innovation Brochure

Report on Post Mansoon
Air Pollution in Lucknow City

CSIR-IITR Calander-2019

Shri Ram Naik, Honourable Governor, Uttar Pradesh, felicitating Dr Satyakam Patnaik, Senior Scientist, CSIR-IITR (Left), Dr K.C. Khulbe, Senior Principal Scientist, CSIR-IITR (Middle) and Shri Ali Kausar, Artist (right)

Group photograph of the staff felicitated by Shri Ram Naik, Honourable Governor, Uttar Pradesh, along with other dignitaries on the dais

Dr Anurag Agrawal, Director, CSIR-IGIB, being felicitated by Shri Ram Naik, Honourable Governor, Uttar Pradesh

Shri Ram Naik, Honourable Governor, Uttar Pradesh, giving the Annual Day Address

Shri Ram Naik, Honourable Governor, Uttar Pradesh, being felicitated by Professor Alok Dhawan, Director, CSIR-IITR


53वां वार्षिक दिवस समारोह
CSIR-IITR
Annual Sports and
Cultural program

ITC-2018

International Toxicology Conclave

Lighting of the lamp by Professor Anil K. Tripathi, Director, CSIR-CIMAP and the Chief Guest of the function and other dignitaries

Professor Anil K. Tripathi, Director, CSIR-CIMAP addressing the gathering

A two day International Toxicology Conclave (ITC-2018) was organized at CSIR-Indian Institute of Toxicology Research, Lucknow, during November 02-03, 2018. The conclave is being organized since 2015 as a part of its Annual Day celebrations. In this edition of the conclave, experts from academia, industry and regulatory bodies deliberated on the following niche areas in toxicology: Safety of AYUSH Products, Diagnostics and Biomedical Devices, Food and Consumer Safety. Inaugurating the conclave, Dr Anil K Tripathi, Director, CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow as the Chief Guest of the inaugural funetion opined that it is imperative upon the scientific community to scientifically validate the age-old practices of traditional systems of medicine. While AYUSH systems of medicine have yielded the desired results, increasing global practice of the science demands a more thorough evidence-based safety evaluation, he said. Professor Alok Dhawan, in his Presidential address reiterated the relevance of toxicology and safety testing in ensuring safer devices and products for human use. Dr Poonam Kakkar, Chief Scientist, CSIR-IITR and Chairperson of the Organizing Committee, ITC-2018, welcomed the gathering. Dr Sanghamitra Bandopadhyay and Dr Debabrat Ghosh, Conveners of Organizing Committee, ITC-2018, gave the genesis of the conclave and proposed the vote of thanks, respectively.

ITC-2018 had four sessions. On day one (November 02, 2018), the first session was on "Safety of Ayush Products" which was chaired by Professor Jayesh Bellare, IIT-Bombay and Dr Poonam Kakkar, CSIR-IITR and there were five invited lectures followed by a panel discussion. Dr Poonam Kakkar gave a talk on 'CSIR-IITR's initiatives towards safety of AYUSH products, highlighting the active role of CSIR-IITR in the preparation of guidance document and SOPs for safety assessment of ayurvedic drugs. She mentioned that under the Golden Triangle Partnership project, a collaborative venture between CSIR, ICMR and AYUSH was established. Therefore, CSIR-IITR is committed to participate in all endeavours towards safety of AYUSH products. The next lecture was by Professor Jayesh Bellare on "Neurotoxicity studies of ayurvedic medicines, Rasasindura, Kajjali and Swarna Bhasma in a Zebrafish swimming behavioural model". Dr V. Sasibhushan, Dabur Research Development Centre, Ghaziabad, Uttar Pradesh, then spoke on "Status of safety with ayush formulations". This was followed by a lecture by Dr Anil Kr Sharma, AIMIL India Research Foundation, New Delhi, on "Quality assurance during the herbal product development". The last presentation of this session was given by Professor Anand Chaudhuary, Banaras Hindu University, Varansai, on "Safety profile of ayurvedic medicines: Myths and realities". The key points that emerged from the Panel discussion were a) Safety of ayush products with new formulations and b) Reviving Indian age-old traditional herbal medicine market share in the global scenario by following international norms of regulations for safety assessment.

The next session on "Diagnostics and Biomedical Devices" was chaired by Dr D. Kar Chowdhuri, CSIR-IITR and Dr Arun Bandyopadhyay, CSIR-IICB. The session covered the following topics: (1) the emerging technologies and innovations in the field of diagnostics and biomedical devices, such as, IoT based lightweight diagnostic device for chemical analysis, connected to central laboratory remotely (2) a novel antibody-free, instrument-free platform technology for use in routine diagnostics (3) 3-D model for drug validation; (4) prototype for the detection of rheumatic heart disease, etc. and (5) the role of preclinical imaging: A bridging tool for translational research. The speakers were Mr Partha Chakraborty, Arogyam Medisoft solution Pvt. Ltd., IIT-Kanpur, Dr Susmita Ghosh, DiagnoRite Innovation Healthcare, Pune, Dr Jugnu Jain, Sapien Biosciences, Hyderabad, Dr Arun Bandyopadhyay,CSIR-IICB, Kolkata and Dr Kokhan Shamsi, Rad MD, New York, USA, respectively.

Dignitaries releasing the Abstract Book of ITC-2018

Professor Anil K. Tripathi, Director, CSIR-CIMAP being felicitated by Professor Alok Dhawan, Director, CSIR-IITR; Also seen is Dr Poonam Kakar, Chairperson, ITC-2018

The entire second day was on "Food and Consumer Safety" which was divided in two sessions. The first session was chaired by Dr D. Kanungo, FSSAI, New Delhi and Professor Alok Dhawan, Director, CSIR-IITR. The speakers in session, Dr R.K. Khandal, India Glycols Ltd., Noida, Uttar Pradesh, Dr P. Rajesh, BIS, New Delhi, Dr P.C. Panchariya, CSIR-CEERI, Pilani and Dr A.K. Srivastava, CSIR-CFTRI, Mysore, had focused on food safety and the issues related to assurance of quality of food in India and presented an overview on the recently launched CSIR-Mission Mode Programme on "Food and Consumer Safety Solutions (FOCUS)". To ensure high quality and safe food, ISO 22000 and the recently updated Food safety Management System Standards (FSMS)- IS/ISO 22000:2018 were also discussed.

Professor A. Chaudhary, Banaras Hindu University being felicitated by Professor Jayesh Bellare, IIT-Bombay and Dr Poonam Kakkar, CSIR-IITR

Professor Alok Dhawan, Director, CSIR-IITR felicitating Dr A.K. Sharma, Raja Ramanna Fellow at GCNED, Delhi; Also seen are Dr Yogeshwer Shukla, CSIR-IITR and Dr N. Bhasker, FSSAI, New Delhi

The next session on "Food and Consumer Safety" was chaired by Dr N. Bhaskar, FSSAI, New Delhi and Dr Yogeshwer Shukla, CSIR-IITR. The speakers, Dr D. Kanungo, Professor P.K. Mukherjee, Jadavpur University, Kolkata, Dr Arun Sharma, FSSAI, New Delhi, Dr Yogeshwer Shukla and Dr N Bhaskar had emphasized on the importance of health risk assessment of newly identified chemicals in the environment, including food and water. They described the threshold of toxicological concern (TTC) approach to predict potential human health concerns for a chemical, based on its chemical characteristics and estimated exposure when chemical-specific toxicity data are scarce or absent.

The final session of "Food and Consumer Safety" chaired by Dr Poonam Kakkar and Dr P. C. Panchariya, had two speakers, Dr P. Hepburn, Unilever-UK and Dr Matche, CSIR-CFTRI, Mysuru, they discussed on the next generation risk assessment approaches in food toxicology.

Panel discussion on food safety

Overall recommendations were as follows:

1. To perform various national survey programs including total dietary intake studies on adulterations and biological and chemical contaminants. 2. Systematic exposure assessment of different food additives and contaminates and generate risk assessment analysis documents. 3. To reduce biological contaminants consumption episodes and the need to perform various mass awareness programs for rural people, such as, separation of raw and cooked food through cooking, safety temperatures of food preservation, etc. The participants also recommended CSIR-IITR as the nodal centre for safety studies of ayurvedic products. It was also suggested that the Indian regulatory bodies may take appropriate steps to stop the out of proportion media coverage regarding the toxicity of certain safe chemicals.

Poster presentation by participants

Curtains came down on the two day conclave with the valedictory function chaired by Dr S J S Flora, Director, National Institute of Pharmaceutical Education and Research, Raebareli. Awards were also given to the participants with the best posters that were displayed during the conclave.

Dr S.G.S. Flora, Director, NIPER, Raiberaily, addressing the gathering

Dignitaries presenting Certificate of Commendation to Shri Aditya Kumar Kar, Ph.D. student, CSIR-IITR.

Dr S.G.S. Flora being felicitated by Professor Alok Dhawan

National Science Day Celebration

The citizens of a country are direct beneficiaries of the scientific progress made by the country and this is only reemphasized by the theme for this year's National Science Day celebrations, “Science for the People and People for Science”.

Celebrations of National Science Day, 2019, at the CSIR-Indian Institute of Toxicology Research, Lucknow, began with the inauguration of an exhibition by Professor M.L.B. Bhatt, Vice Chancellor, King George's Medical University, Lucknow, and Chief Guest of the programme, which was to showcase the cutting edge research and technologies developed by the institute. This was followed by a popular lecture delivered by him. He opined that, irrespective of the subject an individual chooses, inculcating a scientific temper is essential to success. Professor Bhatt reminded the audience that our former President, Bharat Ratna Dr A.P.J. Abdul Kalam tirelessly encouraged young ignited minds to always “Dream Big to Achieve Big”.

Dignitaries on the dais (L-R): Dr D. Kar Chowdhuri, Chief Scientist, CSIR-IITR, Professor M.L.B. Bhatt, Vice Chancellor, King George's Medical University, Lucknow, Dr Poonam Kakkar, Chief Scientist, CSIR-IITR and Dr K. Raviram, Principal Scientist, CSIR-IITR

Earlier, welcoming the gathering, Dr D. Kar Chowdhuri, Chief Scientist, CSIR-IITR, and Chairman of the Organizing Committee, reminded the students that India celebrates the National Science Day on February 28, every year to commemorate the discovery of the Raman Effect by Nobel laureate and Indian Physicist, Sir Chandrashekhara Venkata Raman on February 28, 1928. Delivering her Presidential Remarks, Dr Poonam Kakkar, Chief Scientist, CSIR-IITR, urged the student community to have their inquisitive minds focused on ways and means to make the world a better place to live and should try to create awareness regarding the safe environment for better human health. The institute observed an open day from 10 AM to 2:30 PM. More than 200 students from city based schools and colleges visited the laboratories of the institute and also interacted with the scientific staff. Dr K. Ravi Ram, Principal Scientist, CSIR-IITR and Convener, Organizing Committee, proposed the vote of thanks.

Students visiting laboratories to have hands on experience on different techniques/instruments

Professor M.L.B. Bhatt, Vice Chancellor, King George's Medical University, Lucknow, delivering the lecture and being felicitated by Dr Poonam Kakkar, Chief Scientist, CSIR-IITR

A group photograph of the students from different schools with the dignitaries

National Technology Day Celebration

On May 11, 1998, India established itself as a full-fledged nuclear powered Nation. Operation Shakti, the Pokhran Nuclear Test conducted on this day, is celebrated every year as the National Technology Day. The celebrations highlight the important role of science and technology in our daily lives and also to encourage students to embrace Science as a career option. The event also highlights the achievements of our scientists and engineers in the field of science and technology.

CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow, observed this day as an Open Day for school and college students to visit the institute and to interact with the scientists. Around 120 intermediate students from Delhi Public School, Colvin Taluqdar College and Unity College, Lucknow, visited the institute's laboratories and Centre for Innovation and Translation Research (CITAR). They enjoyed an interactive session with Professor Alok Dhawan, Director, CSIR-IITR and other scientists of the institute and were excited to get a glimpse of the cutting edge research being undertaken. An exhibition showcasing the technologies developed and the services offered by the institute was another attraction for the visiting students.

Dr Poonam Kakkar, Chief Scientist, CSIR-IITR, welcomed the gathering and described the genesis of the Technology Day celebrations. The finale of the celebrations was the 'Technology Day Lecture' delivered by Mr Ajay Jain, Managing Director, Microlit India, a pioneer in the area of laboratory liquid handling equipment manufacturing. While presenting his deliberation on "Success brings happiness, while failures provide the motivation", Mr Jain said that supporting the inherent risks in creativity is of paramount importance for successful innovation. He narrated two incidences from his own life, how challenges made him more determined for innovation. The world today needs passionate researchers with

Dignitaries on the dais (L-R): Dr S.C. Barman, Chief Scientist, CSIR-IITR, Professor Alok Dhawan, Director, CSIR-IITR, Shri Ajay Jain, M.D. Microlit India, Dr Poonam Kakkar, Chief Scientist, CSIR-IITR and Dr Smriti Priya, Scientist, CSIR-IITR

clarity of the goal and willingness to work unconditionally towards achieving that goal. Delivering the Presidential Address, Professor Alok Dhawan, Director, CSIR-IITR, urged the student community to convert their passion into purpose and eventually into profession. He reiterated the importance of grit and determination while working towards one's goal. Dr Smriti Priya, Scientist, CSIR-IITR, introduced the chief guest and Dr S.C. Barman, Chief Scientist, CSIR-IITR, proposed the vote of thanks.

Professor Alok Dhawan, Director, CSIR-IITR inaugurating the technology day exhibition with the school students

Shri Ajay Jain, Managing Director, Microlit India, delivering the Technology Day lecture

Shri Ajay Jain, Managing Director, Microlit India being felicitated by Professor Alok Dhawan, Director, CSIR-IITR

World Environment Day

Air pollution is a global emergency affecting everyone. There is an urgent need to bring together communities, individuals, government agencies and the society at large to tackle this ever growing problem. Different sources of renewable energy and green technologies need to be tapped in order to help in improving air quality in cities and regions across the world. These were some of the thoughts that echoed at the World Environment Day Celebrations at the country's premier toxicology institute, CSIR-Indian Institute of Toxicology Research (CSIR-IITR) Lucknow.

Dr D. Kar Chowdhuri, Chief Scientist, CSIR-IITR and Chairperson of the Organizing Committee, welcomed the gathering and described the genesis of the World Environment Day celebrations since its inception in 1974 by the United Nations. He also stated that this year's theme is "Beat Air Pollution".

As a part of the celebration, the 23rd Dr C.R. Krishnamurthy Memorial Oration was delivered by Wing Commander Paramvir Singh, an Indian Air Force officer, currently with the National Mission for Clean Ganga, Ministry of Water Resources, River Development and Ganga Rejuvenation. Wing Commander Singh, an Adventure Sports athlete, has 13 World, three Asian and seven National Records to his credit, the most held by an Indian. An open-water endurance swimmer, Sri Singh completed the historic first-ever swim down the entire stretch of the River Ganga and opined that every individual can contribute towards a cause in his/her own way. He chose to use his passion for ultra-endurance adventure to make his humble contribution for the cause of Swachh Bharat, Namami Gange and Beti Padhao-Beti Bachao campaigns.

Release of Pre-monsoon report 2019 on Assessment of ambient air quality of Lucknow city by the dignitaries (L-R): Dr D. Kar Chowdhuri, Chief Scientist, CSIR-IITR, Professor Alok Dhawan, Director, CSIR-IITR, Wing Commander Shri Paramvir Singh, Dr S.C. Barman, Chief Scientist, CSIR-IITR and Er A.H. Khan, Senior Principal Scientist, CSIR-IITR

Delivering the Presidential address, Professor Alok Dhawan, Director, CSIR-IITR, said that the talk "Ganga Avahan" delivered by Wing Commander Singh, was a fitting tribute to the Oration. Dr C.R. Krishnamurthy, himself, was a pioneer in the areas of environmental toxicology and biodegradation. Professor Dhawan urged the young generation in the audience to take inspiration from the lecture and strive to make their own contributions towards making the world a better place to live. Earlier, Dr S.C. Barman, Chief Scientist, CSIR-IITR, introduced the chief guest and gave the genesis of Dr C.R. Krishnamurthy Memorial Oration. The institute also released the report on Assessment of Ambient Air Quality of Lucknow City and Wing Commander Paramvir Singh awarded prizes to the winners of painting competition for school children and quiz competition for Ph.D. scholars of the institute. Both these programme were conducted earlier. Er A.H. Khan, Senior Principal Scientist, CSIR-IITR, proposed the vote of thanks.

Wing Commander Paramvir Singh giving the 23rd Dr C.R. Krishnamurthy Memorial Oration (Right) and being felicitated by Professor Alok Dhawan, Director, CSIR-IITR (below)

Wing Commander Paramvir Singh along with dignitaries on the dais with winners of poster painting competition

Hindi Week-2019 celebration

CSIR-IITR, Lucknow, celebrates Hindi Week every year. The inaugural function of this year's Hindi Week celebration was organized on September 14, 2019, at the institute. The Chief Guest on the occasion was Dr Dinesh Sharma, Honorable Deputy Chief Minister and Minister of Science and Technology, Government of Uttar Pradesh. In his address, Dr Sharma said that during Hindi week, pledge is taken to use Hindi language at our work place and in every possible sphere of life. Hindi is a very rich and simple language. It assimilates the words of other languages very easily and adapts to its style and later those words are used frequently in Hindi. He lauded the institute's efforts in Hindi through various scientific publications and brochures to reach common man for their benefit. While releasing 31st edition of the institute's half-yearly official language magazine,"Vishvigyan Sandesh", Dr Sharma commended the effort and wished that in future also, the institute would continue this effort and reach greater heights by using simple and sensible Hindi. The distinguished guest of the function, Shri T.N. Khuntia, Deputy Inspector General of Police, Group Center, Central Reserve Police Force, Bijnor, Lucknow, said that official language Hindi has great importance in tying the country to the thread of unity. Many languages are prevalent in different regions of the country but nowadays, people understand and speak Hindi well in all areas. Speaking on the occasion, Professor Alok Dhawan, Director, CSIR-IITR, said that the institute has been continuously providing its services in the field of environment and health for more than 50 years and was providing scientific and technical information to the general public through Hindi language. Almost 98% of the scientific work of the institute is being published by Hindi media. He said that the official language magazine of the organization, the annual report and the website are in Hindi and information related to general public are published in Hindi. Dr Alok Kumar Pandey, Senior Scientist, CSIR-IITR, welcomed the guests. Shri Chandra Mohan Tiwari, Hindi Officer of the institute proposed the vote of thanks.

The prize distribution and valedictory function was held on September 20, 2019. The Chief Guest on this occasion was Shri Ajay Malik, Deputy Director, Regional Implementation Office (North), Government of India, Ministry of Home Affairs, Department of Official Language. Dr Devendra Parmar, Chief Scientist, CSIR-IITR, welcomed the Chief Guest and everybody in the audience and explained the progress of implementation of Official Language in the institution. Shri Chandra Mohan Tiwari, Hindi Officer and Convener of the program, introduced the Chief Guest. On this occasion, Shri Malik said that to understand the importance of the language, one has to love the language and bring

Professor Alok Dhawan, Director, CSIR-IITR welcoming the gathering during the inaugural function of Hindi Saptah

Dr Dinesh Sharma, Hon'ble Deputy Chief Minister, Government of Uttar Pradesh, addressing the gathering

Dignitaries on the dais releasing the 31st edition of Vish Vigyan Sandesh (L-R): Shri Chandra Mohan Tewari, Hindi Officer, CSIR-IITR, Professor Alok Dhawan, Director, CSIR-IITR, Dr Dinesh Sharma, Hon'ble Deputy Chief Minister, Government of Uttar Pradesh, Shri T.N. Khuntiya, DIG, CRPF, Bijnor, Lucknow and Dr Alok Kumar Pandey Senior Scintist, CSIR-IITR

Shri T.N. Khuntiya, DIG, CRPF, Bijnor, Lucknow addressing the gathering

in close to the heart and soul. He emphasized to generate scientific vocabulary in Hindi for the benefit of present and future generation. Dr D. Kar Chowdhuri, Chief Scientist, CSIR-IITR, in his Presidential Address said that Hindi implementation is being ensured in the institute as per the annual program of the Official Language and in addition to Hindi magazine, booklets and brochures published in Hindi by the institute along with information on scientific achievements are being made available to the public. The Chief Guest gave away 28 awards in nine competitions and 11 prizes under the incentive scheme for working in Hindi. Dr Jyotsana Singh, Senior Scientist, CSIR-IITR proposed the vote of thanks.

Shri Ajay Malik, Chief Guest of the valedictory function being felicitated by Dr D. Kar Chowdhuri, Chief Scientist, CSIR-IITR, also seen are Shri Chandra Mohan Tewari, Hindi officer, CSIR-IITR (L) and Dr Devendra Parmar, Chief Scientist, CSIR-IITR (R)

Dr D. Kar Chowdhuri, Chief Scientist, CSIR-IITR giving his Presidential Address during valedictory function

Prize winners with the dignitaries on the dais

Rajbhasha Activities

CSIR-Indian Toxicology Research Institute has achieved several successes in the Official Language Implementation area through phased efforts. The scientific achievements of the institute are being widely disseminated through the Hindi language. The institute's official language magazine “Vishvigyan Sandesh” is published six monthly. The institute's “Toxicology Research Bulletin” is an online bilingual publication where in abstracts of research papers of the institute and research related information are published. The annual report of the institute is published separately in Hindi. Along with this, many Hindi / bilingual posters, small books and brochures etc. (especially regarding environmental protection, safe drinking water, plastic usage, polythene bags and safe food items etc.) are being published regularly by the institute to provide useful information to the public. Recently, the Government of Uttar Pradesh and Gujarat have praised the brochures / short books published by the institute. Gradually, the use of Hindi language in the scientific work of the institute has increased considerably and the benefit of scientific achievements / information is also reaching the general public. An exhibition of Hindi books was also organized.

Professor Alok Dhawan presenting Hindi magazine "Vishvigyan Sandesh" Vol. 29 to Shri Yogi Adityanath, Hon'ble Chief Minister, Uttar Pradesh

Professor Alok Dhawan presenting Hindi magazine "Vishvigyan Sandesh" Vol. 29 to Shri Vijay Rupani, Hon'ble Chief Minister, Gujarat

योगी आदित्यनाथ

मुख्य मंत्री
उत्तर प्रदेश

लाल बहादुर शास्त्री भवन, लखनऊ

Letter to appreciation from Shri Yogi Adityanath, Hon'ble Chief Minister, Uttar Pradesh

Top to Bottom : Professor Alok Dhawan, Director, CSIR-IITR, presenting pamphlets in Hindi published from CSIR-IITR to Shri Rajnath Singh, Hon'ble Home Minister, Govt. of India, Dr Harsh Vardhan, Hon'ble Minster of Science & Technology, Health and Family Welfare and Earth Sciences, Govt. of India, Shri Yogi Adityanath, Hon'ble Chief Minister, Uttar Pradesh, Dr Dinesh Sharma, Hon'ble Deputy Chief Minister, Uttar Pradesh

Dr Poonam Kakkar, Chief Scientist, Shri K.P. Sharma, Controller of Administration and Shri C.M. Tewari, Hindi Officer, CSIR-IITR receiving the shield and certificate of First prize for Vishvigyan Sandesh Vol. 29 and Fourth prize for excellent performance in Hindi implementation and certificate for organizing Hindi workshop during the halfyearly meeting of the Town Official Language Implementation Committee (Office-3), Lucknow, on November 29, 2018

Professor Alok Dhawan, Director, Shri K.P. Sharma, Controller of Administration, Shri C.M. Tewari, Hindi Officer, Sri Kaleemuddin, Senior Technician (2), CSIR-IITR receiving the shield and certificate of Second prize for Vishvigyan Sandesh Vol. 30 and Second prize for excellent performance in Hindi implementation and certificate for organizing Hindi workshop during the half yearly meeting of the Town Official Language Implementation Committee (Office-3), Lucknow on June 25, 2019

Release of the Official Language magazine " Vishvigyan Sandesh" volume 31

Dr Dinesh Sharma, Hon'ble Deputy Chief Minister and Minister of Science and Technology, Government of Uttar Pradesh, released 31st volume of the Official Language magazine **" Vishvigyan Sandesh"** of the institute on the occasion of the inaugural function of Hindi week on September 14, 2019.

Dignitaries on the dais releasing the 31st edition of Vish Vigyan Sandesh (L-R): Shri Chandra Mohan Tewari, Hindi Officer, CSIR-IITR, Professor Alok Dhawan, Director, CSIR-IITR, Dr Dinesh Sharma, Hon'ble Deputy Chief Minister, Government of Uttar Pradesh, Shri T.N. Khuntiya, DIG, CRPF, Bijnor, Lucknow and Dr Alok Kumar Pandey Senior Scintist, CSIR-IITR

CSIR Foundation Day-2019 Celebration

CSIR–Indian Institute of Toxicology Research (CSIR-IITR), Lucknow celebrated the 78th Foundation Day of the Council of Scientific and Industrial Research at its campus.

Welcoming the Chief Guest, Professor Lal Chand Rai, Distinguished Professor, Department of Botany, Institute of Science, Banaras Hindu University, Varanasi and the gathering, Dr Devendra Parmar, Chief Scientist, CSIR-IITR, recalled the period that led to establishing CSIR way back in 1942. The organization has come a long way since then, making several societal contributions in the years gone. Dr D. Kar Chowdhuri, Chief Scientist, CSIR-IITR and Chairperson, Organizing Committee, introduced the Chief Guest for the day. Delivering the Foundation Day Lecture, Professor Lal Chand Rai apprised the august gathering through the journey of his tryst with algae, using it as a model system to study metal toxicity.

Professor Lal Chand Rai, Chief Guest of the function inaugurating the exhibition on CSIR Foundation Day along with students and Professor Alok Dhawan, Director, CSIR-IITR

The function was presided over by Professor Alok Dhawan, Director, CSIR–IITR. Delivering his Presidential Address, Professor Dhawan enumerated several technologies developed by CSIR since its inception. He urged the visiting students to make full use of the open day at the institute, visit the laboratories and interact with the scientists of the institute.

Professor Lal Chand Rai, Chief Guest of the function being felicitated by Professor Alok Dhawan, Director, CSIR-IITR

The institute also felicitated its employees completing 25 years of service and those who had superannuated during the previous year. Prizes were also given away for the essay writing competition that was conducted for the children of CSIR employees. Professor Lal Chand Rai launched the CSIR-IITR Alumni Association Webpage. The association is expected to serve as a reliable networking platform for the present scientific community and the former students of the institute.

An exhibition of the contributions made / technologies developed by CSIR-IITR was also organized and the institute was open for the students and the citizens of Lucknow to experience firsthand, cutting edge R&D. About 150 students from various schools and colleges of the city visited the exhibition and interacted with the scientists. Dr K.C. Khulbe, Senior Principal Scientist of the institute and Convener of the program, proposed the vote of thanks.

Award winners of essay writing competition and employees completing 25 years of service and those who had superannuated during the previous year along with dignitaries on the dais

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CSIR
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वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्
CSIR INDIA

Distinguished Visitors

DG-CSIR visits CSIR-IITR

DG-CSIR visits CSIR-IITR and encouraged the scientists to do exploratory research for the benefit of masses

Dr Shekhar C. Mande, Director General, Council of Scientific & Industrial Research (CSIR) & Secretary, DSIR, visited the institute on May 02, 2019. Professor Alok Dhawan, Director, CSIR-IITR, with fellow scientists welcomed him. This visit coincided with 55th Research Council meeting of the institute. The program was inaugurated with the lighting of the lamp by the dignitaries. Dr Mande, along with Professor Y.K. Gupta, Chairman, Research Council, CSIR-IITR and members of the council reviewed the R&D activities of CSIR-IITR.

Professor Alok Dhawan gave a presentation on the R&D overview, societal activities and products developed by the institute. He presented a brief account of the institute's facilities, ongoing work and CSIR-IITR's roadmap for the upcoming years. He also briefed the house on all the programs initiated by the institute in tandem with CSIR's mandate of linking research to market space and for societal benefit.

Dr Shekhar C. Mande then addressed the gathering and acknowledged the contributions of CSIR towards nation building. He encouraged the scientific staff and students of CSIR-IITR to do exploratory research so as to identify the problems and their possible solutions for societal impact. Dr Mande appreciated the institute's work in the direction of Nanomaterial Toxicology, Environmental Toxicology, Food, Drug & Chemical Toxicology, Regulatory Toxicology and Systems Toxicology & Health Risk Assessment. Dr Mande also insisted on working closely with academic institutes, central and state universities, etc. to upgrade the skills of their young researchers from an early age by sharing of appropriate resources, expertise and technical support. He highlighted the success of various CSIR schemes, such as, Jigyasa, Student Scientist Connect Program, and Skill Development Programme to achieve the above-said goals. Dr Mande explained that for more substantial societal impact, people need to be aware of the exemplary technologies being developed which can be achieved through effective science communication.

Dr Shekhar C. Mande, DG-CSIR being welcomed by Professor Alok Dhawan, Director, CSIR-IITR, Lucknow

Dr Shekhar C. Mande, addressing the gathering and acknowledging the glorious history and the contributions of the institute

Dr Shekhar C. Mande, and Professor Y.K. Gupta, Chairman, Research Council, CSIR-IITR with Professor Alok Dhawan, members of the Research Council, CSIR-IITR, scientists and technical staff of the institute

Dr Shekhar C. Mande with Professor Y.K. Gupta and Professor Alok Dhawan, releasing the latest edition of Vishvigyan Sandesh Vol. (30), 2018-19

Dr Shekhar C. Mande with Professor Y.K. Gupta and Professor Alok Dhawan, releasing the brochure of Food and Consumer Safety Solution Database (FOCUS-DB)

Dr Shekhar C. Mande with Professor Y.K. Gupta and Professor Alok Dhawan, releasing the brochure of Environmental Monitoring Hub supported by DSIR-Common Research and Technology Development Hubs (CRTDH)

Dr Shekhar C. Mande with Professor Y.K. Gupta and Professor Alok Dhawan, launching the website of Environmental Monitoring Hub supported by DSIR-Common Research and Technology Development Hubs (CRTDH)

Dr Shekhar C. Mande with Professor Y.K. Gupta and Professor Alok Dhawan, inaugurating the Environmental Monitoring Hub facility supported by DSIR-Common Research and Technology Development Hubs (CRTDH)

On this occasion, Dr Mande released the latest edition of Vishvigyan Sandesh Vol. 30, 2018-19, brochures of Advanced Imaging Facility, Computational Toxicology Facility, Genome and Cell Integrity Laboratory, Biomolecular Toxicology Laboratory and Proteomics and Metabolomics Facility. He also inaugurated the "Environmental Monitoring and Intervention Hub" supported by DSIR-Common Research and Technology Development Hubs (CRTDH) which helps in serving MSEs on clean air/water and effluent management sector to develop indigenous and effective solutions for environmental monitoring, water treatment and effluent management.

At the Silver Jubilee Block, Dr Mande inaugurated various labs namely, Toxicology High Performance Computing and Software Platform (TRISHUL) – the only high performance computing lab in the country, Genome and Cell Integrity Lab, Biomolecular Toxicology Lab, Proteomics and Metabolomics Facility and Technology Development and Innovation Centre. He also inaugurated P.K. Ray auditorium and a 25 KW Solar Power Plant in the campus. Further, Dr Mande launched the Food and Consumer Safety Solution Database (FOCUS-DB) website. The database currently comprises over 2885 food additives. Among these, 2884 molecules are associated with 1642 natural ingredients that belong to 42 different categories like flavoring agents, anticaking agents, preservatives, emulsifying agents, coloring agents, etc.

Dr Shekhar C. Mande inaugurating the Toxicology High-Performance Computing and Software Platform facility at CSIR-IITR. Also seen are Professor Y.K. Gupta, Professor Alok Dhawan and other dignitaries

Dr Shekhar C. Mande with Professor Y.K. Gupta and Professor Alok Dhawan, inaugurating the Biomolecular Toxicology Lab, Genome and Cell integrity Lab, Proteomics and Metabolomics Facility Lab at CSIR-IITR

On the second day, Dr Mande visited CSIR-IITR, Gheru campus. Dr Poonam Kakkar, Chief Scientist, CSIR-IITR and Professor Dhawan, Director, CSIR-IITR welcomed him. He planted saplings in the institute campus to encourage green living and Green Good Deeds. He also inaugurated a 100 KW Solar Power Plant. After the inauguration, he addressed the scientific staff of the campus to focus on the research, which emphasizes social impact. He also met young researchers who are working at the GLP facility. Later, Dr Mande visited aquatic toxicology laboratory with Professor Dhawan, Dr Poonam Kakkar and other fellow scientists.

Dr Shekhar C. Mande along with Professor Y.K. Gupta inaugurating the Technology Development and Innovation Centre at CSIR-IITR. Also seen is Professor Alok Dhawan

Professor Alok Dhawan, with other scientists and students demonstrating "ONEER", an electronic device for drinking water disinfection, developed by CSIR-IITR to Dr Shekhar C. Mande

Dr Shekhar C. Mande planting the sapling with Professor Y.K. Gupta

Dr Shekhar C. Mande inaugurating the 100KW Solar Power Plant at CSIR-IITR Gheru campus. Also seen are Professor Alok Dhawan and Dr Poonam Kakkar

Dr Shekhar C. Mande being felicitated by Professor Alok Dhawan

Dr Shekhar C. Mande, Professor Alok Dhawan, and Professor S.K. Barik, Dr Poonam Kakkar along with students at the Gheru campus

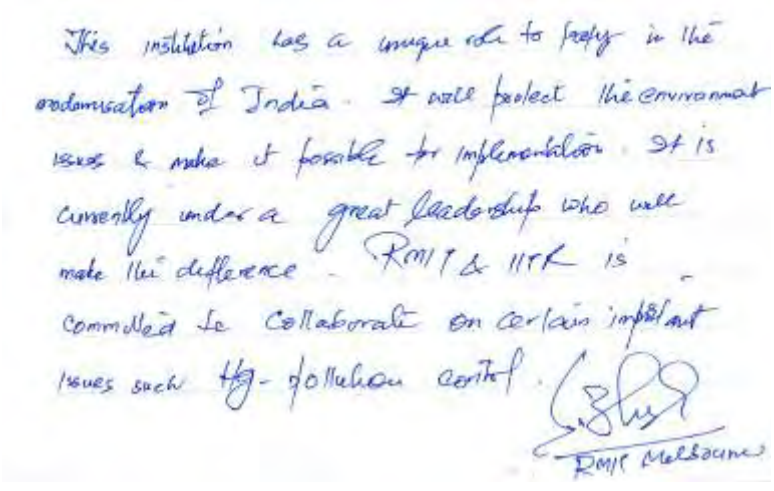
Visit of Ms Rita Teaotia, Chairperson, FSSAI to CSIR-IITR, Lucknow

Ms Rita Teaotia, Chairperson, Food Safety & Standards Authority of India (FSSAI), New Delhi, visited CSIR-IITR on April 05, 2019. Along with Ms Rita Teaotia, officials from FSSAI and Government of Uttar Pradesh, also visited the institute. Professor Alok Dhawan, Director, CSIR-IITR, Lucknow, welcomed the guests and gave an overview of research activities and technological developments of the institute in the area of Food Safety. CSIR-IITR has been recognized by FSSAI as the Food Safety Referral Laboratory. Furthermore, FSSAI has approved CSIR-IITR as the National Reference Laboratory. Ms Rita Teaotia appreciated the initiatives and significant contributions of CSIR-IITR. She stated that there are many other avenues also in which CSIR-IITR and FSSAI can work together and build a productive partnership on Food Safety. Professor Alok Dhawan and Ms Rita Teaotia released the poster and pamphlet for spreading awareness among street vendors regarding selling of healthy and safe food. Team FSSAI interacted with the scientists and research scholars of the institute and visited Centre for Innovation and Translational Research (CITAR) facility.

Release of poster on healthy and safe food by Ms Rita Teaotia, Chairperson, FSSAI in the presence of Professor Alok Dhawan, Director, CSIR-IITR

Ms Rita Teaotia, Chairperson, FSSAI along with FSSAI and Government of Uttar Pradesh officials and CSIR-IITR scientists and Professor Alok Dhawan

Distinguished Visitors


This institution has a unique role to play in the modernization of India. It will protect the environment issue and make it possible for implementation. It is currently under a great leadership who will make the difference. RMIT & IITR is committed to collaborate on certain important issues such Hg-pollution control.
RMIT Melbourne

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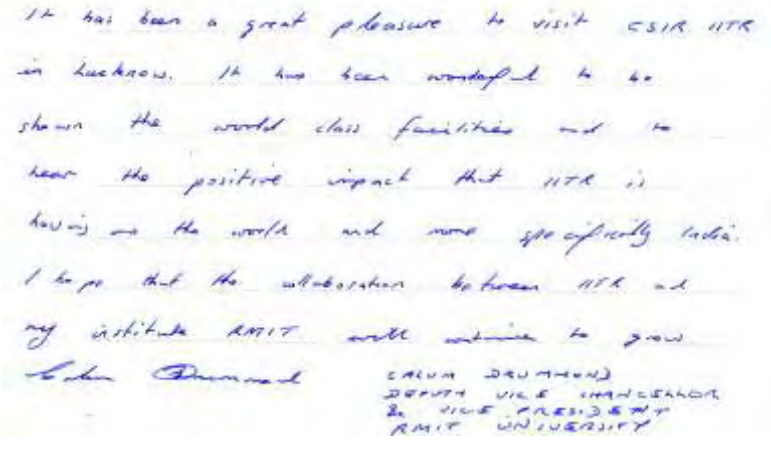
Professor Suresh Bhargava
RMIT, Melbourne

Professor Calum Drummond
Deputy Vice Chancellor &
Vice President
RMIT University


It has been a great pleasure to visit CSIR IITR in Lucknow. It has been wonderful to be shown the world class facilities and to hear the positive impact that IITR is having on the world and more specifically India. I hope that the collaboration between IITR and my institute RMIT will continue to grow.
Calum Drummond
CALUM DRUMMOND
DEPUTY VICE CHANCELLOR
& VICE PRESIDENT
RMIT UNIVERSITY

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सीएसआईआर-भारतीय विषविज्ञान अनुसंधान संस्थान
CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH

भारतीय विषविज्ञान अनुसंधान संस्थान द्वारा आयोजित इस अभियान में रैली कर लोगों को खाद्य सामाग्री को स्वस्थ खाद्य का सफल कार्यक्रम कर जागरूकता के सफल प्रयास के लिए बहुत–बहुत बधाई।

एस. भाटिया
महापौर, लखनऊ

Rita Teaotia
Chairperson, FSSAI


सीएसआईआर-भारतीय विषविज्ञान अनुसंधान संस्थान
CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH

5th April 2019

Thank you for sharing the capacities and very significant initiatives of IITR with the FSSAI team. Not only is this a very important institution, it is also a valuable partner in many aspects of the work of FSSAI. We look forward to a productive partnership.

[RITA TEAOTIA
CHAIRPERSON, FSSAI]

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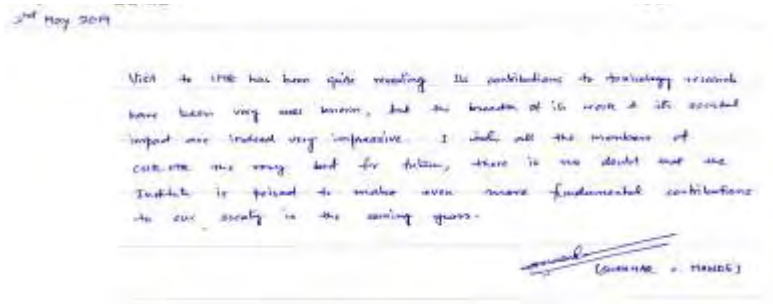
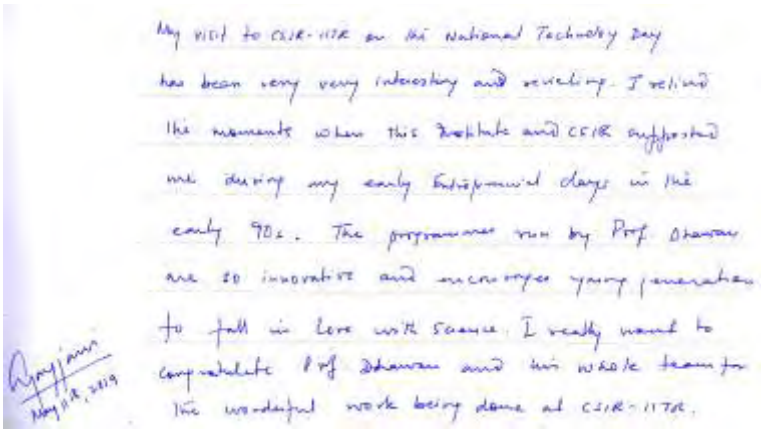


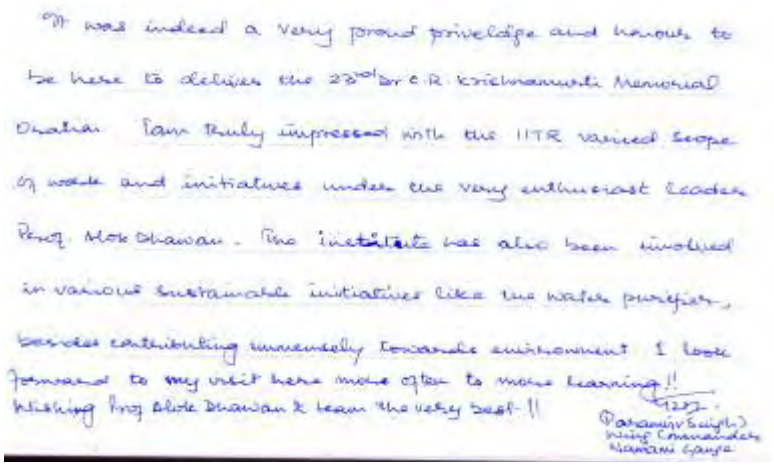
Visit to IITR has been quite revealing. Its contributions to toxicology research have been very well known, but the breadth of its work and its societal impact are indeed very impressive. I wish all the members of CSIR-IITR the very best for future. There is no doubt that the institute is poised to make even more fundamental contributions to our society in the coming years.

(Shekhar C. Mande)
Director General, CSIR and
Secretary, DSIR, Government of India

Shri Ajay Jain
CEO, Microlitt, India



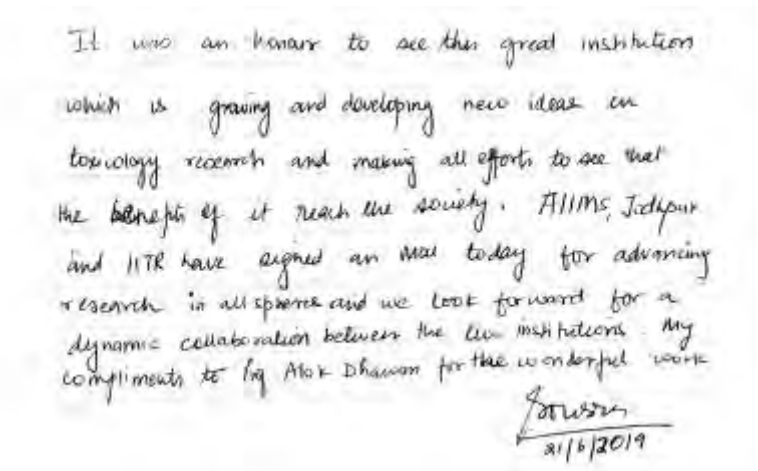
My visit to CSIR-IITR on the National Technology Day has been very interesting and revealing. I relived the moments when this institute and CSIR supported me during my early entrepreneurial days in the early 90s. The programs run by Professor Dhawan are so innovative and encourage young generation to fall in love with science. I really want to congratulate Professor Dhawan and his whole team for the wonderful work being done at CSIR-IITR.



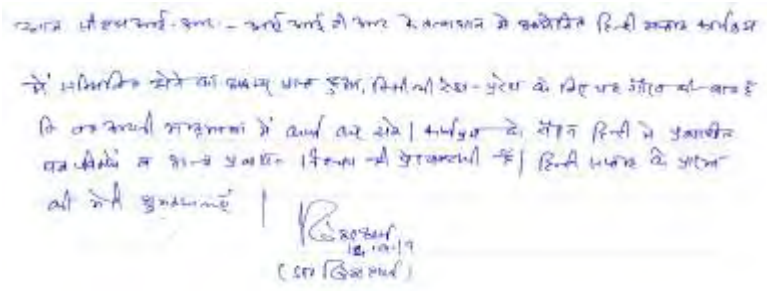
It was indeed a very proud privilege and honour to be here to deliver the 23rd Dr C.R. Krishnamurti Memorial Oration. I am truly impressed with the IITR's varied scope of work and initiatives under the very enthusiastic leadership of Professor Alok Dhawan. The institute has also been involved in various sustainable initiatives like the water purifiers, besides contributing immensely towards environment. I look forward to my visit here more often to more learning!! Wishing Professor Alok Dhawan & Team the very best!!

(Paramvir Singh)
Wing Commander
Namami Gange

Professor Sanjeev Misra
Director, AIIMS Jodhpur



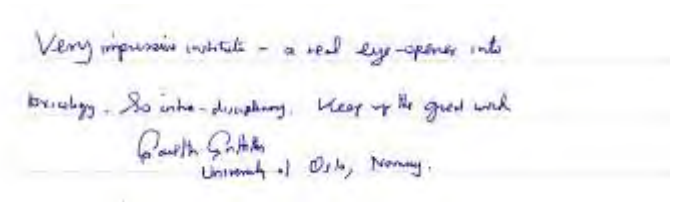
It was an honour to see this great institution which is growing and developing new ideas in toxicology research and making all efforts to see that the benefits of it reach the society. AIIMS, Jodhpur and IITR have signed an MoU today for advancing research in all spheres and we look forward for a dynamic collaboration between the two institutions. My compliments to Professor Alok Dhawan for the wonderful work.



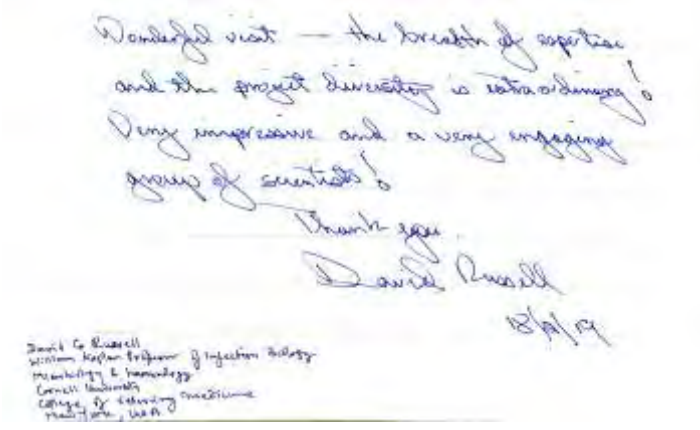
आज सीएसआईआर–आईआईटीआर के तत्वाधान में आयोजित हिन्दी सप्ताह कार्यक्रम में सम्मिलित होने का अवसर प्राप्त हुआ, किसी भी देश–प्रदेश के लिये गौरव की बात है कि वह अपने मात्रभाषा में कार्य कर सके। कार्यक्रम के दौरान हिन्दी में प्रस्तावित पत्र पत्रिकाओं व अन्य प्रकाशन निश्चय ही प्रेरणादायी है। हिन्दी सप्ताह के प्रारम्भ की मेरी शुभकामनाएँ।

डा. दिनेश शर्मा
उपमुख्यमंत्री,
उत्तर प्रदेश सरकार

Graith Grittith
University of Oslo, Norway



Very impressive institute – a real eye-opener into toxicology. So intra-disciplinary. Keep up the great work.



Wonderful visit – the breath of inspiration and the project diversity is extraordinary very impressive and a very enjoying group of scientists.
Thank you.

David G. Russel
William Kaplan Professor of Infection Biology
Microbiology & Immunology
Cornell University
College of Veterinary Medicine
New York, USA

Research Council Meeting

May 02-03, 2019

The 55th CSIR-IITR Research council meeting was held during May 02-03, 2019. Headed by Professor Y.K. Gupta, Principal Advisor, THSTI, Department of Biotechnology, Government of India and Former Head, Department of Pharmacology, All India Institute of Medical Sciences, New Delhi, the Council has a number of distinguished members drawn from academia, institutes and government departments to represent wider domains of science and technology: Dr B. Sesikeran, Former Director, National Institute of Nutrition, Hyderabad; Dr Tapan Chakrabarti, Former Acting Director, CSIR-NEERI, Nagpur; Dr Prakash Amrut Mody, Chairman & Managing Director, Unichem Laboratories Limited, Mumbai; Dr Anil Wali, Managing Director, Foundation for Innovation & Technology Transfer, Indian Institute of Technology, New Delhi; Dr Nilima A. Kshirsagar, National Chair, Clinical Pharmacology, ICMR, Govt. of India, National Institute for Research in Reproductive Health, Mumbai; Professor Jayesh Bellare, Department of Chemical Engineering, Indian Institute of Technology, Bombay; Dr Rakesh K. Mishra, Director, CSIR-Centre for Cellular & Molecular Biology, Hyderabad; Dr Shailja Baidya Gupta, Advisor/Scientist G, International Cooperation Department of Biotechnology, New Delhi; Professor Saroj Kanta Barik, Director, CSIR-National Botanical Research Institute, Lucknow; Dr Rakesh Kumar, Director, CSIR-National Environmental Engineering Research Institute, Nagpur. The inaugural session of the meeting was graced by Dr Shekhar C. Mande, Director General, CSIR and Secretary, DSIR, Government of India. Dr Mande addressed the scientific staff at the beginning of the Council meeting. The Council played a pivotal role in guiding the institute for developing programmes that will have translational values and those programmes that will have direct or indirect linkages to societal issues. As a part of the activity, the Council had evaluated the progress made in different projects/programmes and provided suggestions, wherever needed.

Dr Shekar C. Mande, DG, CSIR, along with CSIR-IITR Research Council and scientists

Research Council

Chairman

Professor Yogendra Kumar Gupta
Former Head, Department of Pharmacology,
All India Institute of Medical Sciences,
Ansari Nagar, New Delhi

Members

Dr Boindala Sesikeran
Former Director,
National Institute of Nutrition,
Hyderabad, Telengana

Dr Prakash Amrut Mody
Chairman & Managing Director,
Unichem Laboratories Limited,
Unichem Bhawan Prabhat Estate,
Off S.V. Road, Jogeshwari (West)
Mumbai, Maharashtra

Dr Nilima A. Kshirsagar
National Chair, Clinical Pharmacology
ICMR, Govt. of India,
National Institute for Research in
Reproductive Health,
Jehangir Merwanji Street, Parel,
Mumbai, Maharashtra

Professor Jayesh Bellare
Department of Chemical Engineering,
Indian Institute of Technology, Bombay,
Powai, Mumbai, Maharashtra

Dr Tapan Chakrabarti
Former Acting Director,
CSIR-National Environmental Engineering
Research Institute,
Plot No. 655, Chhoti Dhantoli,
Near Hotel North View,
Nagpur, Maharashtra

Dr Anil Wali
Managing Director,
Foundation for Innovation & Technology,
Transfer Indian Institute of Technology,
Delhi
Hauz Khas, New Delhi

Dr Rakesh Kumar Mishra
Director,
CSIR-Centre for Cellular & Molecular
Biology,
Uppal Raod, Hyderabad, Telengana

DG Nominee

Professor Saroj Kanta Barik
Director,
CSIR-National Botanical Research Institute,
Rana Pratap Marg,
Lucknow, Uttar Pradesh

Sister Laboratory Nominee

Dr Rakesh Kumar
Director,
CSIR-National Environmental Engineering
Research Institute,
Nehru Marg, Nagpur, Maharashtra

Agency Representative

Dr Shailja Baidya Gupta
Advisor/Scientist G,
International Cooperation,
Department of Biotechnology,
6th-8th Floor, Block 2,
CGO Complex, Lodhi Road, New Delhi

Director

Professor Alok Dhawan
CSIR-Indian Institute of Toxicology
Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Member Secretary

Dr D. Kar Chowdhuri
Chief Scientist,
CSIR-Indian Institute of Toxicology
Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Management Council

Chairman

Professor Alok Dhawan
Director,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Members

Professor Saroj Kanta Barik
Director,
CSIR-National Botanical Research Institute,
Rana Pratap Marg,
Lucknow, Uttar Pradesh

Dr Shyamal Chandra Barman
Chief Scientist,
CSIR-Indian Institute of Toxicology Research,
Gheru Campus, Sarojini Nagar Industrial Area, Lucknow, Uttar Pradesh

Dr Kailash Chandra Khulbe
Senior Principal Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Dr Aditya Bhushan Pant
Principal Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31, Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Dr Alok Kumar Pandey
Senior Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Dr Neeraj Kumar Satija
Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31, Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Dr Prem Narain Saxena
Principal Technical Officer,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31, Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Dr Gyanendra Mishra
Controller of Finance & Accounts,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31, Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Member Secretary

Shri K. Prasad Sharma
Controller of Administration,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Institutional Complaint Committee for Sexual Harassment

From 26.07.2018

Chairperson

Dr Poonam Kakkar
Chief Scientist,
CSIR-Indian Institute of Toxicology Research,
Gheru Campus, Sarojini Nagar Industrial Area,
Lucknow, Uttar Pradesh

Members

Dr Neena Goyal
Senior Principal Scientist,
CSIR-Central Drug Research Institute,
Sector 10, Jankipuram Extension,
Sitapur Road, Lucknow, Uttar Pradesh

Dr Vineeta Prakash
Principal,
Isabella Thoburn College,
7, Faizabad Road,
Lucknow, Uttar Pradesh

Dr Smriti Priya
Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Dr Aruna Satish
Senior Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Convener

Dr Mahendra Pratap Singh
Senior Principal Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Institutional Complaint Committee for Sexual Harassment

From 25.07.2019

Chairperson

Dr Chetna Singh
Principal Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan, 31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Members

Dr Ritu Trivedi
Principal Scientist,
CSIR-Central Drug Research Institute,
Sector 10, Jankipuram Extension,
Sitapur Road, Lucknow, Uttar Pradesh

Dr Vineeta Prakash
Principal,
Isabella Thoburn College,
7, Faizabad Road,
Lucknow, Uttar Pradesh

Dr Vikas Srivastava
Senior Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Dr Smriti Priya
Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Convener

Dr Preeti Chaturvedi
Senior Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan, 31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Institutional Animal Ethics Committee

Chairman

Dr Devendra Parmar
Chairman cum Biological Scientist,
Chief Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

CPCSEA Nominee (External)

Dr Neelam Bala
Main Nominee,
Biological Production Section,
Department of Animal Husbandry,
Lucknow, Uttar Pradesh

Dr Atul Kumar Baranwal
Link Nominee,
In-Charge Animal Facility,
Sanjai Gandhi Post Graduate Institute of Medical Sciences,
Raebareli Road, Lucknow, Uttar Pradesh

Dr Daya Shankar Upadhyay
Scientist from outside the institute,
Senior Principal Scientist & Head, National Laboratory Animal Center,
CSIR-Central Drug Research Institute,
Sector-10, Jankipuram Extension,
Sitapur Road, Lucknow, Uttar Pradesh

Dr Virendra Kumar
Socially Aware Nominee,
Social Worker, Lucknow, Uttar Pradesh

CPCSEA Nominee (from CSIR-IITR)

Dr Mahendra Pratap Singh
(Scientist from different discipline)
Senior Principal Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Dr Mahadeo Kumar
(Veterinarian)
Senior Scientist,
Animal Facility,
CSIR-Indian Institute of Toxicology Research,
Gheru Campus, Sarojani Nagar Industrial Area, Lucknow, Uttar Pradesh

Dr Smriti Priya
(Scientist from different discipline)
Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Member Secretary

Dr Dhirendra Singh
Principal Scientist,
Member Secretary cum Scientist-in-Charge Animal Facility,
CSIR-Indian Institute of Toxicology Research,
Gheru Campus, Sarojani Nagar Industrial Area, Lucknow, Uttar Pradesh

Institutional Human Ethics Committee

Chairman

Dr Chandishwar Nath
Former Chief Scientist,
CSIR-Central Drug Research Institute,
3/67, Viram Khand, Gomti Nagar,
Lucknow, Uttar Pradesh

Members (External)

Professor Uday Mohan
Department of Community Medicine & Public Health,
King George's Medical University,
Lucknow, Uttar Pradesh

Professor O.N. Mishra
Head of Department & Dean, Faculty of Law,
Lucknow University,
Lucknow, Uttar Pradesh

Professor R.K. Singh
Head, Department of Biochemistry,
TSM Medical College & Hospital,
Lucknow, Uttar Pradesh

Shri K.K. Janardanan
2/574, Viram Khand,
Gomti Nagar,
Lucknow, Uttar Pradesh

Shri Vijay Acharya
217, Empire Estate Residency
20 Mall Avenue
Lucknow, Uttar Pradesh

Members (CSIR-IITR)

Dr Devendra Parmar
Chief Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Dr Vinay Kumar Khanna
Senior Principal Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Dr Chetna Singh
Principal Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Member Secretary

Dr C. Keshavachandran
Principal Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Institutional Biosafety Committee

Chairman

Dr Devendra Parmar
Chairman,
Chief Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg, Uttar Pradesh, India

DBT Nominee

Dr Saman Habib
Senior Principal Scientist,
CSIR-Central Drug Research Institute,
BS-10/1, Sector 10, Jankipuram extension,
Sitapur Road,
Lucknow, Uttar Pradesh

Dr Samir V Savant
Expert Scientist, Sister Laboratory,
Senior Principal Scientist,
CSIR-National Botanical Research Institute,
Rana Pratap Marg,
Lucknow, Uttar Pradesh

Dr Sharad Sharma
Biosafety Officer,
Senior Principal Scientist & Incharge
Toxicology & Experimental Medicine,
CSIR-Central Drug Research Institute,
BS-10/1, Sector 10, Jankipuram extension,
Sitapur Road,
Lucknow, Uttar Pradesh

Dr Vikas Srivastava
Senior Scientist,
CSIR-Indian Institute of Toxicology
Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Dr Debabrata Ghosh
Senior Scientist,
CSIR-Indian Institute of Toxicology
Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Member

Dr Smriti Priya
Scientist,
CSIR-Indian Institute of Toxicology
Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Member Secretary

Dr Aditya Bhushan Pant
Principal Scientist,
CSIR-Indian Institute of Toxicology
Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

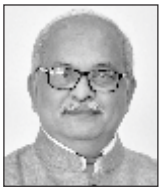
Official Language Implementation Committee

Chairman

Professor Alok Dhawan
Director,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan,
31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh

Dr Poonam Kakkar
Chief Scientist
(up to 30.09.2019)

Dr Debapratim Kar Chowdhuri
Chief Scientist



Dr Yogeshwer Shukla
Chief Scientist

Dr Devendra Parmar
Chief Scientist

Dr Kailash Chandra Khulbe
Senior Principal Scientist

Shri Nikhil Garg
Senior Principal Scientist

Dr Nateshan Manickam
Senior Principal Scientist

Shri K. Prasad Sharma
Controller of Administration

Dr Gyanendra Mishra
Controller of Finance & Accounts

Shri Satyendra Kumar Singh
Stores & Purchase Officer

Shri Yogendra Singh
Principal Technical Officer

Shri Raj Kumar Upadhyay
Senior Technical Officer (3)

Smt Rashmi Rathore
Section Officer (G)

Smt Kusum Lata
Private Secretary

Shri Bikhu Lal
Personal Secretary

Shri Vivek Srivastav
Security Officer

Shri Rakesh Singh Bisen
Senior Technical Officer (3)

Shri Chandra Mohan Tewari
Hindi Officer

Right to Information Act-2005

RTI Act-2005 is being implemented properly in the institute since its inception. Following officials have been designated as per the requirement of the act:

Dr Kailash Chandra Khulbe — CPIO-CSIR-IITR
Senior Principal Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan, 31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh
0522-2628228
kckhulbe@iitr.res.in

Dr Ravi Ram Kristipati — ACPIO-CSIR-IITR
Principal Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan, 31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh
raviram@iitr.res.in

Dr D. Kar Chowdhuri — Appellate Authority-CSIR-IITR
Chief Scientist,
CSIR-Indian Institute of Toxicology Research,
Vishvigyan Bhawan, 31 Mahatma Gandhi Marg,
Lucknow, Uttar Pradesh
dkarchowdhuri@iitr.res.in

Suo-Motto disclosure has been done on institutional website. A total number of 81 applications were received during the year and 80 were responded to. No appeals were made before the Appellate Authority. On-line returns are being filed as per schedule of the act.

CSIR-IITR Staff

Scientific Staff

Professor Alok Dhawan
Director

Dr Debapratim Kar Chowdhuri
Chief Scientist

Dr Yogeshwer Shukla
Chief Scientist

Dr Devendra Parmar
Chief Scientist

Dr Shyamal Chandra Barman
Chief Scientist

Dr Ganesh Chandra Kisku
Chief Scientist

Dr Vinod Praveen Sharma
Senior Principal Scientist

Shri Nikhil Garg
Senior Principal Scientist

Dr Nateshan Manickam
Senior Principal Scientist

Dr Kailash Chandra Khulbe
Senior Principal Scientist

Dr Ratan Singh Ray
Senior Principal Scientist

Dr Vinay Kumar Khanna
Senior Principal Scientist

Er Altaf Husain Khan
Senior Principal Scientist


Dr Mahendra Pratap Singh
Senior Principal Scientist


Dr Akshay Dwarakanath
Principal Scientist


Dr Devendra Kumar Patel
Principal Scientist


Dr Aditya Bhushan Pant
Principal Scientist


Dr Chetna Singh
Principal Scientist


Dr Chandra Shekhar
Nair Kesavachandran
Principal Scientist


Dr Dhirendra Singh
Principal Scientist


Dr Rajnish Kumar Chaturvedi
Principal Scientist


Dr Sanghamitra Bandyopadhyay
Principal Scientist


Dr Ravi Ram Kristipati
Principal Scientist


Dr Ramkrishnan Parthasarathi
Principal Scientist


Dr Alok Kumar Pandey
Senior Scientist


Dr Raja Gopal Rayavarapu
Senior Scientist


Dr Amit Kumar
Senior Scientist


Dr Kausar Mahmood Ansari
Senior Scientist


Dr Anurag Tripathi
Senior Scientist


Dr Abhay Raj
Senior Scientist


Dr Mahadeo Kumar
Senior Scientist


Dr Jyotsna Singh
Senior Scientist


Dr Aruna Satish
Senior Scientist


Dr Vikas Srivastava
Senior Scientist


Dr Nasreen Ghazi Ansari
Senior Scientist


Dr Satyakam Patnaik
Senior Scientist


Dr Debabrata Ghosh
Senior Scientist


Dr Preeti Chaturvedi
Senior Scientist


Dr Sandeep Kumar Sharma
Senior Scientist


Dr Manoj Kumar
Scientist


Dr Somendu Kumar Roy
Scientist


Dr Anbumani Sadasivam
Scientist


Dr Sheelendra Pratap Singh
Scientist


Dr Neeraj Kumar Satija
Scientist


Dr Pradeep Kumar Sharma
Scientist


Dr Smriti Priya
Scientist


Dr Anjenya Ayanur
Scientist


Dr Beena Vamadevan
Scientist


Dr Yatendra Kumar Satija
Scientist


Dr Srikanth Bojjagani
Scientist


Dr Ashish Dwivedi
Scientist


Dr Akhilesh Kumar Yadav
Scientist

Technical Staff

Technical Staff with Professor Alok Dhawan, Director, CSIR-IITR

Dr Anvita Shaw
Principal Technical Officer

Dr Prem Narain Saxena
Principal Technical Officer

Shri Yogendra Singh
Principal Technical Officer

Shri Satgur Prasad
Principal Technical Officer

Smt Sumita Dixit
Principal Technical Officer

Dr Pradeep Kumar
Principal Technical Officer

Shri Satya Prakash Dhruva
Senior Technical Officer (3)

Shri Rakesh Singh Bisen
Senior Technical Officer (3)

Shri Ram Narayan
Senior Technical Officer (3)

Shri Sakendra Kumar Purshottam
Senior Technical Officer (3)

Shri Raj Kumar Upadhyay
Senior Technical Officer (3)

Shri Pradeep Kumar Singh
Senior Technical Officer (1)

Smt Kalpana Padalia
Technical Officer

Shri Pankaj Ramji Jagdale
Technical Officer

Shri Sandeep Kumar
Technical Officer

Shri Shyam Kumar Pal
Technical Officer

Shri Syed Ibrahim Meeran
Technical Officer

Shri Jay Shankar
Technical Officer

Shri Puneet Khare
Technical Officer

Smt Nidhi Arjaria
Technical Officer

Shri Sandeep Negi
Technical Officer

Shri Gubla Naga
Venkata Satyanarayana
Technical Officer

Shri Sarfraj Ahmed
Technical Assistant

Technical Staff with Professor Alok Dhawan, Director, CSIR-IITR

Shri Lakshmi Kant
Senior Technician (2)

Smt Syamala Das
Senior Technician (2)

Shri Mohan Lal
Senior Technician (2)

Shri Kaleem Uddin
Senior Technician (2)

Shri Balkishan
Senior Technician (2)

Shri Ahmad Tajuddin
Senior Technician (2)

Shri Satya Ram
Senior Technician (2)

Smt Mumtaz Jahan
Senior Technician (2)

Shri Ashok Kumar Pathak
Senior Technician (2)

Shri Prem Singh
Senior Technician (2)

Shri Parvez Ahmed Khan
Senior Technician (2)

Shri Umesh Chandra Srivastava
Technician (2)


Shri Budhiram Prasad
Senior Technician (2)


Shri Pradeep Shukla
Technician (2)


Shri Sunder Lal Yadav
Technician (2)


Shri Abdul Rehman
Technician (2)


Shri Pramod Kumar
Technician (2)


Shri Brij Mani Pandey
Technician (2)


Shri Syed Husain Nasir Naqvi
Technician (2)


Shri Jagdish Chandra Awasthi
Technician (2)


Shri Syed Hasnain Nasir Naqvi
Technician (2)


Shri Rajeev Sriavastava
Technician (2)


Shri Chandra Sehkar Singh
Technician (2)


Shri Abhishek Rawat
Technician (2)


Shri Shiv Prakash Rahi
Technician (2)


Shri Sushil Kumar Saroj
Technician (2)

Lab Asistants / Attendants

Shri Machh Narain
Lab Assistant

Shri Hari Ram
Lab Assistant

Shri Naushad Ahmed
Lab Assistant

Shri Ram Kumar
Lab Assistant

Administrative Staff

Administrative Staff with Professor Alok Dhawan, Director, CSIR-IITR

Shri K. Prasad Sharma
Controller of Administration

Dr Gyanendra Mishra
Controller of Finance & Accounts

Shri Satyendra Kumar Singh
Stores & Purchase Officer

Smt Kanaklata Mishra
Finance & Accounts Officer

Shri Dharm Raj
Finance & Accounts Officer

Shri Kul Karan Singh
Section Officer (S&P)

Shri Chandra Shekhar Kandpal
Section Officer (F&A)

Smt Rashmi Rathore
Section Officer (G)


Shri Chandra Mohan Tiwari
Hindi Officer


Shri Vivek Srivastava
Security Officer


Shri Mohammad Aslam
Private Secretary


Smt Kusum Lata
Private Secretary


Shri Prem Prakash
Private Secretary


Shri Devesh Chandra Saxena
Asstt. Section Officer (G)


Shri Shitla Shankar Shukla
Assistant Section Officer (G)


Shri Ganga Prasad
Assistant Section Officer (G)


Akhilesh Kumar Nigam
Assistant Section Officer (G)


Shri Ajay Prasad
Assistant Section Officer (G)


Shri Pawan Kumar
Assistant Section Officer (G)


Shri Amit Kumar
Assistant Section Officer (G)


Shri Narendra Singh
Senior Secretariat Assistant (G)


Shri Ugra Sen
Assistant Section Officer (F&A)


Shri Anuj Deep
Assistant Section Officer (F&A)


Shri Kusehar Prasad
Assistant Section Officer (S&P)


Shri Manoj Tiwari
Assistant Section Officer (S&P)


Shri Ramendra Kumar
Assistant Section Officer (S&P)


Shri Sandeep Kumar Pal
Junior Secretariat Assistant


Smt Vijya Suresh
Senior Stenographer


Smt Balbeer Kaur
Senior Stenographer


Smt Archna Agarwal
Senior Stenographer


Shri Ram Bilas
Senior Stenographer


Smt Suman Yadav
Senior Stenographer


Shri Tanuj Joshi
Junior Stenographer

Support Staff


Shri Vikas Barua
Group D


Shri Mahesh Yadav
Group D


Shri Ram Sajeevan
Group D


Shri Rajesh Kumar
Wash Boy


Shri Ravindra
MTS


Shri Sinod Kumar
Bearer


Shri Rajendra Yadav
Bearer

Superannuation

Shri Bhiku Lal
Personal Secretary
31.10.2019

Dr Poonam Kakkar
Chief Scientist
30.09.2019

Shri Umesh Chandra
Bearer
31.08.2019

Dr P.D. Dwivedi
Senior Principal Scientist
31.07.2019

Dr A. Kanan
Senior Principal Scientist
31.07.2019

Shri Lalit Kumar
Section Officer
31.07.2019

Shri Anirudh Vishwakarma
Lab.Attendant.
30.06.2019

Shri Rajendra Kumar
Tea Maker
30.06.2019

Shri Parmanand
Multi Tasking Staff
31.05.2019

Shri B.K.Mishra
Finance and Accounts Officer
30.04.2019

Shri Suresh Kumar
Section Officer
30.04.2019

Shri Arun Kumar
Senior Technical Officer
31.03.2019

Shri R S Singh
Multi Tasking Staff
31.01.2019

Shri D K Singh
Multi Tasking Staff
31.01.2019

Obituary

CSIR-IITR family deeply mourns the demise of the following members:

Shri Ashok Kumar
Technician (2)
09.12.2018

Dr Kunwar Pal Singh
Chief Scientist
13.10.2019

New Appointments

Dr Beena Vamadevan

Dr Beena Vamadevan joined as a Scientist (Veterinary Pathology) in the Regulatory Toxicology group of CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow, on November 16, 2018. She completed B.V.Sc. and AH from the College of Veterinary and Animal Science, Mannuthy, Kerala in 2013 and M.V.Sc. in Veterinary Pathology from ICAR-IVRI, Bareily in 2015. Later, she continued her Ph.D. in Veterinary Pathology at the same institute. During Ph.D., she worked on pathogenicity and immunogenicity of inactivated Japanese encephalitis virus vaccine in experimental mouse model. She published more than 10 papers in journals of national and international repute. At CSIR-IITR, she is involved in GLP studies and pathology related R&D. She has expertise in all kinds of pathology related work especially gross-, histo-, and molecular- pathology of animal models.

Dr Yatendra Kumar Satija

Dr Yatendra Kumar Satija joined as a Scientist in Research Planning & Business Development (RPBD) division of CSIR-IITR on November 20, 2018. Before joining CSIR-IITR, Dr Satija was working in the field of molecular biology of cancer with primary focus on proteins of p53 tumour suppressor family. He was awarded Ph.D. from the National Institute of Immunology, New Delhi, in the year 2015. After his Ph.D., he had joined the Dr B.R. Ambedkar Center for Biomedical Research (ACBR), University of Delhi, as a DST-INSPIRE Faculty and served there for more than three years. Further, Dr Yatendra has been bestowed with prestigious awards and scholarships, such as, Professor T.S. Sadasivan Memorial NABS-Best Research Paper Award, 2016, Jeans & Ashit Ganguly Educational Fellowship. At CSIR-IITR, he is involved in S&T management and his major responsibilities include drafting of agreements related to R&D activities and technology/know-how transfer, association with academia/industries, coordination for international collaboration, facilitation of intellectual property right management, coordination and administration of scientific aspects of new and ongoing projects including planning and implementation.

Dr Bojjagani Sreekanth

Dr Bojjagani Sreekanth has joined CSIR-IITR as a Scientist on February 27, 2019 in Environmental Toxicology group of CSIR-Indian Institute of Toxicology Research (CSIR-IITR). He did M.Tech. in Environmental Engineering from Central University, Pondicherry. Dr Sreekanth had done Ph.D. from IIT-Bombay, Mumbai in the area of air pollution assessment and air quality Software Modeling. Later, he had worked as an Environmental Scientist and Engineer for Vimta Labs Limited and Bhagavati Ana Labs in Hyderabad. He was a research fellow at Newcastle University, United Kingdom and Postdoctoral Research Associate at IIT-Bombay in the past. He was also a guest lecturer in Engineering Staff College of India (ESCI), Hyderabad. He has completed several scientific and industrial projects related to air quality and Environmental Management. Dr Sreekanth is an QCI-NABET accredited function area expert for category-A projects of air quality modeling and air pollution studies. He is an associate member of The Institutions of Engineers (India), Kolkata, and a member of Confederation of Indian Industry (CII), Hyderabad.

Dr Ashish Diwedi

Dr Ashish Diwedi joined as a Scientist at CSIR-IITR in the area of Food, Drug & Chemical Toxicology on May 27, 2019. He has done his Ph.D. from Photobiology laboratory, CSIR-IITR on phototoxicity/photosafety assessment of therapeutic drugs, environmental pollutants and nanotized phytochemicals after ambient UV-R exposure. He did his Post Doctoral Research from Israel Institute of Technology (IIT), Israel and Colorado University, USA on cancer biology. He has ten years of research experience in photosciences and has published several papers in journals of international repute. He has also published three edited books on Photoprotection, Skin Aging and Neuroprotection. Currently, he is working on the detection of GM food and their safety assessment.

Dr Akhilesh Kumar Yadav

Dr Akhilesh Kumar Yadav joined as a Scientist in the Analytical Chemistry laboratory of this institute on August 21, 2019. Dr Akhilesh completed his Ph.D. in Natural Product/Analytical chemistry from CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow (CSIR-CIMAP) in 2014. After his Ph.D., he also worked as a Research Associate at Indian Council of Medical Research, New Delhi during 2014-2015. Subsequently he worked as a Post Doctoral Fellow in the laboratory for Molecular Infection Medicine, Department of Molecular Biology, Umeä University, Sweden, from March 2015-February 2019. During this period, Dr Yadav had worked on various bacterial models to have a better understanding of the structural and chemical complexity of the bacterial cell wall peptidoglycan, during chronic and acute infections and antibiotic treatment. So far, he has more than 25 publications in national and international journals of repute.

DST Inspire Faculty/ National Postdoctoral fellows/ Woman Scientists/ Project Research Associate

Dr Naveen K. Gautam
DST Inspire Faculty
(upto June 06, 2019)

Dr Shiv Singh
DST Inspire Faculty
(upto May 07, 2019)

Dr Manisha Mishra
DST Inspire Faculty

Dr Kavita Seth
DST Woman Scientist

Dr Kriti Gupta
DST Woman Scientist

Dr Richa Singh
National Postdoctoral Fellow

Vineeta Sharma
Project Research Associate

Abhilasha Kanojia
Project Research Associate

Manisha Bhateria
Project Research Associate

Deepti Chopra
National Postdoctoral Fellow


Abhishek Mishra


Abik Nandi


Aditya Kumar


Aditya Kumar Kar


Aditya Pankaj


Ajit Kumar Rai


Akash Kumar


Alika Sarkar


Alina Zehra


Alpana Mathur


Amrita Singh


Anchal Chauhan


Anees Ahmad


Anil Kumar Singh


Anima Kumari


Anjali Singh


Ankit Kumar


Ankita Gupta


Ankita Rai


Ankita Sharma


Annapurna Maurya


Anshuman Srivastava


Anugya Srivastava


Anuj Pandey


Anuradha Singh


Anuradha Yadav


Anurag Kumar Srivastava


Aparna Dwivedi


Aparna Singh Kushwaha


Archana Yadav


Arun Pratap Singh


Ashish Kumar Sonkar


Ashutosh Yadav


Asmita Garg


Avinash Joriya


Chandra Nath Hansda


Charul Rajput


Chetan Singh Rajpurohit


Deeksha Singh


Deepak Sachan


Deepshi Chaurasia


Devesh Trivedi


Divya Dubey


Divya Singh


Durgesh Mourya


Garima Singh


Gayatri Bagree


Hafsa Hashmi


Hamid Kamal Khan


Harshita Pandey


Himanshu Pawankumar Gupta


Humaira Ahmad


Imran Ahmad


Indra Dev


Ishrat Jahan Saifi


Ishu Singh


Jagreeti Singh


Jagriti Shukla


Jamal Ahmed Ansari


Jitendra Vishwakarma


Juhi Mishra


Julee Verma


Kajal Karsauliya


Kamini


Kapil Mandrah


Kavita Dubey


Kavita Koshta


Keerti Gupta


KM Kainat


Krishna Gautam


Lavi Rani


M.T. Vishnu Sathyan


Manish Kumar Tripathi


Manjeet Gupta


Marhaba


Meetali Sinha


Minal Chaturvedi


Minu Singh


Mirat Ul Fatima


Mithilesh Kumar Mishra


Mohammad Fareed Khan


Mohammad Imran Ansari


Mohan Lal


Mohd Sami Ur Rasheed


Monika Gautam


Monika Seth


Nabojit Das


Namrata Mittra


Nawaz Khan


Neeraj Kumar Verma


Neeraj Rawat


Neha Dhiman


Neha Gupta


Neha Shukla


Neha Singh


Nida Moin


Nidhi Sachan


Nirmesh Srivastava


Nishant Singh


Nitesh Dhiman


Nitisha Mehrotra


Nitya Dubey


Nivedita Maddheshiya


Nupur Mishra


Nuzhat Bano


Onila Lugun


Oyashvi Verma


Pallavi Srivastava


Pankhi Vatsa


Paramjeet Singh


Pawankumar Rai


Pooja Yadav


Poorwa Awasthi


Prakrity Singh


Pramod Kumar


Praveen Kumar


Preeti Devi


Preeti Rathour


Priya Saxena


Radhika Singh


Rafat Malik


Rahul Verma


Raj Kumar Regar


Rajesh Kumar


Rajib Kumar Dey


Ravi Kumar Tiwari


Ravindra Singh Thakur


Renu Negi


Renuka Maurya


Richa Singh


Riddhi Rai


Rishabh Rawat


Rukmani Pandey


Saba Qureshi


Sadaf Aiman Khan


Salil Srivastava


Sana Sarkar


Sangh Jyoti Singh


Sanjay Saini


Sanjeev Yadav


Santosh Kumar Verma


Sarika Yadav


Saumya Shukla


Saumya Asthana


Saumya Gupta


Saumya Mishra


Saumya Mishra


Saurabh Pal


Saurabh Singh


Saurabh Singh


Saurabh Tiwari


Shagun Shukla


Shashank Kumar Ojha


Shashyendra Singh Gautam


Shreya Dwivedi


Shishtha Maurya


Shraddha Pandit


Shrishti Mehrotra


Shristee Gupta


Shubham Mishra


Shubham Verma


Shubhendra Kumar Mishra


Shweta Goyal


Shweta Devi


Shweta Singh Chauhan


Siddhartha Gangopadhyay


Smriti Singh


Snigdha Gupta


Sonam Chandra


Sugandh Saxena


Sukhveer Singh


Sumit Kumar Anand


Supriya Srivastava


Surabhi Jaiswal


Suraj Ghosh


Tripana Das


Tuba Parveen


Tulika Srivastava


Upasana Pandey


Uzair Ahmad Ansari


Varsha Singh


Varsha Tripathi


Ved Prakash


Veena Jain


Vibha Shukla


Vinay Kumar Yadav


Vinita Verma


Vinod Kumar


Vipendra Kumar Singh


Vipin Kumar Yadav


Vivek Kumar Gaur


Yahavi Chandrasekharan


Yogendra Nagar


Zeeshan Arif

Staff Strength

(As on 31/10/2019)

Scientific Staff Group IV	52
Technical Staff Group III	23
Technical Staff Group II	26
Lab Assistants/Attendants	04
Adminsitrative Staff	33
Support Staff	07
Total	145

DST Inspire Faculty / Women Scientist / National Post Doctoral Fellow / Research Associate	10
Research Scholars & Project Fellows	194
Total	**204**

Budget

External Cash Flow (ECF) : (FY 2018-19)

Rs. in Lakhs

Government	912.896
Foreign	29.477
Industries	56.226
Total	**998.599**

Government Budget (FY 2018-19) : 6484.803

Group Photograph

Ph.D. students/ Project Fellows/Research Interns with Director-CSIR-IITR

सीएसआईआर-भारतीय विषविज्ञान अनुसंधान संस्थान
CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH

विषविज्ञान भवन, 31, महात्मा गाँधी मार्ग, लखनऊ-226001, उ.प्र., भारत
VISHVIGYAN BHAWAN, 31, MAHATMA GANDHI MARG, LUCKNOW-226001, U.P., INDIA