



Meeting Report

Indian Society for Alternatives to Animal Experiments: Sixth Annual Meeting and International Conference

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Introduction

Animal experimentation, a traditional approach of scientific exploration, engages around 115 million animals annually for diverse scientific purposes. These include basic research, safety assessments, evaluation of potential harm to humans or animals, and efficacy testing for products like cosmetics, industrial chemicals, drugs, and medical devices (Taylor, 2019). Yet, ethical considerations about the treatment of sentient beings have instigated a profound reassessment of conventional research methods. The ethical principle of respecting and valuing all forms of life emphasizes the responsibility to safeguard fellow creatures, acknowledging their dignity and recognizing the right of each species to thrive in its natural way (Swiss Academy of Medical Sciences, 1997). Despite the extensive use of animals in research, there is a significant gap in translating animal data into successful clinical outcomes, as reflected in high failure rates exceeding 90% between phase-I clinical trials and drug approval (Swaminathan et al., 2019). The discussion regarding the ethical utilization of animals in scientific experiments is heightened by the suffering, discomfort, and mortality endured by these sentient beings throughout such investigations (Doke and Dhawale, 2015). Arguments opposing animal testing underscore the innate rights of living beings to avoid pain and suffering, prompting ethical considerations that necessitate a reassessment of existing procedures and modernization of science. Growing ethical and scientific concerns regarding the utilization of animals in life and biomedical sciences have garnered attention, driven by the initiatives of organizations like People for Animals (PFA), People for the Ethical Treatment of Animals (PETA), India, Humane Society International (HSI), etc., and centers such as Mahatma Gandhi-Doerenkamp Center (MGDC) for Alternatives to Animal Use in Life Science Education established by the Doerenkamp-Zbinden Foundation (DZF), Switzerland, and National Center for Alternatives to Animal Experiments (NCAAE), formerly supported by the University Grants Commission (UGC). During the past ten years, regulatory authorities in India, including Indian Council of Medical Research (ICMR); Committee for the Purpose of Control and Supervision of Experiments on Animals (CCSEA); National Medical Commission (NMC), Pharmacy Council of India (PCI), Ministry of Environment, Forest, and Climate Change (MoEF), and UGC, have introduced regulations and guidelines to tackle these ethical issues (Rahman et al., 2014; CDSO, 2023). In the contemporary scenario, there are new approach methodologies (NAMs) comprising diverse techniques, including 2D cell culture, culture of cells in 3D format, viz., spheroids, organoids, organs-on-a-chip,

microphysiological systems, stem cell applications, etc. (*in vitro*), computational and mathematical models (*in silico*), alternative, less sentient model organisms, *in chemico* assays that attempt to identify reactive compounds, non-invasive diagnostic imaging, and clinical research of micro-dosing in human participants (Taylor, 2019).

The Department of Pharmacology at Jawaharlal Nehru Medical College (JNMC), Aligarh Muslim University (AMU), Aligarh, has been actively involved in the realm of alternatives to animal experimentation since its inception (Rai and Singh, 2006). During that period, the department established a dedicated laboratory called the Alternatives to Animal Experimentation Lab, with the primary goal of educating medical students on alternatives to pharmacology experiments, utilizing software from various sources (Ranganatha and Kuppast, 2006). This has led to a substantial decrease in the utilization of animals for laboratory experiment purposes. Dr Syed Ziaur Rahman and Dr Mohamed Tariq Salman released the third edition of a specialized manual on Alternatives to Animal Experiments in 2014, reinforcing the department's dedication to promoting alternative methods in pharmacology education. In the same year, the Department of Pharmacology at JNMC, AMU, conducted a National Workshop/CME on Alternatives to Animal Experimentation in Medical Science Education (Rahman et al., 2014). To further propagate the concept of alternatives to animal experimentation among the scientific community of India, a two-day International Conference on Alternatives to Animal Experiments and the 6th Annual Meeting of the Society for Alternatives to Animal Experiments (SAAE-I AC6), was organized by this department, in collaboration with the SAAE-I, and supported by PETA India, Council of Scientific & Industrial Research-India (CSIR-India), Jai Research Foundation Global (JRF Global, India), and Doerenkamp-Zbinden Foundation, Switzerland, on November 20-21, 2023.

Preconference paper presentation

A virtual pre-conference presentation was held on Nov 16 featuring 26 paper presenters from across India. The panel of juries, consisting of Prof. Syed Ziaur Rahman, Prof. Farhan Ahmad Khan, and Dr Jameel Ahmad from JNMC, Aligarh, and Prof. Ashok Dubey from All India Institute of Medical Sciences (AIIMS), Bilaspur, selected the best three oral and the best three poster presentations for the MatTek prizes. Prizes for the oral presentations were awarded to Dr Barkha Shakya for “*Drosophila melanogaster: A promising model to detect neurotoxicity and changes in life cycle parameters when exposed to arecoline,*”



Dr Maharajan Kannan for “*Developmental toxicity of pyriproxyfen in zebrafish (Danio rerio) embryos*,” and Shahzad Ahmad for “*Network toxicology in the risk assessment of exposure and health hazards of phthalates*.” Prizes in the poster presentation category were awarded to Dr Garima Jindal for “*The early developmental changes in zebrafish larvae with the exposure to di-ethyl hexyl phthalate*,” Iqra Subhan for “*Effect of geraniol against the toxicity induced by paracetamol*,” and Saba Afsheen for “*Assessment of fenpropathrin toxicity, a pyrethroid pesticide: Induction of dopaminergic neurodegeneration in Drosophila melanogaster*.” The cash prizes and certificates were conferred on November 21 at the valedictory function of the conference. These recognitions highlight the diverse and impactful contributions made by the participants to the concept of alternatives.

Inauguration of the conference

The formal inauguration of the conference was held on Nov 20, 2023. Prof. **Veena Maheshwari** (Dean, Faculty of Medicine, JNMC, AMU), in her introduction, emphasized the commitment to treating animals with kindness. She highlighted the historical roots of the theme of alternatives to animal experimentation, tracing it back to 1959 when William Russell and Rex Burch introduced the 3Rs principle – Replacement, Reduction, and Refinement – for humane experimental techniques. She stated that the conference serves as a platform to delve into alternative methods that align with these principles, offering participants valuable insights into progressive approaches to experimentation without the use of animals. Prof. **Haris M. Khan**, Principal and Chief Medical Superintendent (CMS) of JNMC Medical College Hospital, offered felicitation. Prof. **Mohammad Gulrez**, Vice Chancellor, AMU, the chief guest, highlighted the disparity between millions of animals used daily for medical experiments and the incongruent results in humans. He commended India’s ongoing efforts, rooted in the Prevention of Cruelty to Animals Act of 1960, which laid down conditions for animal experiments. Prof. Gulrez emphasized the need to discern experiments that require animal use from those that can be conducted with alternative methods. Prof. **Syed Ziaur Rahman**, Organizing Secretary of the Conference and Chairman of the Department of Pharmacology at JNMC, AMU, informed that JNMC established India’s first lab in any medical college dedicated to alternatives to animal experimentation in 2006. This pioneering initiative showcased JNMC’s commitment to progressive and ethical education, featuring simulated experimental works on animals using cutting-edge techniques through computer-assisted learning.

In his address, Prof. **Mohammad A. Akbarsha**, General Secretary, SAAE-I, discussed advanced alternatives in medical and toxicology research. Prof. Akbarsha cautioned against reliance on animal data for human clinical testing, urging the adoption of NAMs. His keynote underscored a paradigm shift toward innovative and ethical methodologies aligned with contemporary scientific advancements, providing valuable insights for the future of medical research. Prof. **Mohammad Afzal**, Dean of the Faculty of Life Sciences and Chairman of the Organizing Committee, underscored the unwavering commitment to utilizing invertebrate

animals and exploring alternative methodologies in contrast to traditional animal experiments. This commitment exemplifies the faculty’s dedication to fostering innovative and ethical research practices. In his address, Prof. **Yogendra K. Gupta**, President of SAAE-I and President of AIIMS, Jammu, advocated minimizing animal use and enhancing animal rehabilitation efforts until total replacement of animal experiments becomes possible. He championed the use of alternatives like *in silico* models and organoids in drug trials, utilizing technology to reduce the number of animals involved. He highlighted advancements in testing methodologies, such as using cell simulations in anti-diabetic drug trials, promoting efficiency and ethical practices.

During the inauguration program, a special souvenir and abstracts, edited by Prof. **Farhan Ahmad Khan** and Dr **Irfan Ahmad Khan**, were released by the dignitaries.

Dr Dipti M. Kapoor Endowment Award

Dr **Gopinath Packirisamy**, Professor and Head, Centre for Nanotechnology, Department of Biosciences and Bioengineering, Indian Institute of Technology Roorkee, was selected by the duly appointed committee of juries as winner of the Dr Dipti M. Kapoor Endowment Award 2023. Among many contributions of Dr Gopinath, the outstanding one is “*4D scaffolds: Adding a new dimension to tissue engineering*,” which effectively mimics the dynamic *in vivo* conditions of cells apart from supporting 3D growth and proliferation, and the hybrid multilayered scaffold that has had a significant impact on tissue engineering research.

Lifetime Achievement Award

Prof. **K. C. Singhal**, former Professor of Pharmacology at JNMC, AMU, and Honorary Consultant at the WHO Collaboration Centre for International Drug Monitoring, Sweden, was honored with the Lifetime Achievement Award by the Department of Pharmacology, Faculty of Medicine, JNMC, AMU, Aligarh. The prestigious award was bestowed in recognition of his extensive contributions as a teacher and researcher.

Conference lectures

The introductory lecture of the conference was delivered by Prof. **Y. K. Gupta** (President, AIIMS – Vijaynagar and Jammu, Chairman National GLP Technical Committee, DST, and Chairman, International Centre for Genetic Engineering and Biotechnology-RCGM, Government of India). He spoke on the “*Strategic roadmap for alternatives in India*.” In the first guest lecture, Ms **Savita Nutan**, a scientist from UK, and founder of *Medicine without Cruelty*, advocated strongly against animal trials. In her presentation, she challenged the scientific idea that genetic similarity implies physiological likeness, asserting that curing animal diseases does not guarantee human efficacy. Dr Nutan questioned corporate claims of being animal-free, revealing continued animal testing through affiliated labs. She insisted that the abundance of electronic health data and AI innovation renders animal testing unnecessary, emphasizing its detrimental impact on human health.

Dr **Adrian Smith**, from NORECOPA, spoke online on “*How to use the 3Rs to plan for better science*,” and underscored the ur-



gent necessity of advancing the 3Rs in animal experimentation, driven by scientific, legal, and ethical imperatives. Advocating for a holistic scientific approach, he emphasized early preparation, comprehensive evaluation of alternatives, and collaboration with specialists on NAMs. This collective effort aims to guarantee the validity and transferability of results in experiments involving animals, aligning with contemporary ethical and scientific standards.

In the plenary talk “*Opportunities and challenges for implementing 21st century non-animal toxicity testing in India*,” Dr **Ankita Pandey**, Science Policy Advisor, PETA India, discussed the need for a paradigm shift in the toxicity testing of agrochemicals – from checklists of *in vivo* tests to the use of data from NAMs. Chemical toxicity assessments have conventionally relied on *in vivo* tests, many of which date back nearly 100 years. The questionable human relevance and reproducibility of animal tests, the ethical issues associated with the use of animals, and the need for more rapid and efficient testing tools have led scientists to increasingly adopt modern, non-animal test methods that reflect key aspects of human biology. The talk highlighted global regulatory developments in the use of NAMs, which include *in vitro*, *in chemico*, *ex vivo*, *in silico*, and omics technologies, to replace and reduce the use of animals. Dr Ankita proposed steps to transition the current testing paradigm towards 21st century weight-of-evidence risk assessment based on consideration of use and exposure patterns, existing information, and acceptance of data from non-animal testing approaches to drive risk decisions.

The conference also benefitted from the participation – for the first time – of government regulators and industry stakeholders through a session moderated by Dr Ankita Pandey along with **Vipin Saini**, CEO of the Biological Agri Solutions Association of India. In this session, Dr **S. K. Jain**, Senior Consultant (Medical Toxicology) at the Central Insecticides Board and Registration Committee (CIB&RC), Ministry of Agriculture and Farmer’s Welfare, India, presented “*Application of new approach methodologies to meet agrochemical testing requirements in India*.” The talk explored the regulatory landscape and the current toxicity testing requirements for agrochemical registration in India. Dr Jain highlighted CIB&RC’s efforts to embrace NAMs in its revisions to the guidelines for chemical pesticides and biopesticides (CIB&RC, 2023) and achieve scientific alignment with global regulatory agencies while continuing to protect human health and the environment.

In his address on “*Implementing NAMs to modernize agrochemical risk assessment*,” Dr **Pradeep Kumar**, Regulatory Toxicologist at Corteva Agriscience, India, discussed how using NAMs and avoiding animal use are pivotal in the advancement of chemical hazard assessment. Dr Kumar expanded on Corteva Agriscience’s global experience in using NAMs, shared general strategies for replacing and reducing the use of animals for acute toxicity testing of agrochemicals, and highlighted the benefits of and barriers to wider acceptance of NAMs in agrochemical risk assessment. Dr **Abhay Deshpande**, Director of Global Innovation and Strategy, Jai Research Foundation (JRF), India, spoke about “*NAMs, we have some, we need some more ...*” He highlighted

the current trends in NAMs, the non-animal methods offered at his contract research organization (CRO), and the scientific benefits and limitations of using NAMs from the perspective of a CRO.

The panel discussion that followed identified existing barriers to change and strategies to facilitate widespread adoption of NAMs in India. Dr **Debabrata Kanungo**, Global Expert of Medical Toxicology, Human Health Risk Assessment, and Food Safety, former Additional Director General of the Ministry of Health and Family Welfare, and Chair of the Food Safety and Standards Authority of India’s Scientific Panel on Pesticide Residues, emphasized the need for regulators to move from an animal-intensive check-box approach to a more robust risk assessment framework using NAMs. The panelists noted that more flexibility should be incorporated into the guidelines to allow data requirements that do not add value to the regulatory decision-making process to be waived. They agreed that substantial progress has been made in India, but concerted efforts are still necessary to maximize scientific advancements in toxicity testing. Increased dialogue between industry and regulators – to allow for clarification of toxicity data requirements before testing begins – and more discussions on the availability and readiness of the latest NAMs to be incorporated in a regulatory context, striving towards global harmonization, will help to facilitate the incorporation of new testing strategies in India.

A session on the use of non-animal methods for regulatory testing of pharmaceuticals was chaired by Dr **Rohit Bisht**, scientist, Pharmaceuticals and Medical Devices, PETA India, and Prof. **Yogendra K. Gupta**, President of SAAE-India. Dr Bisht presented his talk on the theme “*Replacing animal test methods with alternatives in the Indian pharma sector: Where we are*.” In the last several decades, the collective efforts of global regulatory bodies, academia, the pharmaceutical industry, and other stakeholders have resulted in a shift towards the use of human-relevant non-animal methods. This change is now official policy for an increasing number of government agencies, but significant efforts are needed to ensure that these changes proceed in India at a rate comparable to other regions. Challenges – such as the high cost of alternatives, lack of funding opportunities, and lack of hands-on experience in using new technologies – need to be addressed. PETA India works with regulators, policymakers, funding agencies, scientists, and stakeholder companies to address these challenges and to advance the accessibility of non-animal methods in India. In her talk on “*Alternative test methods in Indian Pharmacopoeia*,” Dr **M. Kalaivani**, Senior Scientific Officer of the Indian Pharmacopoeia Commission (IPC), India, advocated proactive steps to implement the 3R principles through the *Indian Pharmacopoeia*, including the constitution of a targeted expert working group. By evaluating non-animal methods’ applicability and how they compare to the *in vivo* methods they aim to replace, assessing published scientific literature, and examining retrospective data, IPC has been able to reduce animal use, including by removing the abnormal toxicity test from human vaccine monographs and introducing the monocyte activation test as a replacement for the rabbit pyrogen test and the bacterial endotoxin test. Dr **Aldon Fernandes**, Head of Operations, Genei Laboratories Pvt Ltd, India,



delivered a talk on “*Efficient and humane use of animals in biologicals production and the search for alternatives.*” The talk recognized the need for alternative methods of quality control release testing in biologics that would advance analytical techniques and their applications and offer the opportunity to replace or reduce animal use. Regulations and guidelines governing how the safety and efficacy of vaccines and other biologics are evaluated currently require large numbers of animals to be used in immensely painful and distressing procedures. Dr Fernandes said NAMs are a high priority for global regulatory authorities and cited the need for consistency and the harmonization of alternative methods, supported by regulators. Dr **Ashvinkumar Bhaverkar**, Senior Expert from Merck Life Sciences, India, discussed in a talk titled “*Monocyte activation test: Alternative pyrogen test method,*” how the non-animal method can replace and improve on the animal test for the detection of pyrogens. The monocyte activation test, which is available as a ready-to-use kit, is the only *in vitro* test for pyrogen detection that can detect the full range of pyrogens, whereas the rabbit pyrogen test lacks human relevance due to the difference between the reaction of humans and animals, and the bacterial endotoxin test detects only endotoxins.

In the panel discussion that followed, Dr **Bisht** highlighted the strategies for overcoming present challenges, including the establishment of a database on the number of animals used in studies and their outcomes, and action by funding agencies to redirect funds away from animal-based studies and towards the development of alternative methods, and to conduct critical scientific analyses of funding applications and reject those proposing tests on animals when non-animal methods are available. Dr Kalaivani discussed how the IPC Expert Working Group targets opportunities for animal replacement and welcomes discussion about alternative methods. As a concluding remark, Prof. Gupta highlighted the need for a brainstorming session to bring together regulators and stakeholder agencies.

A special session of a CRO, Jai Research Foundation (JRF), Vapi, Gujarat State, was conducted. Dr **Jaimish Prajapati** delivered a lecture on “*In vitro inhalation toxicity assay of lambda-cyhalothrin 5% EC using EpiAirway.*” He gave information regarding MatTek’s EpiAirway™ model, an effective alternative to conventional OECD tests for assessing inhalation toxicity of agricultural chemicals. Dr **Mamata Mishra** discussed “*Development and characterization of a reconstructed human epidermis (RHE) model using house-isolated human primary epidermal keratinocytes (HPEK) is almost identical to other epidermis models.*” According to her, the global shift towards reducing animal use in research emphasizes the urgent need for *in vitro* models, such as the in-house 3D human skin model using neonatal foreskin samples. This model, characterized by keratinocyte expression profiles, offers a viable alternative for skin toxicity testing and safety assessment in cosmetic research. Dr **Priyanka Mishra** spoke about “*3D spheroid models and their application in assessing long-term hepatotoxicity.*” She explained that 3D tumor spheroids serve as an effective *in vitro* model for long-term toxicity screening, offering improved cell viability and mimicking *in vivo* conditions. These models enhance drug safety assess-

ment by providing molecular insights into sequential changes and potential outcomes during prolonged exposure and aiding in drug development decisions. Dr **Subham Barard**’s lecture focused on “*JRF’s participation in an OECD TG 428 study ring trial with 14C-caffeine and its comparison with in-house GLP data.*” The OECD TG 428 dermal absorption assay demonstrated robust and reliable performance across multiple laboratories, showing consistent results in intra- and inter-laboratory trials. The study’s internal validation and historical data from JRF reaffirmed the reliability of the assay and highlighted its suitability for assessing dermal absorption potential in standardized conditions. Dr **Bharath Basavapattana Rudresh** spoke about “*Development and experimental validation of 3D QSAR models for thyroid disruptors using integrated methods of computational chemistry,*” while Dr **Sreerupa Mitra** spoke on “*QSAR-based mutagenicity prediction of nitrosamine drug substance-related impurities.*”

Prof. **S. Raisuddin** (Jamia Hamdard Deemed University, New Delhi; Vice President, SAAE-I) spoke on “*Fish as an alternative model for the study of environmental stress.*” He highlighted zebrafish and Japanese medaka serving as valuable models for studying toxicity, disease modeling, and pharmaceutical efficacy. Research has demonstrated their suitability for assessing toxicopathological effects, oxidative stress, and endoplasmic reticulum stress induced by environmental chemicals, offering insights into environmental impact and biomarker responses. Dr **Christian Pellevoisin**, from MatTek, France, joined online and shared insights on the “*Fascinating journey of toxicology’s 20-year revolution fueled by the transformative impact of 3D models.*” Over the past two decades, 3D-tissue models, notably for skin and eye toxicity testing (OECD Test Guidelines TG 439, 498, and 492), have replaced animal methods. Despite the progress, challenges in regulatory acceptance and global access persist. MatTek, a leading 3D tissue producer, effectively participates in addressing these issues, fostering the success and broader adoption of 3D models in toxicology. Prof. **Nobuhiko Kojima**, Department of Life and Environmental System Science, Graduate School of Nanobioscience, Yokohama City University, Japan, also joined online and talked about a context initiative aimed at increasing awareness of 3Rs principles among high school students. Mr **Nick Jukes**, Founder of International Network for Humane Education (InterNICHE), delivered a captivating lecture introducing alternatives to animal experiments in education and showed a film featuring veterinary surgery scenes from the documentary “*DVM: Training the animal doctor.*”

Valedictory function

Prof. **Abdul Alim** (Dean Students Welfare, AMU, Aligarh), chief guest at the valedictory function, stressed the use of technology as an alternative to animal experiments, highlighting the interconnectedness of science, society, and culture. Mr **Pooran Chand**, Assistant Commissioner (Drug), presided over the function. Prof. **Y. K. Gupta** and others discussed the imperative for non-animal testing methods in scientific research. Prof. Syed Ziaur Rahman, Organizing Secretary, thanked all contributors, participants, ad-



ministration, and funding agencies for the support and making this international conference a success.

Conclusion

At the end of the international conference, feedback was collected from participants. Most attendees rated the conference at point 4 on the Lickert scale. The conference was successful in creating awareness and enhancing the acceptability of alternatives. The participants were willing to use modern techniques in the form of alternatives, and this program provided them with a good platform towards this end. Most of the participants urged to organize similar international conferences regularly.

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