

RESEARCH ACTIVITIES:

The National Poisons Information Centre (NPIC) at All India Institute of Medical Sciences is actively engaged in multidisciplinary research activities focused on clinical toxicology, poison surveillance, toxicovigilance, analytical toxicology, and public health preparedness. The research programs are aimed at improving poisoning management, generating evidence for policy formulation, and strengthening national poison control systems.

MAJOR RESEARCH ACTIVITIES AT NPIC INCLUDE:

CLINICAL TOXICOLOGY RESEARCH:

NPIC is actively engaged in studies on the epidemiology, clinical presentation, management, and outcomes of poisoning cases involving pesticides, pharmaceuticals, household chemicals, snakebite, heavy metals, and drugs of abuse. Additionally, research activities towards 'Evaluation and metabolomic analysis of pesticide-induced toxicity using in-silico methods- an exploratory study' was taken up (Ethical approval- AIIMSA4614/12.09.2025) targeting occupational hazard. The primary objective was to estimate pesticide levels in pest control workers and to compare them with healthy controls and to characterize pesticide-induced toxicity and identify associated metabolic alterations using a comprehensive metabolomic approach. The study would lead to understand the interaction between the pesticides and its metabolites to identify key pathways involved using in-silico methods. To complete the study, health campaign was organised to collect the demographic details, blood samples of pest control workers and obtain their exposure history including physical parameters and to explain the preventive measures. The pulmonary function tests (PFTs) were also done to assess the impact of pesticide exposure on lung health. It would further help in evaluating the extent of lung function impairment and guide the management and treatment of respiratory diseases associated with pesticide exposure.



Pyrethroids are synthesized in agriculture and household pesticides. They have high insecticidal potency and relative safety in mammals. However, excessive or chronic exposure may cause neurotoxicity, respiratory irritation, endocrine disruption, oxidative stress, and adverse developmental effects, posing significant concerns for human health and environmental safety. At the outset, Dr Devendra Singh is analysing the association between the pyrethroid exposure with the incidence of parkinsonism in clinical subjects. The findings of this study will be crucial in analysing the neurological impact of long-term exposure to synthetic pyrethroids such as mosquito repellents.

MOLECULAR AND EXPERIMENTAL TOXICOLOGY:

Dr Swati Sharma is interested in identification of biomarkers for early and precise identification of toxin exposure. With the financial support from the AIIMS-IRG project, her team Identified potential biomarkers associated with lead toxicity using in-silico models.

Imidacloprid is a widely used neonicotinoid insecticide effective against sucking and soil insects in agriculture. It acts by targeting nicotinic acetylcholine receptors in insects, causing paralysis and death. Although considered less toxic to mammals, prolonged exposure may induce neurotoxicity, oxidative stress, reproductive toxicity, and environmental hazards, particularly affecting pollinators. Nonetheless, its cardiovascular effects are least explored. Dr Ajay Godwin Potnuri is interested in understanding the cardiovascular effects of neonicotinoids and he is currently working on exploring the effects of Imidacloprid and its metabolites on QT prologation. He is working in collaboration with Department of Biophysics and utilizes patch-clamp techniques for understading hERG channel kinetics. Preliminary data indicates that Imidacloprid and its metabolites are potential hERG channel blockers.

Another study by Dr Jyoti focuses on unravelling the effects of imidacloprid exposure on neurological and blood brain barrier functions during early development. This project is funded by AIIMS IRG scheme and the results of this project will shed light on the developmental toxicity of this class of pesticides.

EDUCATION AND CAPACITY BUILDING:

Apart from the conventional toxicological research, NPIC also focuses on education and capacity building research. Dr Swati Sharma extensively works on creating awareness among the vulnerable groups regarding the poisoning and analysis the KAP outcomes using statistical tools. The project funded by DST is instrumental in initiating both Education and Capacity Building research as well as the outreach activities of the center.

List of Research Projects sanctioned to NPIC			
Title of the project	PI details	Funding agency	Duration
Polymorphism of APOE gene in Alzheimer’s disease due to exposure of residuals of DDT, BHC and Dieldrin pesticides in Indian population”	Dr Madhuri Gupta	AIIMS -IRG	2016-2017
Assessment of awareness, perception and KAP (Knowledge, Attitude & Practices) related to common poisons and development of scientific communication modules for lifestyle modulation & year-round strategy for public awareness towards prevention of poisoning	Dr Swati Sharma	DST	2021-2023
Identification of potential biomarkers associated with lead toxicity due to occupational exposure using in-silico methods	Dr Swati Sharma	AIIMS-IRG	2020-2022
Association of pyrethroid exposure in Parkinson’s disease	Dr Devendra Singh	AIIMS-IRG	2024-2026
Understanding the QT prolongation risk of Imidacloprid and its metabolites using in vitro pharmacological studies	Dr Ajay Godwin Potnuri	AIIMS – IRG	2024-2027
Deciphering the effects of imidacloprid exposure on neurological and blood brain barrier functions during early development: a pilot study	Dr Jyoti	AIIMS-IRG	2025-2027