

Profile

National Institute of Pharmaceutical Education and Research (NIPER) is the first national level institute in pharmaceutical sciences with a proclaimed objective of becoming a centre of excellence for advanced studies and research in pharmaceutical sciences. The Government of India has declared NIPER as an 'Institute of National Importance'. It is an autonomous body set up under the aegis of Ministry of Chemicals and Fertilizers, Government of India. The Institute is conceived to provide leadership in pharmaceutical sciences and related areas not only within the country, but also to the countries in South East Asia, South Asia and Africa. NIPER is a member of Association of Indian Universities and Association of Commonwealth Universities. The institute is structured into ten departments catering to pharmaceutical as well as interdisciplinary scientific field of drug research viz. medicinal chemistry, natural products, pharmaceutics, pharmaceutical analysis, pharmacology and toxicology, biotechnology, pharmaceutical technology, pharmacoinformatics, pharmacy practice and pharmaceutical management.

The objectives of the institute are:

- Nurturing and promoting quality and excellence in pharmaceutical education and research.
- Continuing education programmes
- Creation of National Centres to cater to the needs of pharmaceutical industries and other research and teaching institutes
- Collaboration with Indian industries to meet the global challenges
- National/International collaborative research
- Curriculum and media development
- Study of sociological aspects of drug 'use and abuse', and rural pharmacy, etc
- Conducting programmes on drug surveillance, community pharmacy and pharmaceutical management

Department of Natural Products, NIPER – A Profile

The Department of Natural Products came into existence as one of the six basic departments opened at time of inception of NIPER on September 1, 1994. The department was adequately equipped in two years and it started doctoral program in July 1996. The medicinal plants garden was also created with a view to develop it as a referral center for authentication of botanicals for research purposes. The admission to Masters' program was opened in July 1998 through a national level entrance test. The department offers courses for degrees in M.S. Pharm. (natural products) and Ph.D. (natural products) and started recently M. S. (traditional medicine) course from July 2007. The main thrust of the academic programs focuses on researches on standardization and quality control of herbal/traditional medicinal products, discovery of new bioactive molecules for various therapeutic areas, design and synthesis of natural products and their analogs. The students are also exposed to interdisciplinary curricula so as to enable them to undertake researches in drug discovery development and process chemistry of active constituents. The courses are designed to integrate traditional knowledge with modern medicines.

The department has attracted funding by receiving research grants from various government, non government, and international agencies such as Department of AYUSH, Central Council of Research in Ayurveda and Siddha (CCRAS), and Indian Council of Medical Research (ICMR) under Ministry Health and Family Welfare; Department of Science and Technology (DST), Department of Biotechnology (DBT) Govt. of India, Council of Scientific and Industrial Research (CSIR) under Ministry of Science and Technology; International Foundation for Science (IFS) etc. The faculty has also undertaken a number of industry sponsored projects and consultancy assignments. The research efforts have led to several publications in journals of repute, both national and international and generation of Intellectual Property Rights (IPRs). The technical support has been provided to Ayurvedic Pharmacopoeia of India, Ayurvedic Formulary of India and Indian Pharmacopoeia in their development of standard monographs on botanicals and their formulations. The department has also contributed to the series of books on quality standards of Indian medicinal plants by ICMR.

International collaborations

Merck, USA has provided research award to undertake anti-obesity drug development project recently. In addition Merck has instituted 3 travel grant awards to Ph. D. scholars of the department for 2008-09. Merck, USA is also a co-sponsor of the DDNP-TM 2008 international conference. Department is also collaborating with the Institute of Pharmaceutical Sciences, Karl Franzens University, Graz, Austria in the field antimycobacterial natural products research. Other international collaborators include University of Mississippi USA, Australian National University and University of Louisville USA.

Presently, the department has **three faculties**, all having exposure to international research laboratories. **Seven students** have completed their doctoral degree and are well placed in academia and industry or have found positions as post doctoral fellows abroad. **Nine batches** of M.S. (Pharm.) students (**total 40**) have also passed out and have been well accepted in industry/academia. The department has successfully conducted two national workshops, one on curriculum development in natural products at post-graduate level to provide leadership in pharmaceutical education and research needed for natural products development and one on cultivation techniques of medicinal plants to all stakeholders right from cultivation fields, quality control personnel working for the processing industry and policy makers.

The department is well equipped and has state of the art facilities for research. It has well established chromatography laboratory with five HPLCs equipped with all different detectors, HPTLC, counter current chromatography, flash chromatography systems, gas chromatography and LC-MS. The department has recently procured Accelerated Solvent Extractor (ASE) and Supercritical Fluid Extractors (SFE, 2 No.) for fast and efficient extraction of plant materials. The department also has freeze dryer, pilot scale evaporators and extractors. The department also has a well established biology laboratory for biological evaluation of natural products and a tissue culture facility.

RESEARCH PRIORITIES

Drug discovery programmes: with an objective of generation of new lead molecules using melange of Chemistry and Biology.

- Discovery of new chemical entities (NCEs) from natural products of terrestrial, microbial and marine origin in the following
- therapeutic areas:
- Anti-diabetics, Antioxidants and immunomodulation, Adaptogens, Anti-inflammatory agents, Gynaecology and endocrine dysfunction, Anticancer agents with apoptotic molecular basis, Anti-protozoal and Anti-infective agents, Anti-obesity and Anti-hyperlipidemic life style diseases.
- Development of in vitro testing models for screening of natural products, in the above mentioned therapeutic areas
- Semi synthesis and synthesis of biologically active compounds along with generation of pseudo-natural Products

Traditional Medicine development programmes: with an objective of standardization and quality control of herbal drugs and products. The overall objective and aim of this traditional medicine programme are to meet the demand of cost effective medications and biological agents from sustainable medicinal plant resources with the following steps:-

- To lay down standards and effective quality controls on the Herbal Medicinal Products
- To create databases for identification and authentication of materials with well defined botanical and phytochemical characteristics
- To create libraries of marker/characterizing constituents for positive chemical identification of materials through chemoprofiling
- To create quantitative standards for extracts and their formulations through chemo- and bio- profilings
- To create standard protocols for establishing purity of materials, identification of adulterants, substitutes, pathogenic bacteria & fungi, heavy metals and pesticide residues
- To develop dosage forms of the herbal products and their stability studies with the help of Biomarkers
- Finally, to conduct clinical trials of the scientifically developed formulation and validate the traditional claims
- Understanding synergy between components of a medicinal plant, that have been described at a molecular level giving credence to the biomarker concepts apart from well understood chemical marker concepts
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Process technology programmes: With an objective of development of chemical process technologies for important natural products involving isolation, semisynthesis or synthesis.

Other areas of interest:

- Agrotechniques for the development of commercially important medicinal plants with high active component
- Development of tissue/cell suspension cultures for production of secondary metabolites
- Development of analytical methods for Phytochemicals.

The department has successfully implemented and completed **30** major research and development **projects in last 10 years**.