CV of Dr. Nitya Anand

Name & Designation: **Dr. Nitya Anand**
Retired Director
CSIR- Central Drug Research Institute, Lucknow

Date of Birth: 1st January 1925

I. Academic and Professional Qualifications:

Degree	Year	University/Inst.	Supervisor
M.Sc.	1945	Delhi University	
Ph.D.	1948	UDCT, Bombay University	**Prof. K. Venkataraman**
Ph.D.	1950	Cambridge University (U.K.)	**Prof. Lord Todd**
Rockfeller Foundation Fellowship	1958-59	Dept. of Bacteriology & Immunology, Harvard Medical School, Boston (USA)	**Prof. Bernard D. Davis**

II. Positions held : Scientist at Central Drug Res. Insitute, Lucknow (1951-84)

Junior Scientific Officer	Medicinal Chemistry	1951-54
Scientist B	Medicinal Chemistry	1954-59
Scientist C	Medicinal Chemistry	1959-64
Scientist E & Head	Medicinal Chemistry	1964-72
Scientist F & Head	Medicinal Chemistry	1972-73
Director's Grade & Head	Medicinal Chemistry	1973-74
Director	Central Drug Research Institute	1974-84
Retired Scientist	Central Drug Research Institute	1985-

III. Research Specialisation: Medicinal Chemistry, New Drugs Discovery Research

IV. Research Contributions

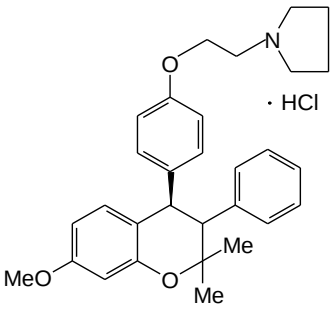
Dr. Anand built an active school of Medicinal Chemistry Research at CDRI, which made significant contributions to the design, discovery and development of new drugs. An innovative concept which he introduced in drug design was to build new molecules around a central core platform with a well defined geometry, and add the interactive substructures at suitable sites around this platform to interact with the reactive sites on the receptor/target, so that if found active they would have a defined geometry and easy to optimize their activity. This concept proved very

productive and is now quite widely adapted and used in NDDR. His group's research resulted in the discovery and development of a number of new candidate drugs, and those which successfully went through the regulatory experimental animals toxicity/safety studies, followed by Phase I-III Clinical trials, were approved and registered with DCGI, and licensed to Industry for marketing by CDRI, are listed in the Table-I given below.

Table-I

Drug CDRI Name	**Activity**	**International non-proprietary (INN) or brand name & Year of licensing**	**Status**
Centimizone	Antithyroid	Mipinazole, 1972	Licensed
Centbucridine	Local Anaesthetic	Bucricaine, 1987	Licensed & marketed
Centpropazine	Antidepressent	Centpropazine 1974	Licensed
Centbutindole	Neuroleptic	Biriperone, 1987	Licensed
Gugulipid	Hypolipidemic	Guglip, 1987	Licensed &marketed
Centchroman	• Oral Contraceptive, • For DUB • For Cancers and bone resorption	"Ormeloxifene" 1989 as Saheli, by HLL by Torent & HLL 1991 Under development	• Licensed & marketed • Licensed & marketed • Under trial
3-β-hydroxy-5,16-pregnadien-20-one [80-574]	• Hypolipidemic • Hypoglycemic	Centatin, 2015	Under negotiation
Chandonium iodide	Neuromuscular blocker	Chandonium iodide 1995	Jointly with Punjab University, to help them in this product development.

A very special case is that of Centchroman, a non-steroidal oral contraceptive developed by CDRI. This project was initiated in 1957. The steroidal antifertility agents, the progestins, were just introduced then, but these acted as anti-ovulatory agents. As ovulation is an essential physiological process of a healthy young woman, we did not want to interfere with ovulation and looked for alternative approaches, to act at more peripheral or added on events in fertilisation, such as blastocyst development or its implantation. Designing anti-estrogens provided one possibility. We had decided quite early in our planning to focus on non-steroidal compounds as these would be devoid of the common side effects of steroidal compounds, such as nausea, weight gain and obesity etc. The triphenylethylene antiestrogens such as MER25 were just introduced in 1958-59, and seemed to offer a very suitable lead for design of non-steroidal anti-estrogens. Based on the consideration of the concept of designing molecules around a central platform structure discussed above, it was decided to build a triphenylethylene (or ethane) structure around benzocyclo-alkanes (and related heterocycles) with the required substructures and screen them for the required contraceptive activity.



Centchroman

After extensive studies of diaryl-benzofurans, diaryl-naphthofurans, diaryl-indoles, diaryl-coumarines, diaryl-chromenes and -chromans, trans-2,2-dimethyl-3-phenyl-4-(p-(β-pyrrolidino-

ethoxyphenyl)7-methoxychroman, Centchroman, emerged as the most promising compound. It went through the required regulatory toxicology studies, Phase I-III Clinical trials, dose-ranging studies, and was approved by the DCGI as a post-coital contraceptive in 1989 [INN: Ormeloxifene] and licensed to Hindustan Latex Life Care Ltd. (HLL) and Torrent Pharma for marketing. HLL has marketed it successfully since 1991 under the brand name "**Saheli**". It was also taken up by MOH&FW for social marketing from 1995. The special points about Ormeloxifene are: (a) it does not affect ovulation and does not disturb the hypothalamo-pituitary-ovarian axis; (b) it has very long half-life, 168 hr, resulting in it use as a weekly pill; in clinical use it is administered as a biweekly pill for 3 months to build up a suitable blood level, followed as weekly pill thereafter; (c) it has a very high safety margin; LD_{50}, Ca 1850 mg/kg and ED_{50} 5mg/kg. In PMS it has so far shown no side effects except delay in menstruation in about 8% women, but this has also proved useful as this helps in controlling DUB; today Ormeloxifene is the drug of choice for controlling DUB and marketed both by HLL & Torrent.

Ormeloxifene, though originally designed as an anti-estrogen, has proved to be a selective estrogen receptor modulator (SERM), with tissue selective estrogen modulating activities. It has shown anticancer activity against breast and ovarian cancers, and pro-estrogenic activity on bone and CVS in post-menopausal women. So when used for long periods for family planning, Ormeloxifene has the potential of providing prophylactic action against these cancers, and as a replacement for HRT.

Ministry of Health & Family Welfare has recently decided to include Ormeloxifene as a non-steroidal oral contraceptive in its Family Planning Program under the brand name "**CHAYA**". **It is very gratifying that Ormeloxifene will now be included in the National Family Planning Program.**

V. Human Resource Development

Much of this research work was carried out by Junior & Senior Research Fellows and Post-Doctoral Fellows recruited for training. An important outcome of Dr. Anand's contribution to research includes his contribution to creating human resource for Drug Discovery Research by supervising over 90 Research Fellows for their Ph.D. degrees, and a similar number of PDFs, many of whom have occupied senior and leaderships research positions in R&D Laboratories in academia, including at CDRI, and Pharmaceutical Industries in India, which has greatly enriched drug discovery research in India.

VI. Other Advisory Roles

- Member of **Scientific Advisory Committee to the Cabinet, GOI** 1981-83
- Member of many of the **Pharmaceuticals & Drugs Policy Forming Committees** of the GOI between 1956-1990

He was also the Secretary of the Pharmaceuticals and Drugs Research Committee of CSIR in 50s & 60s, and kept CSIR in close touch with the developments of the Pharma industry. CSIR along with Dr. Anand played a major role in creating support for the change in Indian Patent Law from Product Patent to Process Patent in Pharmaceuticals from 1970, which brought about almost a revolution in Pharma production. India not only became self-sufficient in indigenous production of essential drugs, and by 1990 had become a world-wide exporter of generic drugs.

- **Consultant to UNCTAD and UNIDO** for drawing up of policies and plans for the development of pharmaceutical industry and establishing research capability on plant

drugs in developing countries. Advisor to National Drug Research Institutes in Bangkok (Thailand) and Kathmandu (Nepal) from 1980-95.

- **Advisor to WHO** : Member & then Chairman of 'the Steering Committee for Chemotherapy of Malaria of WHO' from 1980-86; Member of the Scientific and Technical Advisory Committee for Tropical Diseases and of Steering Committee for Human Reproduction of WHO.
- **Ranbaxy Science Foundation (RSF)** – Member GB of RSF from its beginning in 1985, and its Chairman from 2001-2015.
- **Member Board of Directors & R&D Advisor** to some of the Indian Pharma companies which included Ranbaxy Research Laboratory Ltd., Unichem Labs Ltd, ASTRA-Zeneca (at that time ASTRA-IDL), between 1985-2010.
- **Indian Pharmacopoeia Committee / Commission** – was Chairman of Indian Pharmacopoeia Committee from 1978-2004. Played a major role in the setting up of a fully autonomous Indian Pharmacopoeia Commission (IPC), established in 2005; was Co-Chairman of IPC & Chairman of its first Scientific Body from 2005-2010, which helped to change the structure and function of Indian Pharmacopoeia, which is now regarded as a World class book of drug standards.

  He was Chairman of a Committee which got Phytopharmaceuticals accepted as a separate class of drugs, with appropriate quality standards, irrespective of the system of medicine in which they would be used, which will add much value and acceptability to traditional systems drugs. This has been gazetted and notified.
- Played a major role in the planning and establishment of the first **National Institute of Pharmaceutical Education & Research (NIPER)** at Mohali, Chandigarh in 1990 and was the Head of its Academic Development Board from 1990-2010; also a member of its Governing Body. Based on its success, five more NIPERs have been set up in India.

VII. Some Awards & Honours

Title of the Award/Honour	Name of Organisation	Year
Roll of Honour,	• Government College, Lahore	1943
Elected Fellow of Science Academies	• The Indian National Science Academy, New Delhi • National Academy of Sciences India, Allahabad • Indian Academy of Sciences, Bangalore	1970 1972 1974
Amrut Mody Research Award	• Unichem Laboratories	1971
K.G. Nayak Gold Medal	• Baroda University	1972
Acharya P.C. Ray Medal	• Indian Chemical Society	1972
Sir J.C. Ghosh Medal	• Indian Chemical Society	1976
Vishwakarma Medal	• Indian National Science Academy (INSA)	1982
Acharya P.C. Ray Medal	• Indian Chemical Society	1982
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National Nehru Science Award	• M.P. Council of Science & Technology	1996
Vigyan Gaurav Award	• U.P. Council of Science & Technology	2000
Vaidya Zandu Bhatt Oration	• IASTAM, Mumbai	2005
Padma Shree	• Government of India	2012
Life Time Contribution to Drug Research	• IDMA Award	2012
Vigyan Vibhushan Award	• First UP Science Congress	2013
Udyog Ratna Award	• Punjab University, Chandigarh	2013

Vigyan Ratna Award	• BBA University, Lucknow	2014
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VIII. Honoured with around 50 Award Lectures

IX. Publications:

- Research papers **≈370**
- National/International Patents Granted : **≈120**
- **Books Published:**Jointly Authored two volumes on: "**Art in Organic Synthesis**"
  Anand, Bindra & Ranganathan;
  -Vol.1, Holden Day Inc, California 1969;
  -Vol.2, John Wiley & Sons, 1996
- **Edited two books:**

"Chemotherapy and Immunology in the Control of Malaria, Filariasis & Leishmaniasis", McGraw Hill, New Delhi, 1983 Ed. Anand N. & Sen A.B.
"Approaches to Design and Synthesis of Antiparasitic Drugs" Elsevier Ed. Anand N.

- **Book Chapters** : About 30 in classic text books of Medicinal Chemistry, such as Burger's, Foyes' & Comprehensive Medicinal hemistry by Hansch, and Principles of Pharmacology by Munson
- **Students supervised** for Ph.D.: ≈ **90**

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