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# PHCOG MAG.: Researcher's Profile
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**BASIC EDUCATION:**

1985 - Ph.D. Biochemistry, University of Poona
1981 - M.Sc. Biochemistry, University of Poona
1979 - B.Sc. Chemistry, Major, University of Poona
1990 – Doctor of Medicine Honorary Degree (Medicina Alternativa)
1993 – Fellow of International Council of Ayurveda
2001 – Fellow of Maharashtra Academy of Sciences
2005 – Manipal Fellowship

**Summary:**

- **Basic education:** Graduation from Ferguson College, Post-graduation from School of Biological Studies with Late Professor John Barnabas. Doctoral research at pharmacology department of Haffkine Institute and University of Pune under supervision of Professor Samuel David.
- **Academic development:** Taking inspiration from Late Professor P.V. Sukhatme returned fulltime to academics and led the formation of Interdisciplinary School of Health Sciences of the University. Has extensive experience of over 20 years in academic and University governance at the highest level of Senate, Academic Council, Management Council and many other authorities and bodies. Responsible for developing and defending a proposal for University with Potential for Excellence that led to 30 crores grant from the UGC. Responsible for credit system implementation in the University and developed many innovative teaching and research programs.
- **Research & Development:** Over 80 research publications in peer reviewed Journals, over 200 popular science articles, number of international Patents, 7 PhDs, 10 Research Fellows, 16 M. Pharm students, 2 Research Associates. Has attracted substantial research funding from national (CSIR, DST, UGC, ICMR) and international agencies (Ford Foundation, WHO). One of the three Champions, steering a national project on Herbal Drug Development under the 'New Millennium Indian Technology Initiative' coordinated by the CSIR. Worked in pharmaceutical industry in R&D managerial and scientific advisory capacity. Recipient of prestigious Parkhe Award for Industrial Excellence from Chamber of Commerce Pune. Responsible for development of cooperation with number of leading industries.
- **Academic organization:** Has orchestrated many important academic events and performance, as the chief organizing secretary of Indian Science Congress 2000 Pune has been the hallmark. Has organized many national and international seminars, conferences, workshops and focused discussions. Brings in a unique blend of Industry-Academia executive culture.
- **International cooperation:** Invited by UGC as Convener of national committee on Promotion of Indian Higher Education Abroad (PIHEAD). Worked as consultant to WHO, participated in academic programs of UNESCAP, UNIDO, NIH, World Bank. Has traveled extensively throughout Europe, the Americas and the Orient for research and academic interchange programs.
- **Scholarship:** Has received best research awards and recognitions throughout the career. One of the top 10 globally cited authors of Journal of Ethnopharmaccology. The Commission on Intellectual Property Innovation and Public Health, WHO Geneva, awarded a study on Traditional Medicine in 2004. Manipal Academy of Higher Education conferred Manipal Fellowship 2005 in recognition of work in the field of health sciences.
- **Social involvement:** Has generally promoted Science for Society approach, regularly interacts with important components of the society including the Local Governments, Chambers of Commerce and Industries, Voluntary organizations and the opinion leaders.

**1. Education & Teaching**

- Working as full time Professor of Health Sciences since 1995 at the Interdisciplinary School of Health Sciences, University of Pune
- Visiting faculty for number of other Universities, Institutions, Colleges, Government and Non Government Organizations across the country.
- Founder Chairman of Interdisciplinary School of Ayurvedic Medicine University of Pune established in 1990
- Worked as Honarary Joint Director of Indian Drug Research Laboratory and managed M. Pharm in Pharmacognosy course.
- Recognized postgraduate teacher and research guide for University of Pune and Bharati Vidyapeeth DU for Health Sciences and Pharmaceutical Sciences
- Regular examiner for Ph.D. and Masters work evaluations at University of Mumbai, National Institute of Pharmaceutical Education and Research (NIPER)
- Worked on education reforms, innovations, internationalization at the local and national levels.
- Hon. Director, International Longevity Center – India, Pune.
- Visiting Faculty, Penn-in-India program of University of Pennsylvania, USA
- Intensive Certificate Program on intellectual property and technology management conducted by Science and Technology Park in collaboration with University of Michigan.

**2. Research & Development:**

- Over 20 years of research and development experience both in industry and University systems.
- 7 PhDs and 16 M. Pharm students have completed studies under his guidance. Currently, guiding 10 Research Fellows, 4 M. Pharm students and 2 Research Associates.
- Over 80 research publications, 12 reviews, 4 books, 2 US and 6 Indian Patents, 5 educational films and over 200 popular science articles. A complete list of PhD, M. Pharm students and publications in peer reviewed Journals may be provided on request.

**Summary of Scientific Contributions**:

- Made outstanding and original contributions to the area of Ayurveda, ethnopharmacology, herbal drug technology and discovery.
- One of the globally top 10 most cited authors invited to contribute in the 100th Special issue of Journal of Ethnopharmacology (Elsevier).
- Invited as a special advisor by the World Health Organization, Geneva to study traditional medicine.
- Innovatively used concepts of systems biology and reverse pharmacology for integrative and evidence-based Ayurvedic medicine.
- Used an array of advanced technologies for identification, separation, standardization and herbal pharmaceutics.
- Developed novel pharmacological models to study botanical immunoadjuvants and created holistic clinical protocols that gave unique identity to contemporary research in Ayurveda.

**Summary of important research projects**:

Botanical Immunomodulators and Rasayana Drugs: Mainly worked on Ashwagandha (*Withania somnifera)*, Guduchi (*Tinospora cordifolia)* and Shatavari (*Asparagus racemosus)*. Reported immunomodulatory activity in various standardized extracts and formulations prepared from these important Ayurvedic Rasayana drugs and evaluated their potential as antistress, adaptogenic, immuno and myeloprotectants. In an interesting study he reported Ashwagandha as better and safer drug to Ginseng. Such investigations remain noteworthy to properly position Ayurveda in competitive international market. Recent review on Botanical Immunodrugs in appeared in prestigious Journal in drug research - *Drug Discovery Today (Impact Factor 7)*.

Vaccine adjuvants: Newer vaccines like subunit and DNA vaccines are weakly immunogenic and require adjuvants. He used modified Kendrick test that involved challenge of live Pertussis cells intracerebrally where significant increase in antibody titer, reduced mortality and improvement in overall health was observed. This observation has immense importance in vaccine industry to obtain more efficient and sustained immunostimulation resulting increased yield of immune sera and immunobiologicals. This study indicates applications of test material as potential immunoadjuvant that also offer direct therapeutic benefits resulting lesser morbidity and mortality. 4 Indian Patents have been filed in the area of vaccine adjuvant. Recently, DST awarded him a project in collaboration with industry partner Serum Institute of India.

Adjuvants in cancer therapy: Most of the cancer chemotherapeutic agents are immunosuppressants and

cytotoxic. Used Cyclophosphamide-induced-immunosuppression to screen plant-derived drugs for anticancer and cytoprotective potential and to demonstrate myelo and immuno-protective activity in ascitic sarcoma bearing animals. He did activity-related extractions to identify best performing candidate drugs. This product will have significant importance in cancer therapeutics. One US patent has been filed in the area of cancer adjuvants. Project on Ayurveda and cancer adjuvants has been recently shortlisted by the DBT.

Immunostasis activity: Studied pharmacodynamics of Ashwagandha in experimentally induced tumors and infection mouse models where one of the well recognized cellular target for immunomodulation is Th1-Th2 balance. He studied *in vivo* (Th) cytokine modulation using flowcytometry and showed that 100 mg/kg dose resulted significant Th1 response (IL-2, IFN-g) in comparison to Levamisole and Cyclopsorin. In immune suppressed animals, Ashwagandha exhibited significant dose dependent potentiation of cellular and humoral immune response comparable to Levamisole and faster recovery of CD4+ T cells percentages as compared to control and cyclosporin. The study indicates immunostasis activity and suggests its use where Th1-Th2 modulation in required.

Herbal drug development: Developed a standardized polyherbal formulation for treatment of arthritis that addresses important clinical targets like pain, cartilage regeneration, chondroprotection and established preclinical safety, pharmacology and clinical efficacy in randomized controlled clinical trials. One US and two Indian Patents have been granted that are commercialized. Currently, he is one of the three Champions involved in CSIR NMITLI Herbal Drug Development project.

AyuSoft and AyuGenomics: With C-DAC, conceptualized an innovative project named AyuSoft, which has been supported by the Ministry of Information Technology. Also involved in studying genetic correlations with Ayurvedic concepts where a preliminary data on HLA DRB1 indicates specific distributions between different Prakriti. These findings are radically extraordinary and likely to have tremendous implications on future research in pharmacogenetis and customized medicine. This work was presented at the Cold Spring Harbor Symposium on Pharmacogenomics and has been published in JACM recently.

**Traditional Medicine:** The World Health Organization Geveva awarded him an important study for consideration of newly established Commission on Intellectual Property, Innovation and Public Health (CIPIH). His study reviews the existing evidence base on the use of TM in meeting the health needs of populations in developing countries to address and analyze the benefits in terms of accessibility, availability and affordability, including the health benefit and cost-benefit and considers the scope for using TM systems to deliver modern medicines, and the possibility for conjunctive use. The study also reviews existing evidence on current innovative efforts in TM to combat diseases that disproportionately affect developing countries, and the challenges and difficulties related to: regulatory issues, effectiveness of the patent system, and reliance on renewable natural resources, documenting traditional knowledge about medicine.

**Major Research Grants:**

- Successful in attracting substantial funding from national and international agencies such as University grants Commission, Ford Foundation, Impact India Foundation, Department of Science and Technology (DST), Council for Scientific and Industrial Research (CSIR). Some of the major research grants he has obtained include:
- DST: 'Development of novel herbal adjuvants for vaccines' in collaboration with Serum Institute of India. Financial outlay: Rs 153 lakh.
- CSIR: 'Development of Ayurveda based formulations for treatment of arthritis' in collaboration with leading national research laboratories and industry partners. Total financial outlay of NMITLI herbal drug is Rs1400 Lakh and that of arthritis component is Rs 350 lakh.
- Department of Information Technology: 'Development of AyuSoft – An intelligent decision support system based on Ayurvedic knowledge' in collaboration with Center for Development of Advance Computing. Financial outlay: Rs 300 lakh.
- In addition, there are many smaller grants in the range of one lakh to 50 lakh from other funding agencies such as UGC, Ford Foundation, WHO.

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