A Talk by **Dr. Mukund S. Chorghade**

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On February 9, 2024; Time: 11:00 AM to 12:00 PM

Venue: LH-I, Transit Campus
IISER Berhampur.

TITLE: Chemosynthetic Livers: Predict, Prepare and Prove the Structure, Activity and Toxicity of Drug Metabolites

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Fellow, American Chemical Society; Fellow, American Institute of Chemists
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Fellow, Indian Society for Chemistry and Biology; Fellow, Indian Chemical Society
Fellow, Sigma Xi. Distinguished Lecturer July 1, 2022 - June 30, 2024

Biodata: Dr. Mukund Chorghade is a serial entrepreneur and Founder, President, and Chief Scientific Officer, THINQ Pharma and Ayurvidya Healthcare Innovations. He was elected Foreign Fellow National Academy of Sciences, India, in 2023 and was awarded a D.Sc. by the University of Mumbai in 2021. He earned B. Sc. / M. Sc. degrees from the University of Poona, India, and a Ph. D. from Georgetown University. After postdoctoral research at the University of Virginia and Harvard University, he directed research groups at Dow, Abbott, CytoMed and Genzyme. He holds/held Adjunct Research Professor/Visiting Fellow/ Visiting Scientist appointments at Caltech, Harvard, MIT, Northeastern, Northwestern, Princeton, Rutgers, Univ. of Chicago, School of Medicine-University of Illinois Urbana-Champaign (USA), University of British Columbia (Canada), Cambridge, Leeds, Strathclyde, (UK), College de France, Universite' Louis Pasteur

(France), Universities of Mumbai, Poona, ICT, CSIR, KHRC, Dr. Reddy's Institute of Life Sciences (India). He serves as a Chief Scientific Advisor, Late Prin. B.V. Bhide Foundation and is on the Scientific Advisory Board of corporations/foundations such as BVG Life Sciences, Empiriko, HSvj, YewSavin, World Innovation, Health Sciences Collegium. He is a Faculty of Eminence on the International Advisory Board of Studies at Datta Meghe Institute of Higher Education and Research. He officiates for the Molecular Maker Laboratory Institute Education and Workforce Development Advisory Board, University of Illinois, Urbana-Champaign. Elected Fellow of the Maharashtra, Andhra Pradesh, and Telangana Academies of Sciences and a recipient of three Scientist of the Year awards, he is a featured speaker in international symposia, serves on Editorial Advisory Boards of Journals and is active in professional societies. An American Chemical Society Fellow, he was Section Chair of Brazoria (1990), Northeastern (2007) and Princeton (2019). He participates in ACS' Career Services / Professional Development/Entrepreneurship and Small Chemicals Businesses. He was Secretary, Division of Chemistry Human Health of IUPAC and worked on Commissions on Biotechnology, Medicinal Chemistry, and US National Committee. As Chair, RSC Committee on Process Chemistry and Technology (2018-20) he expanded its geographical and scientific boundaries. An expert in patent litigation and a Certified CGLP / cGMP professional, his synthetic chemistry, process and pharmaceutical development expertise has transformed academic laboratories, pharmaceutical companies, and engineered innovation/ strategic collaborations. His research interests are in Drug Discovery / Development, Process Chemistry Derived Medicinal Chemistry, Traditional Indian Medicine. The "Chorghade-Dolphin" sterically protected and electronically activated metalloporphyrin catalysts ("chemosynthetic livers") find utility in drug metabolism, valorization of biomass and environmental remediation.

Abstract: We report advances in proprietary *in vitro* green chemistry-based technology, mimicking *in vivo* metabolism of several chemical entities used in pharmaceuticals, cosmetics, and agrochemicals. Our catalysts enable prediction of metabolism patterns with soft-spot analysis and the methodology introduces new paradigms for drug discovery and drug-drug interactions for clinical diagnostics. Metabolites are implicated in adverse drug reactions and are the subject of intense scrutiny in drug R&D. Present-day processes involving animal studies are expensive, labor-intensive, and chemically inconclusive. \Our catalysts (azamacrocyclic) are sterically protected and electronically activated, providing speed, stability, and scalability [1]. We predict structures of metabolites, prepare them on a large scale by oxidation, and elucidate chemical structures [2]. Comprehensive safety evaluation enables researchers to conduct more complete *in vitro* metabolism studies, confirm structure and generate quantitative measures of toxicity. We define an animal-free platform that identifies a more complete set of safety-relevant drug metabolites to accelerate the pace of drug discovery and development [3].

Polypharmacy, involving co-administration of several drugs, is common among the elderly and chronically ill. It is a risk factor for adverse drug reactions (ADRs) and drug-drug interactions (DDIs). One plausible DDI occurs when a drug interferes with another, causing irreversible changes to formation of metabolites from one or both. Such suppression or attenuation of metabolism could cause variances in toxicity and efficacy. We report experiments to predict and confirm modulation of oxidative metabolites from several combinations of common drugs for cancer, diabetes, hypercholesterolemia and hypertension in the presence of each other. Recent papers indicate best evidence for the dimerization of some compounds in dilute aqueous solution or assorted complex formation between disparate compounds.

References

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2. Mukund S. Chorghade*, "Metalloporphyrins as Synthetic Livers", published in "Drug Metabolism: Databases and High Throughput Testing During Drug Design and Development", International Union of Pure and Applied Chemistry: DMDB Working Party, Ed. Paul W. Erhardt, Blackwell (1999), pp.152-162.
3. Mukund S. Chorghade*, “Delivering Toxicity tests”, Chemistry and Industry, October 2014, pp 21-23. www.soci.org/chemistryandindustry

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