Department of Chemical Engineering, IIT Hyderabad
CH5036-Industry Lecture Series
Jan-May 2025

Date: 29-01-2025
Time: 04:00 PM (IST)
Speaker: **Prof. K V Venkatesh**
Affiliation: MetFlux Research Private Limited, India & IIT Bombay
Title: From Complexity to Coherence: Leveraging Investigative Physiology® AI for Precision Health
Venue: LHC-01

Abstract

Human physiology is an ensemble of various biological processes spanning from intracellular molecular interactions to the whole-body phenotypic response. Systems biology endures to decipher these multi-scale biological networks and bridge the link between genotype to phenotype. The structure and dynamic properties of these networks are responsible for controlling and deciding the phenotypic state of a cell. Several cells and various tissues coordinate together to generate an organ level response which further regulates the ultimate physiological state. The overall network embeds a hierarchical regulatory structure, which when unusually perturbed can lead to undesirable pathophysiological state. At MetFlux, we have developed an Investigative Physiology Platform for specific states which integrates several data types from genomic to metabolomics to diagnostic biomarkers. The application of such an analysis is illustrated in the case of metabolic syndrome/NAFLD, Gut health and wellness/fitness. The work emphasizes the importance of integrating data structures, knowledge graphs, expert systems to physiological readouts, linking various data types providing a scientific basis for personalized nutrition and lifestyle suggestions.

Biography

KV Venkatesh is a professor in the department of chemical engineering at IIT Bombay. He had his undergraduate degree from IIT Madras and a doctoral degree from Purdue University, USA. Since 1993, he has been a faculty member at IIT Bombay. His area of expertise is in systems biology, applying engineering systems

principles to biological phenomena. He has developed novel theoretical platforms to understand the underlying design principles in nature thereby linking genotype to phenotype. In the last decade, his lab has developed systems biology-based physiology models of organs and diseases, which have broad applications in drug discovery, wellness, and personalization of healthcare data. He has graduated with more than 40 PhDs and published close to 250 publications. He is a fellow of the national academy and in the top 2% of scientists globally. Based on these models, he has incubated a startup MetFlux Research, which offers specialized applications using system biology AI to FMCG/pharma and healthcare/wellness companies in product development and scientific characterization, drug discovery, disease management and wellness.