Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Morning vs Evening exercise: Role of diurnal modulations of skeletal muscle mitochondrial functions

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Exercise influences nearly all physiological processes and serves as a powerful intervention for various metabolic and age-related diseases. While exercise performance and metabolic adaptations are influenced by the time of day, the underlying molecular mechanisms remain poorly understood. In this talk, I will present findings from my PhD research demonstrating that diurnal fluctuations in skeletal muscle mitochondrial function play a crucial role in regulating exercise capacity. Additionally, our findings reveal distinct time-of-day-dependent differences in exercise-induced muscle metabolomics and mitochondrial energetics, with significant variation between ZT3 and ZT15. These metabolic and mitochondrial oscillations are strongly correlated with changes in exercise performance. Furthermore, using Sirtuin 4 knockout (Sirt4KO) models, we provide causal mechanistic evidence that disrupting mitochondrial diurnal variation abolishes time-of-day-dependent differences in muscle output. Collectively, our results establish baseline skeletal muscle mitochondrial function as a key determinant of diurnal exercise capacity. Future work will focus on elucidating the mechanistic links between clock genes, mitochondrial dynamics, and exercise adaptation. Additionally, translating these findings to human studies will be essential for developing chrono-exercise strategies tailored for optimal performance and health benefits.

Wednesday, Feb 19th 2025

14:30 Hrs (Tea / Coffee 14:15 Hrs)

Seminar Hall, TIFRH