Data Science in Translational Biology: Foundations and Applications

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The integration of data science and artificial intelligence (AI) with omics-driven biology is reshaping translational research and accelerating the drug discovery and development pipeline. Rentosertib exemplifies this shift, becoming the first fully AI-designed drug to advance to Phase IIa clinical trials in 2025. Data science enables systematic analysis of complex biological datasets, transforming them into actionable insights for understanding health and disease. This session will introduce participants to core data science concepts and their applications in biology, with emphasis on high-throughput approaches such as differential gene expression analysis and drug sensitivity profiling. Key steps including data preprocessing, quality control, visualization, and statistical analysis will be highlighted to demonstrate how robust analytical practices enhance reproducibility and can help shorten the drug discovery process. The session will also include a practical hands-on component, providing participants with experience in accessible workflows. By bridging biological questions with computational methods, the workshop aims to equip participants with both a conceptual foundation and practical skills that can be applied across diverse translational science contexts.