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Know thy cells: improving biomedical research reproducibility

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Abstract

Irreproducible basic biological and preclinical research is a tremendously expensive and global problem. The inability to reproduce experimental data in preclinical studies has resulted in the invalidation of research breakthroughs, retraction of published papers, abrupt discontinuation of clinical studies, and reduced trust in the research and development enterprise. More importantly, valuable time and critical resources are wasted by irreproducibility as opportunities to enhance global health are delayed or simply lost. Although the causes of irreproducible preclinical research are complex, they can be traced to cumulative errors/flaws in one or more of the following areas: (1) study design, (2) biological reagents and reference materials, (3) laboratory protocols, and (4) data analysis and reporting. These sources of irreproducibility are often magnified by the explosion of high-throughput technologies, genomics, and other data-intensive disciplines.

This presentation will use examples of biological materials and reagents, specifically cell lines and antibodies, on the impact of irreproducibility in biomedical research and development, and how the implementation of consensus-based standards to authenticate and certify these reagents will lead to both increased rates of reproducibility and dramatic returns on research funding investments.

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