**Next-Gen Therapeutics: Pioneering Drug Discovery with iPSCs, Genomics, AI, and Clinical Trials in a Dish**

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In the high-stakes arena of drug discovery, the journey from bench to bedside is hindered by a daunting 92% failure rate, primarily due to unpredicted toxicities and inadequate therapeutic efficacy in clinical trials. The FDA Modernization Act 2.0 heralds a transformative approach, advocating for the integration of alternative methods to conventional animal testing, including cell-based assays that employ human induced pluripotent stem cell (iPSC)-derived organoids, and organ-on-a-chip technologies, in conjunction with sophisticated artificial intelligence (AI) methodologies. Our review explores the innovative capacity of iPSC-derived clinical trial in a dish models designed for cardiovascular disease research. We also highlight how integrating iPSC technology with AI can accelerate the identification of viable therapeutic candidates, streamline drug screening, and pave the way toward more personalized medicine. Through this, we provide a comprehensive overview of the current landscape and future implications of iPSC and AI applications being navigated by the research community and pharmaceutical industry.

Keywords: iPSC-derived Organoids, AI-driven Drug Discovery, Clinical Trial in a Dish, Personalized Medicine, FDA Modernization Act 2.0