Editorial

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Revolutionizing Drug Development: Harnessing the Potential of Organ-on-Chip Technology for Disease Modeling and Drug Discovery

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A R T I C L E   I N F O

One of the groundbreaking advancements in the field of biomedical research is the development of organoids or organ on chip technology. Promising potential of this technology has reshaped the future of disease modelling and drug discovery. Organoids are microfluidic devices which can mimic the physiological functions of natural organs of human body. Animal models are being used in laboratories to evaluate the drug effectiveness but due to the recent ethical concerns, regarding the use of animals, are affecting drug development and treatment for various diseases. But organ on chip is an emerging tool which is filling the gap between animal models and outcomes of drug treatment by eliminating the ethical concerns.

Demand for precision medicine is growing due to rapid arousal of various deadly disease but traditional methods of developing drugs fall short as they can't exactly replicate the human physiology. So instead of using animal models or cell cultures to design drug, to detect the its efficacy and toxicity, organ on chip technology is perceived to be a best option. It saves the time and resources that were being wasted, due the use of animal models, during the preclinical and clinical trials of the drug. On the other hand, organoids are more reliable in satisfying the demand of precision medicine.   These artificial organs provide a bioengineered platforms mimicking the specific functions of living organs such as gut peristalsis and lung breathing in a very controlled manner. Moreover, different organs communication after drug treatment is also being studied by developing multi-organ systems so that the utility of these micro-engineered organs can be enhanced. These organs generate more accurate data about the drug effectiveness and toxicity. Moreover, it generates it in real time thus reducing the reliance on the animal models on which testing is usually time taking and can give false results. Furthermore, molecular basis of numerous complex diseases like cancer, diabetes and neurogenerative diseases can be predicted with this technology and it is very helpful in producing precision medicine. Controlled drug delivery is one of the best applications of these organoids eliminating the chance of false hits. Therefore, this technology has demonstrated a paradigm shift in biomedical research providing a better alternative in case of efficiency and reliability.

Now the integration biosensors, artificial intelligence in organ on chip technology has enhanced its predictivity power and also allow the real time imaging and monitoring of cellular responses to the particular drug. Though, there some obstacles regarding the adoption of this technology but efforts are being made continuously to accelerate its usage in mainstream research. Thus, paving the way for a new era of personalized medicine.