Current Development and Future Trends Using Organ-on-a-Chip Technology

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Abstract

The current technology developed to emulate organ-level functions in miniaturized tissue-engineered models is known as micro-physiological systems or organs-on-a-chip. This chip can mimic the function of organs and reacts with a physiological manner to become a potential tool providing an opportunity for development of new drugs, test of personalized medicine, and ultimately replacing of animal models. The key revolution of these 3D models which are better than conventional 2D cell culture (i.e. petri dish) is that they can mimic dynamic mechanical environment (i.e. stretching), dynamic flow environment (i.e. perfusion), cell differentiation criteria (i.e. formation of tissue, tissue organization), and functional tissue (i.e. barrier, cilia movement, multi-culture). Currently, these models are also used to act as *in vitro* disease models so that the researchers can use them to predict the drug response of cells similar to the physiological environment, such as tumor-on-a-chip. In this presentation, I will describe the lastest developments in the filed of organ-on-a-chip models (e.g. lung, skin, gut) and demonstrate their integration with other supporting equipment to maintain the functionality for drug study. Future perspectives and major challengens in the development of orgon-on-a-chip will also be discussed.