Researchers discuss plans for developing human model organs on plastic chips

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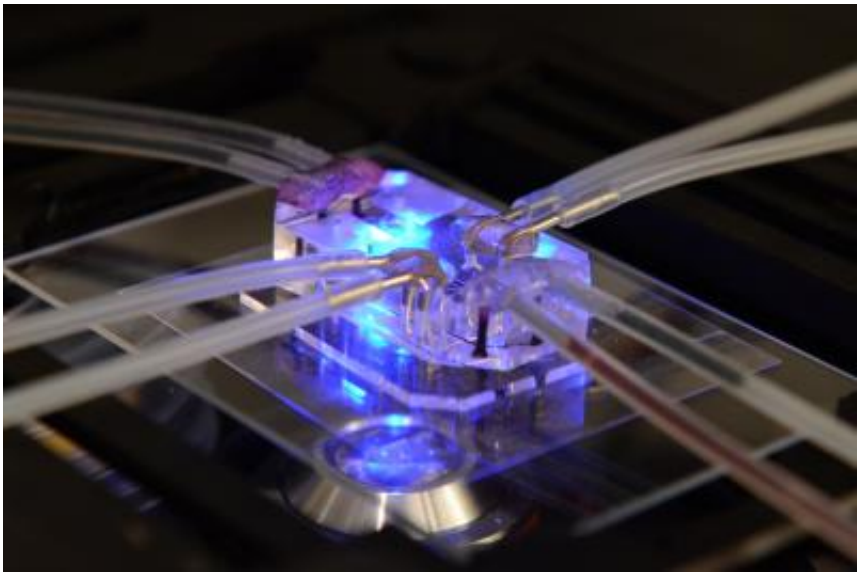

The latest advancement using the Wyss Institute's human breathing lung-on-a-chip offers further proof-of-concept that human "organs-on-chips" hold tremendous potential to replace traditional approaches to drug discovery and development. Credit: Wyss Institute, Harvard University

(Medical Xpress)—A diverse group of speakers at this year's American Society for Microbiology-Biodefense and Emerging Diseases Research Meeting held last week, outlined their work and plans for the future on developing among other things, human model organs. Though their approaches differ, the ultimate goal for most of them is the same—to create a system of connected artificial model organs that can accurately

mimic the intricacies of the human body when subjected to certain toxins.

It is not about building cyborgs or living robots, it is about combating diseases and controlling outbreaks or attacks. It is difficult, for example, to study the impact of ricin on human beings. There are very few cases and researchers cannot infect people on purpose, thus they are forced to study its impact on cells in a Petri dish, which most agree, is not sufficient for offering advice to government officials trying to plan for deliberate attacks. Also, using animals for testing purposes has become more controversial in recent years and more expensive. Such roadblocks have caused researchers to turn to developing what they call human model organs—little plastic boxes with chips and channels inside that are meant to mimic a three dimensional human organ. The boxes are seeded with real human cells and are then kept alive via tubes providing nutrients. The chips are used to control the artificial environment and to monitor how things are going when toxins are introduced.

Many groups have developed such model organs, which are currently being used in a variety of research arenas, but now, the focus has shifted, from individual models, to networks of models connected together in ways similar to how it is done in the human body. This needs to happen because human organs do not live in a vacuum, they are connected by blood vessels, nerves, chemicals and tissue. In order to truly see the impact of toxins on a given organ, researchers need to mimic all the factors that contribute to its health.

In addition to many private entities, the government is eager to get involved as well, DARPA is sponsoring several teams trying to tie together 4-model systems. The EPA is also heavily involved, offering $18 million to a team attempting to build an artificial liver, fetal membrane, limb and mammary gland system to see if it can be determined just what happens when toxic pollutants such as bisphenol A

or dioxin make their way into bodily organs and systems. Homeland Security is also looking into funding groups that can help show what can happen to people involved in an anthrax attack.