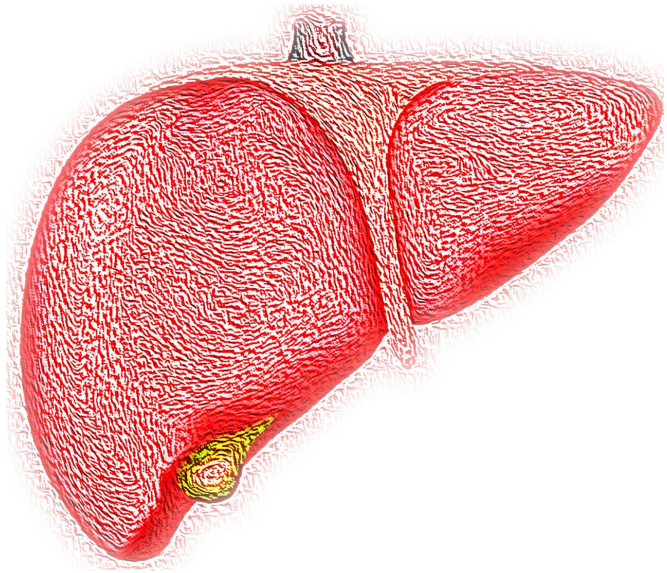
Lab-on-a-chip may help identify new treatments for liver disease

29 August 2019



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Non-alcoholic fatty liver disease (NAFLD)—the accumulation of liver fat in people who drink little or no alcohol—is increasingly common around the world, and in the United States, it affects between 30 and 40 percent of adults. Currently, there are no approved drugs for the treatment of NAFLD, which is predicted to soon become the main cause of chronic liver problems and the need for liver transplantation.

Now a team led by investigators at Massachusetts General Hospital (MGH) has developed a "lab on a chip" technology that can simulate different levels of NAFLD progression in cells across a single continuous tissue.

For the research, which is described in an article published in the journal *Lab-on-a-Chip*, the scientists used their new platform to evaluate the effects of different drivers of NAFLD—such as fat and oxygen concentrations— on liver cells. In this way, the platform can allow for detailed studies of NAFLD progression. Other influences such as inflammatory cues can also be superimposed onto the platform to examine their impacts.

In addition, the lab on a chip platform can be used to assess investigational drugs' effects on NAFLD progression, therefore revealing their potential for further testing in clinical trials.

"This platform is unique in that in one continuous liver tissue on a single chip, we are able to look at different severities of the disease and to study how liver tissue might respond to both triggers of NAFLD as well as different therapeutic approaches," said senior author O. Berk Usta, Ph.D., an investigator in the Center for Engineering in Medicine at MGH and assistant professor of Surgery at Harvard Medical School. "While further studies into more complex pathologies of NAFLD and its progressive forms are needed to establish a more complete recapitulation, the current platform establishes a basis for lab-based drug efficacy screening for NAFLD," noted Beyza Bulutoglu Ph.D., the lead author of the manuscript.

Usta suggested that such a strategy may help accelerate the search for effective drugs for NAFLD conditions that range from benign fat accumulation to more serious complications including fibrosis, cirrhosis, and liver cancer.

More information: Beyza Bulutoglu et al, A microfluidic patterned model of non-alcoholic fatty liver disease: applications to disease progression and zonation, *Lab on a Chip* (2019). DOI: 10.1039/C9LC00354A

Provided by Massachusetts General Hospital