Life Sciences

New Method Helps Spot Gastric Cancer Cell

Gastric cancer is the third leading cause of cancer death worldwide, accounting for over one million new cases and nearly one million deaths per year. The poor prognosis of gastric cancer is largely due to the difficulty in early diagnosis of peritoneal metastasis. Overall, the separation and characterization of cancer cells are essential for the early diagnosis of peritoneal metastasis.

To find out a possible solution for accelerating the prognosis of gastric cancer, the researchers at Shenyang Institute of Automation (SIA) of Chinese Academy of Science (CAS) and City University of Hong Kong (CityU), cooperated with doctors from the First Hospital of China Medical University, jointly proposed an optically induced electrokinetics (OEK) microfluidic method for label-free separation and characterization of patient gastric cancer cells. The study was published in *Science Advances* on August 05, entitled "Detection and isolation of free cancer cells from ascites and peritoneal lavages using optically induced electrokinetics (OEK)".

In this study, the researchers reported an OEK microfluidic method, which is a lable-free technique, to expedite the time to diagnosis of peritoneal metastasis in the gastric cancer. They fabricated a novel OEK based microfluidic chip to separate live gastric cancer cells from patients' ascites and characterize the electrical properties of gastric cancer cells.

The polymerization model of cells and solution model of cell membrane capacitance were established for cell separation and characterization. The experiments proved that the sizes and electrical characteristics between the gastric cancer cells and peritoneal lavage
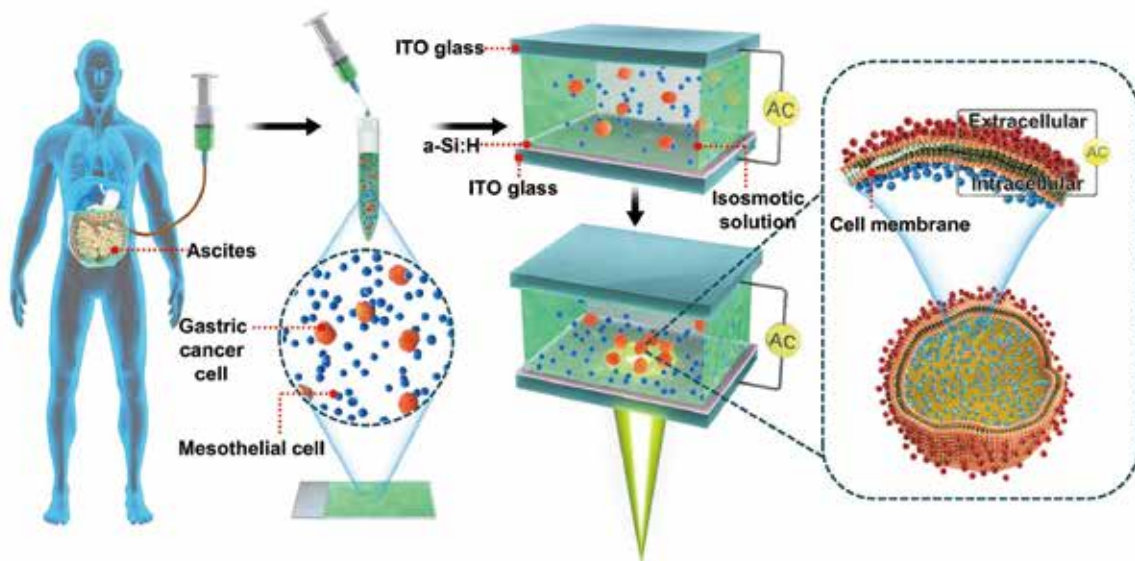
A new method based on optically induced electrokinetics (OEK) microfluidic chip has been developed for detecting peritoneal metastasis and cell membrane capacitance. (Image by SIA)

cells were significant different. Thus, the OEK method could theoretically separate gastric cancer cells from the ascites and peritoneal lavages.

Through experiments, they successfully separated gastric cancer cells from 6 patients' ascites with purity up to 71%. Meanwhile, they also obtained the cell membrane capacitances of gastric cancer cells and peritoneal lavage cells – these digital data can be used as a bio-marker to characterize cancer cells and diagnose peritoneal metastasis in gastric cancer. The high efficiency and sensitivity of OEK method solve the predominate problem of low sensitivity using traditional detection methods.

All the experiments conducted during the study demonstrated that the proposed OEK method is capable of detection free cancer cells in ascites and benefit early diagnosis of peritoneal metastasis.in gastric cancer.

Further, the cell membrane capacitance that was measured during separation can also be used as a bio-marker, as part of cellular information.

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Reference

Y. Zhang, J. Zhao, H. Yu, P. Li, W. Liang, Z. Liu, G. B. Lee, L. Liu, W. J. Li, Z. Wang, (2020) Detection and isolation of free cancer cells from ascites and peritoneal lavages using optically induced electrokinetics (OEK). *Science Advances* 6, eaba9628. doi: 10.1126/sciadv.aba9628.