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High-throughput anticancer drug evaluation using microfluidics and 3D printing

Shaohua Ma
Tsinghua-Berkeley Shenzhen Institute, China

Tumour heterogeneity requires personalised medical care after the surgical operation on a cancer patient. For an individual patient, there might be tens of choices for medical treatment, including the chemotherapeutics, targeted drugs, immune checkpoint drugs, and the sequential use of more than two drugs. How to rapidly evaluate the efficacy of the numerous choices is of significant importance. Here, we establish a high-throughput antitumour drug evaluation system that relies on the combined advantages of microfluidics and 3D printing, enabling high-throughput, low-cost and automatic screening of personalised treatment strategies. It offers the promise to advance the clinical treatment with more precision options. The screening platform contains hundreds of identical 'mini-tumours' cultured on a customised microfluidics bioreactor. The 'tumours' are derived from patient samples after surgery and placed into individual culture units by using a 3D printing setup. Parallel culturing, screening and readout are guided by a programme. Our development is on the way to be tested with the clinical treatment.

ma.shaohua@sz.tsinghua.edu.cn