

## **Precision Cancer Medicine in the Acoustic Dispensing Era: Ex Vivo Primary Cell Drug Sensitivity Testing**

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### **Abstract:**

Cancer therapy is increasingly becoming individualized, but there are also big gaps between the molecular knowledge of individual cancers we can generate today and what can be applied in the clinic. In an attempt to bridge this knowledge gap between cancer genetic and molecular profiling and clinically useful information, an individualized systems medicine program has been established at the Institute for Molecular Medicine Finland (FIMM), University of Helsinki, and the Helsinki University Hospital. Central to this program is drug sensitivity and resistance testing (DSRT), in which responses of primary cancer cells to a comprehensive clinical oncology and signal transduction drug collection are monitored. The drug sensitivity information is used with molecular profiling to establish hypotheses on individual cancer-selective targeting drug combinations and their predictive biomarkers, which can be explored in the clinic. Here, we describe how acoustic droplet ejection is enabling DSRT in our cancer individualized systems medicine program to (1) generate consistent but configurable assay-ready plates and determine how this affects data quality, (2) flexibly prepare drug combination testing plates, (3) dispense reagents and cells to the assay plates, and (4) perform ultra-miniaturized follow-up assays on the cells from DSRT plates.

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