Combinatorial Drug Screening On 3D Ewing Sarcoma Spheroids Using Droplet-Based Microfluidics

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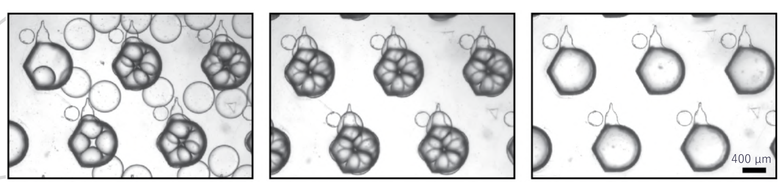
Abstract Okomera develops a unique droplet microfluidic workflow for miniaturized, automated and functional cell assays in precision cancer medicine. Here we applied concomitant and sequential drug combination of two chemotherapies, etoposide and cis-platin, to the Ewing sarcoma cell line A673. Synergistic drug combination was found, notably when etoposide was applied 24 h before cisplatin.

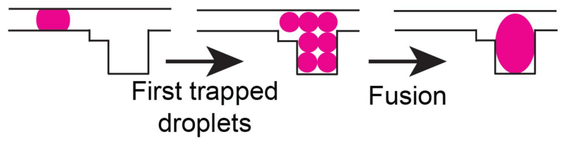
Droplet 3D cell culture and testing

Spheroid growth

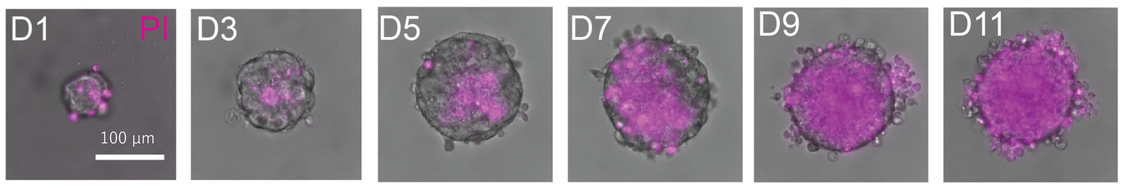
Microfluidic chip

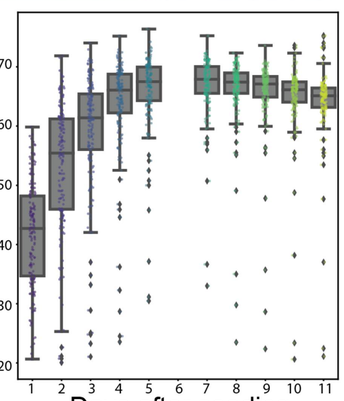


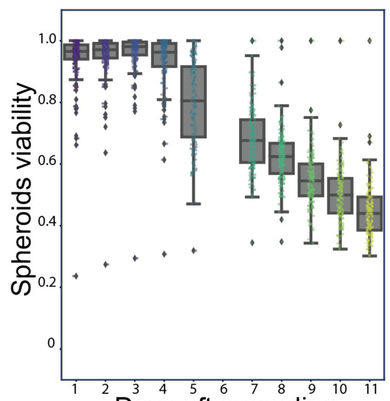
Multiple droplets merged into one in each microwell



Spheroid growth

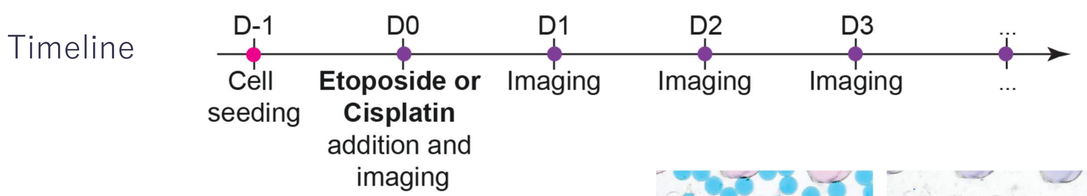


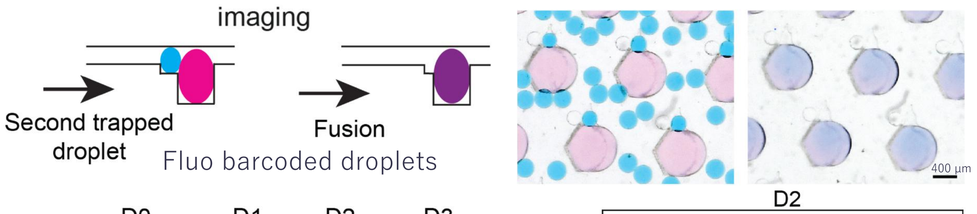


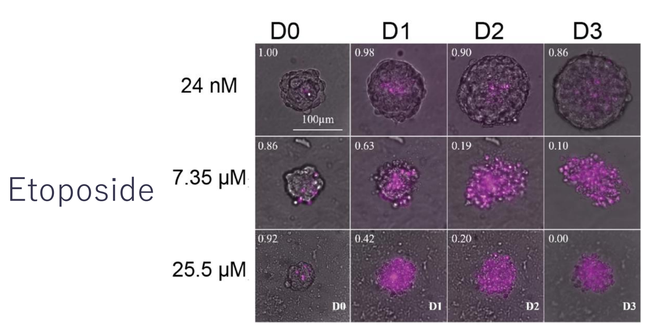


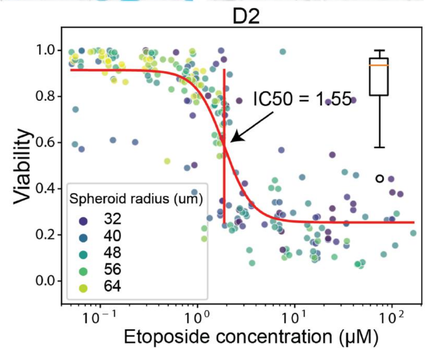
Spheroid growth during **5 days**

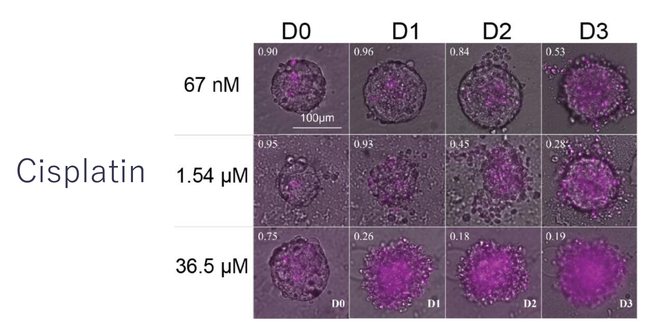
Single Drug Toxicity

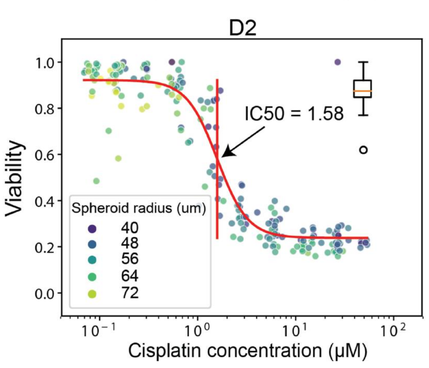












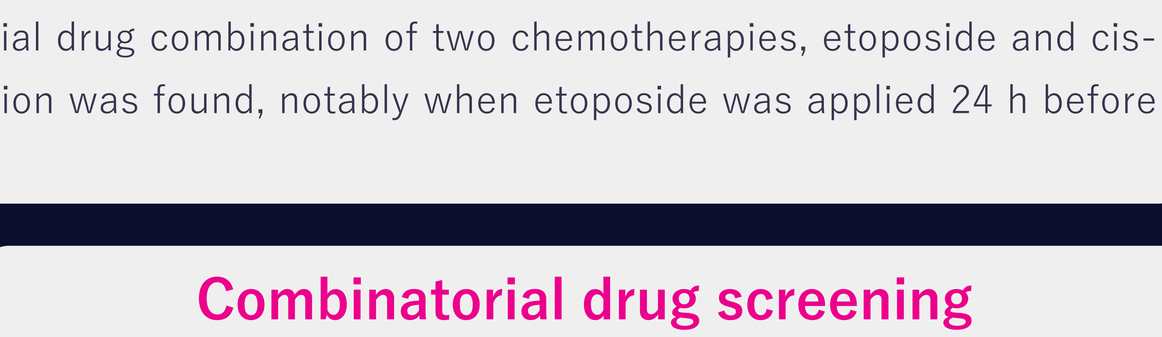
Similar IC50 measured in ultra low attachment multiwell plates

Combinatorial drug screening

Simultaneous combination

Sequential droplet library loading

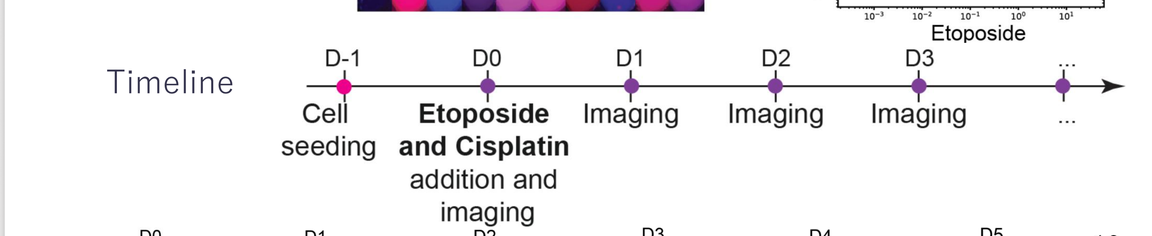
49 conditions



Combinatorial drug response over time

Sequential combinations

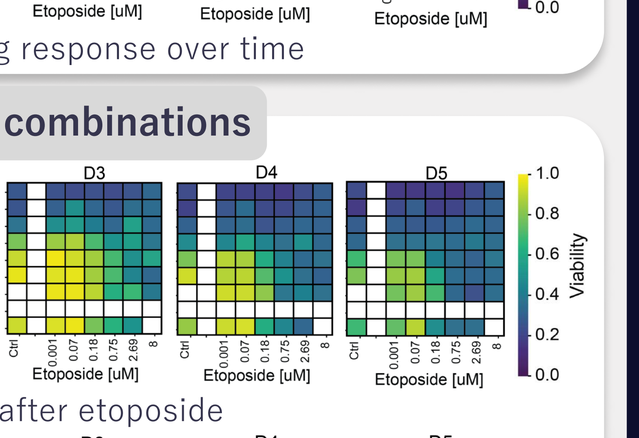
Cisplatin 24 h after etoposide



Etoposide 24 h after cisplatin

Synergy FIC index (Fractional Inhibitory Concentration)

	Simultaneous	**Eto. then CisPt**	CisPt then Eto.
FIC	0.62	**0.34**	0.59



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