Title:	Developing a device for high throughput fabrication of spheroids using iterconnected chambers in a dynamic flow
Authors:	Saini, Shweta
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Abstract:	Cancer is a highly lethal disease with increasing global incidence. Despite extensive laboratory research to develop effective, safe, and economically viable anti-tumor drugs, the clinical approval rate for these drugs remains extremely low at 7%. This low success rate can be attributed to the unreliable nature of current preclinical drug testing models, such as animal models, mammalian cell lines, and 3D tumor models, each with their own limitations. Therefore, there is a need to develop a more reliable preclinical anti-cancer drug testing platform that better mimics the tumor microenvironment and yields dependable data. In this study, we utilized a combination of 3D printing, microfluidics, and 3D mammalian cell culturing of GFP+MDA-MB-231 and HDF cells to develop tumor spheroids with higher cellular viability compared to spheroids formed in commercially available 96 well plates. Embedded 3D printing was used to develop a 3D printed device with a novel material made up of Si-Co mixture. The Si-Co mixture was developed that had the advantage of high optical transparency, and high recovering ability, which was used as a support bath with sacrificial ink used for developing complex structure that were found to be stable and circular. The 3D printed microfluidic device was developed as a proof of concept for high throughput fabrication of spheroid using a dynamic flow of cell media. The device constituted a bifurcated channel with spherical chambers at the bottom, that leads to the formation of spheroids. Our innovative model also reduced the manual work required for spheroid generation. The cellular distribution in the spheroid was checked by Hoechst staining. To assess cellular viability, Live Dead staining using ethidium homodimer and calcein was employed. Overall, our study presents a promising approach for a more reliable and efficient preclinical drug testing platform for anti- cancer drugs.
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