In Vitro Cancer Model Using Microfluidics and 3D Tumor Spheroids

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While many cancer treatment modes have emerged in the past several decades, cancer remains one of the most significant public health challenges. One difficulty with developing new, effective cancer therapies is the expense of conducting animal and clinical trials, and the difference in results between these two types of trials. Microfluidic devices that mimic the vasculature system have emerged as an *in vitro* model, that when coupled with 3D cancer cell cultures (i.e., *in vitro* tumors) may offer an effective platform for testing treatment therapies before entering the clinic. To that end, we have reproduced a microfluidic device that mimics capillary transport of nutrients (panel a) and loaded colon cancer spheroids into the device (panel b). Our initial results indicate we can control key physical features of the spheroid, including size and the presence of a necrotic core. We have confirmed this system produces appropriate fluid flow rates within the device when loaded with a spheroid. Moving forward, we will collaborate with units at OIST investigating advanced radiation therapies to treat cancers in difficult to treat locations, such as the head and neck.