

Infographic: 'Why not print cancer?' Here's what we learn from building glioblastoma on a chip

If arranging cells in a particular formation was a good way to build cancer models that mimic what's going on in the body, [graduate student Hee-Gyeong] Yi, who had been working on 3-D printing of cartilage cells at the time, thought: "Why not print cancer?"

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"[Glioblastoma] patients suffer from the extraordinarily aggressive and rapid progression of the disease, and reactions to anti-cancer treatments often vary from patient to patient," Yi, now at Seoul National University Medical Research Center, tells The Scientist in an email. There is a great need to test potential treatments before they are given to individual patients, she adds—something that could perhaps be done using a 3-D–printed tumor on a chip.

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After the GBMs-on-chips incubated in culture media for a week, Yi and her colleagues exposed them to radiation and the chemotherapy drug temozolomide, treatments the patient donors had undergone. The research team found that lower survival of tumor and vascular cells in the GBM-on-a-chip model correlated with longer survival of the patients who received similar treatments. Moreover, the GBMs-on-chips responded to other treatments as would be predicted based on the cancer's genotype, further validating the models' biomimetic accuracy.

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A chamber wall is printed with silicon-based bioink on a sterile glass slide (1). Within this chamber, a mixture of human vascular cells derived from umbilical cords and decellularized extracellular matrix (ECM) from a pig's brain is printed in a ring (2). Finally, a third bioink, containing porcine ECM combined with glioblastoma (GBM) cells taken from a patient's resected tumor, fills in the ring (3). After a week of growth in a cell culture incubator, the model is ready to be used to screen various therapy options. Image: Kelly Finan

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