Escaping flatland

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Nothing is more iconic of biological research than the petri dish. Yet the idea that growing cells in a flat dish can sometimes lead scientists astray is gaining traction.

As an alternative, some researchers are experimenting on cells grown in gelatinous materials made from many of the same structural proteins that fill the spaces between cells in the body. The nutritive materials allow the cells to form three-dimensional structures, as in real tissues, rather than flattening into a single layer in a dish. The experiments are revealing the many ways that cells' immediate surroundings guide their behaviors.

"All of the sudden, half the field is jumping into these 3-D models," says Mina Bissell of the Lawrence Berkeley National Laboratory in Berkeley, Calif., who helped pioneer 3-D cell cultures about 30 years ago (SN: 8/30/97, p. 138).

For example, cancerous breast cells develop resistance to multiple chemotherapy drugs more readily when grown in 3-D conditions, better mimicking what happens in patients, according to research led by Valerie M. Weaver of the University of California, San Francisco. Weaver's team found that cancer cells grown in a 3-D environment had higher levels of a protein called nuclear receptor corepressor 2 (N-CoR2) than cells in flat dishes. While it's still not clear what environmental cue causes the cells to boost N-CoR2 production, adding N-CoR2 to the cells in dishes allowed those cells to develop drug resistance.

"Finding a way to treat these cells in 3-D would be beneficial for cancer therapy," says Chandrima Chatterjee, a member of Weaver's research team at the University of Pennsylvania in Philadelphia.
