UN GRAN AVANCE EN LA INVESTIGACIÓN DEL CÁNCER DE COLON

Comentario de la noticia “Mini-guts grown from colon cancers spark new treatment hopes”

Resumen de la noticia

Los tumores son difíciles de estudiar porque la mayoría de ellos no sobreviven en el laboratorio el tiempo suficiente. Ahora, un equipo ha conseguido crear "mini intestinos" a partir de muestras de tumores de colon, que conservan las propiedades de los tumores originales y que son muy resistentes en el laboratorio, incluso sobreviven a la congelación y la descongelación.

Para hacer esto, han utilizado una técnica que fue utilizada por Hans Clever (Instituto Hubrecht) para crear intestinos a partir de células madre intestinales. Utilizando casi el mismo procedimiento, investigadores del Instituto Sanger de Cambridge y el Instituto Broad han conseguido crear mini intestinos a partir del tejido tumoral de 27 pacientes con cáncer colorrectal, obteniendo organoides en hasta un 90% de las muestras de los pacientes.

Después de realizar un estudio genético, se ha visto que estos organoides presentan la mayoría de mutaciones causantes del cáncer, así que es viable probar en ellos varios fármacos que puedan ayudar a atacar a este tipo de tumores.

Por último comentar que aunque existen otros métodos de probar fármacos en tejidos provenientes de tejidos tumorales, este nuevo descubrimiento es muy importante pues el coste del proceso es bastante reducido en comparación a los otros métodos, cosa que impedía que se hicieran pruebas automatizadas o a gran escala.

Imagen 1. Mini intestino creado a partir de la muestra de un tumor del colon
Mini-guts grown from colon cancers spark new treatment hopes

By Gretchen Vogel
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Despite their out-of-control growth in cancer patients, most tumors don’t survive in lab dishes long enough for doctors or researchers to effectively study them. Now, a team has taken cancerous intestinal tissue from people and grown miniature human guts that retain properties of the original tumors, an advance that may help identify better, or more personalized, treatments for colon cancer.

Several years ago, Hans Clevers of the Hubrecht Institute in Utrecht, the Netherlands, and colleagues developed a way to grow intestinal stem cells into miniature organoids of gut tissue in the lab. With a combination of growth factors and gel-like media, the researchers can coax the cells to form cell clusters roughly 0.1 mm in diameter with a hollow center and the signature folded crypts that make up the lining of the gut. The organoids can be kept alive in the lab for years, and they can also survive freezing and thawing.

Now, with colleagues from the Wellcome Trust Sanger Institute in Hinxton, U.K., and the Broad Institute in Cambridge, Massachusetts, the Dutch team has adapted the technique to cancer. The researchers grew mini-guts from tissue taken from tumor samples from 27 colorectal cancer patients. The technique is surprisingly efficient, growing organoids from up to 90% of patient samples, the team reports today in Cell.

To see how well the mini-guts resembled the tumors, the researchers sequenced the genomes of the organoids. Although the match wasn’t perfect,
the mini-guts had most of the same cancer-causing mutations found in the original tumor sample. Tumors are often composed of several kinds of cells carrying different sets of mutations. And depending on which part of the tumor a sample came from, an organoid may not include all the cell types present in the patient. Nevertheless, “they capture most if not all of the most important mutations,” says Eduard Batlle at the Institute for Research in Biomedicine in Barcelona, Spain.

The technique has advantages over the two leading techniques for studying patient tumors: creating immortal cell lines and transplanting human cancer cells into mice, says Alberto Bardelli of the Institute for Cancer Research and Treatment in Candiolo, Italy. Immortal cell lines often acquire new mutations as they adapt to growing in culture, and so they are a less accurate model of the cancer, Bardelli says. Tumors transplanted into immune-deficient mice, called xenotransplants, are more accurate, but they are expensive and hard to maintain. “Xenos are wonderful, but you can’t do large-scale [drug] screening on xenos,” he says.

With the cancerous organoids, in contrast, the researchers were able to test more than 80 drugs and could measure how sensitive the mini-guts were to each compound. The mini-guts “fill a critical gap,” Bardelli says. “It’s very exciting.”

Clevers says two clinical trials are already evaluating the usefulness of the cancerous mini-guts. The first tests how well an organoid created from a person newly diagnosed with colorectal cancer can predict the tumor’s response to treatments. A second will test whether the organoids can help identify drug combinations effective in people whose cancer has spread to multiple tissues.