

Artificial lung cancer tissue could help find new drug treatments

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The 3D hydrogel created in University Professor Molly Shochet's lab was modeled to mimic the environment of lung cancer, enabling more effective and quicker drug screening. Credit: Roberta Baker/University of Toronto Engineering

A 3-D hydrogel created by researchers in U of T Engineering Professor

Molly Shoichet's lab is helping University of Ottawa researchers to quickly screen hundreds of potential drugs for their ability to fight highly invasive cancers.

Cell invasion is a critical hallmark of metastatic cancers, such as certain types of lung and [brain cancer](#). Fighting these cancers requires therapies that can both kill [cancer cells](#) as well as prevent [cell invasion](#) of healthy tissue. Today, most cancer drugs are only screened for their ability to kill cancer [cells](#).

"In highly invasive diseases, there is a crucial need to screen for both of these functions," says Shoichet. "We now have a way to do this."

Shoichet and her team are internationally known for their work on hydrogels, jello-like materials based on hyaluronic acid, a biocompatible substance commonly used in cosmetics. In the past, they have used hydrogels to enhance [stem cells](#) that are injected in the body to overcome disease or degeneration.

In their latest research, the team used hydrogels to mimic the environment of lung cancer, selectively allowing cancer cells, and not healthy cells, to invade. In their latest research, the team used hydrogels to mimic the environment of lung cancer, selectively allowing cancer cells, and not healthy cells, to invade. This emulated environment enabled their collaborators in Professor Bill Stanford's lab at University of Ottawa to screen for both cancer-cell growth and invasion. The study, led by Roger Y. Tam, a research associate in Shoichet's lab, was recently published in *Advanced Materials*.



LAM cells growing within the hydrogel designed to emulate the microenvironment of the lung. Credit: Molly Shoichet

"We can conduct this in a 384-well plate, which is no bigger than your hand. And with image-analysis software, we can automate this method to enable quick, targeted screenings for hundreds of potential [cancer](#) treatments," says Shoichet.

One example is the researchers' drug screening for lymphangiomyomatosis (LAM), a rare lung disease affecting women. Shoichet and her team were inspired by the work of Green Eggs and LAM, a Toronto-based organization raising awareness of the disease.

Using their hydrogels, they were able to automate and screen more than 800 drugs, thereby uncovering treatments that could target disease growth and invasion.

In the ongoing collaboration, the researchers plan to next screen multiple drugs at different doses to gain greater insight into new treatment methods for LAM. The strategies and insights they gain could also help

identify new drugs for other invasive cancers.

Shoichet, who was recently named a Distinguished Woman in Chemistry or Chemical Engineering, also plans to patent the [hydrogel](#) technology.

"This has, and continues to be, a great collaboration that is advancing knowledge at the intersection of engineering and biology," says Shoichet.

More information: Roger Y. Tam et al, Rationally Designed 3D Hydrogels Model Invasive Lung Diseases Enabling High-Content Drug Screening, *Advanced Materials* (2018). [DOI: 10.1002/adma.201806214](https://doi.org/10.1002/adma.201806214)

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