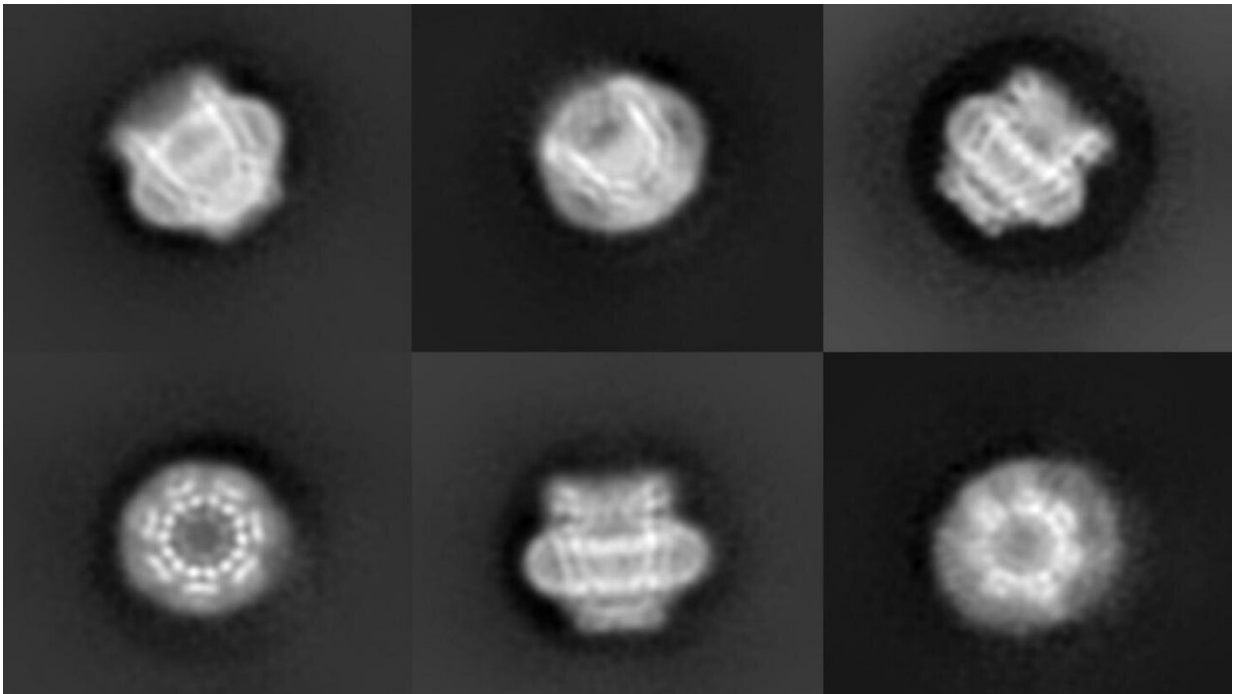


Images of 'invisible' holes on cells may jumpstart research

March 3 2020, by Brian Stallard



Six microscopic views of the 3D pore protein pannexin 1. The images were captured using cryo-electron microscopy. Each pore protein is about 6 nm wide. This means that well over 300,000 could fit on the head of a pin (2 mm). Credit: Furukawa lab/CSHL, 2020

High blood pressure, inflammation, and the sensation of pain may rely in part on tiny holes on the surface of cells, called pores. Living cells react to the environment, often by allowing water and other molecules to pass

through the cell's surface membrane. Protein-based pores control this flow.

One set of pores, called pannexins, are like tiny "black holes" of biology; their existence has been confirmed by computational and functional evidence but until very recently, they were never actually seen. They help [cells](#) communicate with and react to their surroundings, but until scientists see what they look like, it is hard to know how. Now, a team of researchers from Cold Spring Harbor Laboratory (CSHL) and Cornell University have developed very high-resolution images of these elusive structures.

"We all knew these pores had to exist... but there's definitely been some mystique about pannexins," said postdoctoral researcher Kevin Michalski, who co-led the project. "Without images, it's been really difficult to figure out exactly what these pores are doing."

Michalski spent more than six years trying to get a clear image of pannexins.

"I had spent so long trying to set up experiments without really being able to see what I was working with. That's what makes this so exciting," Michalski explained. "For the first time, we can definitely see this detailed structure—it's all new information."

Michalski and Johanna Syrjanen, also in the Furukawa lab at CSHL collaborated with the Kawate lab at Cornell University, and published their findings in the journal *eLife*. They used a technique called cryo-[electron microscopy](#) (cryo-EM) to capture a half-million images of a pannexin pore, called "pannexin 1," from many different angles. They then merged the images to form a three-dimensional model. Pannexin 1 is made up of seven identical proteins in a donut-like ring around a central pore.

Researchers have hypothesized that pannexin 1 is responsible for releasing the signals that trigger a failing cell's self-destruction. These signals prompt macrophages to destroy the ailing cell, clearing the way for new cells to thrive. Without the replacement of ailing cells with new cells, organisms age.

"But what's interesting is that even cells that don't go through the process of self-destruction can have pannexins," Michalski said. "That means that there has to be some other important mechanisms that this pore is performing."

"The way pannexin 1 is shaped on a cell is different from another kind of pore that my lab recently revealed," added Professor Hiro Furukawa, who oversaw the research. "It appears that there are more kinds of pores than scientists originally anticipated. How and when they open and close are important questions to be explored."

The flow of water, salts, and other molecules into a cell across a [pore](#) regulates the cell's size. Cells that misregulate their size or [water flow](#) could contribute to [high blood pressure](#), pain, and inflammation.

Pannexins are also thought to allow much larger molecules to pass through their pores. Understanding how molecules negotiate their way through a pannexin could lead to new classes of drugs.

More information: Kevin Michalski et al, The Cryo-EM structure of pannexin 1 reveals unique motifs for ion selection and inhibition, *eLife* (2020). [DOI: 10.7554/eLife.54670](https://doi.org/10.7554/eLife.54670)

Provided by Cold Spring Harbor Laboratory

Citation: Images of 'invisible' holes on cells may jumpstart research (2020, March 3) retrieved 6

May 2024 from <https://phys.org/news/2020-03-images-invisible-holes-cells-jumpstart.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.