# Molecular “movie” helps microbiologists better understand chronic infections associated with cystic fibrosis

*Office of Research*

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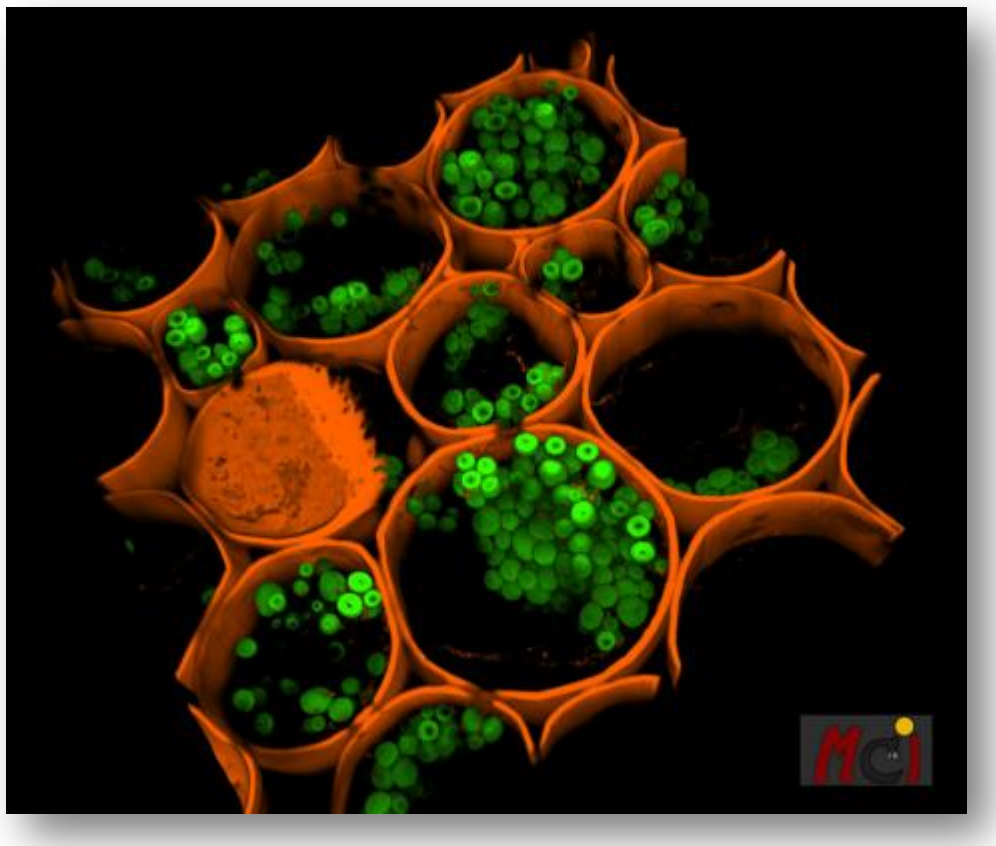

In microbiology, a “movie” makes all the difference, between seeing everything at the molecular level, and seeing very little.

So says University of Guelph Prof. Cezar Khursigara, who’s seeing more than ever these days thanks to a new spinning disk confocal microscope recently acquired by Khursigara, and colleagues Joseph Lam and Chris Whitfield in the Department of Molecular and Cellular Biology. It’s opening up new research possibilities Khursigara and his colleagues previously only dreamt of.

“If a picture’s worth a thousand words,” he says, “then maybe a movie’s worth a million words.”

The new system, housed inside the Guelph Advanced Analysis Centre, is based on a camera capable of capturing biological processes as they occur in real time. It’s differentiated from older systems by its speed.

Here’s why it’s game changing: Biological processes often occur on imperceptibly short time scales. In the time it takes to snap an image, the process that a microbiologist might be trying to observe could have already expired. To eliminate this problem, the new system utilizes a spinning disk that can capture images at speeds of up to 100 frames per second.

One of the principal applications of Khursigara’s research involves studying how bacterial communities called biofilms form and react to environmental and chemical changes. Being able to observe these communities take shape in real time is informing Khursigara’s cystic fibrosis research, as it pertains to biofilms in the lungs.

“We can mimic conditions that you’d find inside a lung, except we do them under a coverslip under the microscope,” he says. This capability allows researchers to begin to ask how these new understandings of bacterial communities can inform more efficient and effective therapeutic treatments for pathogenic and chronic infections.

Acquiring the microscope took some creativity. A Canada Foundation for Innovation John Evans Leadership Fund and Ontario Ministry of Innovation Infrastructure Grant supported the spinning disk and the computer hardware and software needed to produce and render the images. Khursigara, Lam and Whitfield recycled parts from older microscopes to form the base of the new system.

“The lab generates a ton of images and we see things that are beautiful, that you wouldn’t expect to see, that are informative, that go beyond the expectations of what the experiment might be or designed to do,” says Khursigara. The spontaneity of these discoveries routinely informs how he and his colleagues visually communicate their findings to their field and the public.

A video of this research story is also available.

https://www.youtube.com/watch?v=ByrJtvpSNFs