Researchers in hot pursuit of creeping bacteria

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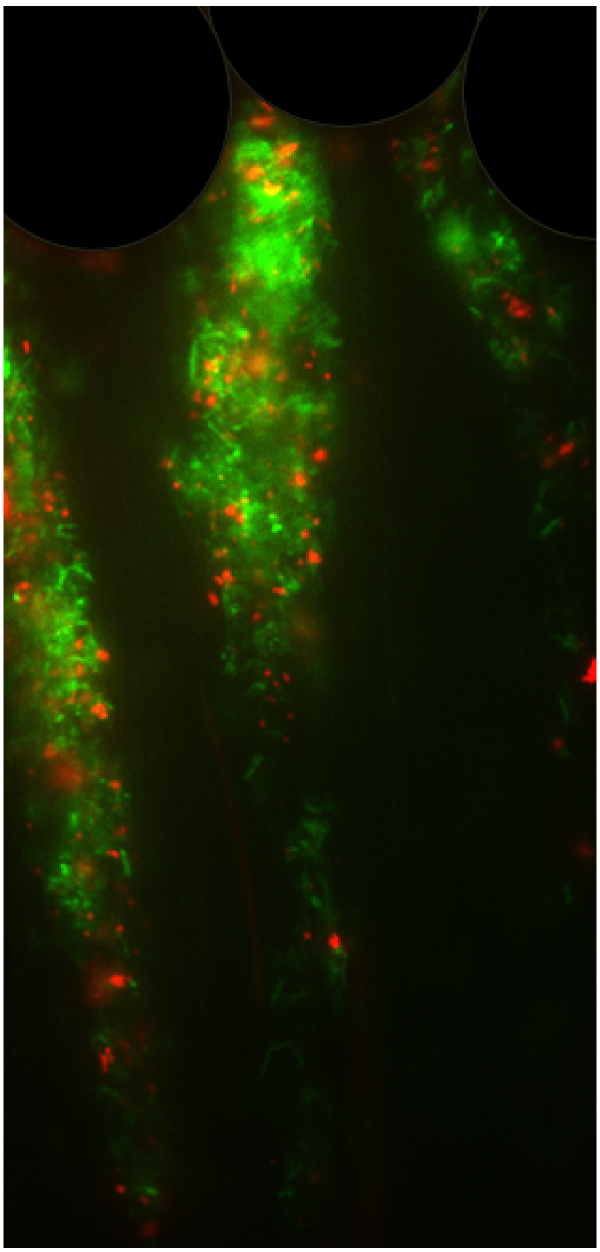

Image captures bacterial "Streamers" under flow conditions. Credit: Aloke Kumar, UAlberta Engineering

University of Alberta mechanical engineering professor Aloke Kumar and members of his lab are hot on the trail of bacteria as they spread between surfaces connected by fluid flows. Understanding how this spread occurs is contributing to the development of prevention techniques and could improve our health and our healthcare practices.

Their research paper concerning the formation, deformation and breaking of microscopic streams of bacterial filaments in slo flowing fluids (creeping), written by Ishita Biswas, a PhD student in Kumar's lab, was published recently in *Scientific Reports*.

Bacteria typically do not live in isolation, but live together in groups, encased in a matrix of self-secreted extra-cellular substances, called bio-films. When bacteria begin to make these biofilms in flowing, fluid conditions, the biofilms form as streamers—slender filaments that grow longer and longer. Eventually, however, the filaments will break, and bacteria will float along with the flow of the fluid to new sites, bringing infection with them.

Such a problem is not insignificant when you think of all the liquid flowing through all those miles of tubing at your local hospital or Medi-Centre. Because this movement of bacteria with flow can lead to the spread of infection, or even just build up in pipes and tubes, Kumar's lab set out to study the formation of the filaments, as well as the conditions under which they begin to break down and finally break off.

"The complexity of the problem is created because of the extra-cellular substances that make up the streamers," says Kumar. "They have significant elasticity and they can unfold in different ways, so that when they're in a flow, the stress and strain

factors are not straight forward—definitely not linear."

What's more, these streamers are very small and light-weight, because they have formed in such small devices. If, in order to study them, the researchers remove the streamers from the devices, they simply fall apart. In order to test them, therefore, Kumar and his lab members must work with the streamers inside these small devices.

Sometimes the smallest, slowest moving foes are the most formidable.

Provided by University of Alberta