Bacteria thrive on ‘film’

This slimy glue is everywhere—in your body, on your teeth—and hard to kill

BY CHRIS SHERR

When he was studying for his doctorate in microbiology, Mark E. Sherrill thought he knew a lot about bacteria.

But then he heard a lecture by Dr. Robert K. Jain, a Stanford bioengineer, and his whole worldview changed. Jain showed how bacteria can form protective film, or biofilm, that protects them from antibiotics and other treatments.

Jain also demonstrated how biofilms are responsible for many human diseases, from tooth decay to infections of medical devices.

This realization prompted Sherrill to delve deeper into the field of biofilms. He began to explore the ways in which bacteria form these protective layers and how they can be targeted for treatment.

In the years since, Sherrill has become an expert in the field of biofilms and has made significant contributions to the understanding of these microorganisms. His work has implications for a wide range of fields, from medicine to dentistry.

Sherrill is currently working on developing new therapies for biofilm-related infections, and his research has received funding from the National Institutes of Health.

Sherrill’s work is just one example of the growing importance of studying biofilms. As scientists continue to unravel the mysteries of these microorganisms, they are finding new ways to fight infections and improve human health.
Combating bacteria bound by film

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"we can't attack after forming biofilm. "We can't punch holes in the biofilm," Shifflett said, "and it probably wouldn't do any good." Above, showing some of the bacteria involved in biofilm are a common mouth bacteria. About 10% of all bacteria in the oral cavity are found in biofilm, according to the National Institutes of Health.

When biofilms are on bone, Cavallini's model does not replace the bone, but it does replace the bone. The cells also grow and divide, similar to other areas, and they produce a thick layer of slime. The slime also holds biofilm to the teeth, causing them to release caustic acids and proteins. "They start breaking down," Shifflett said. "They then release enzymes that make them hard to the biofilm." Furthermore, the biofilm can stick to the teeth and cause them to break down. This is when the biofilm spreads again.

Scientists estimate that 65 percent of all patients with bacterial biofilms are resistant to treatment. More than 80 percent of patients with dental biofilms are resistant to treatment. Beyond dental biofilms, CIP patients can develop bacterial biofilms on the skin, in the lungs, and in the bladder. Without effective treatment, the biofilm can spread to other areas of the body.

Clinical studies, a type involving human volunteers, patients with biofilms, are about to begin at the University of Maryland Dental School. The researchers say they are close to developing a new treatment for the biofilm.

Mark E. Shifflett walks in his lab at the University of Maryland Dental School. He recently received $3.25 million to research ways to prevent the formation of biofilms.

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Bacteria culture media is injected into saline taking connected to a respiratory system, which pumps liquid into the tubing. The bacteria that adheres to the tubing are then studied.