

Defending us from our dirty mouths

Our mouths are filthy, full of disease-causing microbes picked up from food, dirty fingers, and anything else that makes it past our lips. Bathed in this sea of germs, why doesn't even the slightest cut fall prey to serious infection? New data suggest that, at the first sign of injury, the inside of our mouths applies its own antibiotic.

The concept is hardly new. While working at the National Institutes of Health, Michael A. Zasloff discovered that the skin of wounded frogs secreted natural antibiotics (SN: 8/8/87, p.85). He termed the compounds "magainins," after the Hebrew word for shield. Two years ago, he found that sharks produce similar antimicrobial agents.

Now, Zasloff has observed related infection-fighting peptides in and around grazing injuries on the tongues of cows. He and his colleagues at Magainin Pharmaceuticals, a company he founded in Plymouth Meeting, Pa., report their finding in the March 17 *SCIENCE*. In fact, Zasloff adds, follow-up studies suggest that all moist surface linings — from the eye and cheek to the gut, rectum, and lung — respond to injury by producing these antibiotics.

His team isolated the predominant antibiotic — a defensin — from freshly slaughtered cattle. The group then looked for heightened activity of the gene that codes for the production of defensin. Invariably, they found it at sites of injury.

In fact, elevated antibiotic production occurred wherever other, more familiar germ-fighting elements of the immune system had been triggered, observes Barry S. Schonwetter, who led the study. Work by others has shown that defensins can recruit circulating immune system cells, such as neutrophils, to sores, where they release a related antibiotic, says Zasloff. This suggests that the tongue's antibiotics "are part of the immune system," Schonwetter explains, "and associated with acute or chronic inflammation."

Because animals ranging from chickens to humans produce related defensins, these antibiotics appear primitive and fairly universal, Zasloff says. "The same system, using different molecules, dominates the insect world."

Zasloff suspects that many diseases "represent failures of the system to keep up with the [attack] of certain bacteria or viruses." If so, drugs might be fashioned to jump-start dormant systems or rev up sluggish ones.

"I don't think anyone had thought about the tongue as a potential site for antimicrobial peptides," notes Robert I. Lehrer of the University of California, Los Angeles, Center for Health Sciences. "One nice contribution of this lovely paper is calling our attention to this."

When a dog or cat gets cut, it licks the wound. Traditionally, Lehrer says, "we physicians saw that as cleaning — debriding — it." But it now appears that "they may be putting a little antibiotic on as well."

— J. Raloff