

Alligator blood may put the bite on antibiotic-resistant infections

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Alligator blood could provide a powerful new source of antibiotics for fighting deadly "superbugs" and other infections, researchers say. Photo credit: Courtesy of U.S. Fish & Wildlife Service

Despite their reputation for deadly attacks on humans and pets, alligators are wiggling their way toward a new role as potential lifesavers in medicine, biochemists in Louisiana reported today at the 235th national meeting of the American Chemical Society. They described how proteins in gator blood may provide a source of powerful new antibiotics to help fight infections associated with diabetic ulcers, severe burns, and "superbugs" that are resistant to conventional medication.

Their study, described as the first to explore the antimicrobial activity of alligator blood in detail, found a range of other promising uses for the gator's antibiotic proteins. Among them: combating *Candida albicans* yeast infections, which are a serious problem in AIDS patients and transplant recipients, who have weakened immune systems, the scientists say.

"We're very excited about the potential of these alligator blood proteins as both antibacterial and antifungal agents," says study co-author Mark

Merchant, Ph.D., a biochemist at McNeese State University in Lake Charles, La. "There's a real possibility that you could be treated with an alligator blood product one day."

Previous studies by Merchant showed that alligators have an unusually strong immune system that is very different from that of humans. Unlike people, alligators can fight microorganisms such as fungi, viruses, and bacteria without having prior exposure to them. Scientists believe that this is an evolutionary adaptation to promote quick wound healing, as alligators are often injured during fierce territorial battles.

In collaboration with Kermit Murray and Lancia Darville, both of Louisiana State University in Baton Rouge, Merchant and colleagues collected blood samples from American alligators. They then isolated disease-fighting white blood cells (leucocytes) and extracted the active proteins from those cells.

In laboratory tests, tiny amounts of these protein extracts killed a wide range of bacteria, including MRSA (methicillin-resistant *Staphylococcus aureus*), the deadly bacteria that are moving out of health care settings and into the community. These "superbugs" are increasingly resistant to multiple antibiotics and cause thousands of deaths each year.

The proteins also killed six out of eight different strains of *Candida albicans*, the researchers say. Their previous research also suggests that blood proteins may help fight HIV, the virus that causes AIDS.

The scientists are working to identify the exact chemical structures of the antimicrobial proteins and determine which proteins are most effective at killing different microbes. The gator blood extract may contain at least four promising substances, they estimate.

With the chemical structures in hand, scientists can begin developing them into antibacterial or antifungal drugs, including pills and creams, for fighting infections. These drugs show particular promise as topical ointments, Merchant says. Gator-blood creams could conceivably be rubbed onto the foot ulcers of patients with diabetes to help prevent the type of uncontrolled infections that lead to amputations, he says. The creams could also be applied to the skin of burn patients to keep infections at bay until damaged skin can heal, the researcher adds.

Merchant suggests that the proteins might be called "alligacin." If studies continue to show promise, the drugs could land on pharmacy shelves in another seven to ten years, he estimates. Until then, don't try to create your own home-remedies using alligator blood, as raw, unprocessed blood could make you sick or even kill you if injected, the researcher cautions.

Similar antimicrobial substances might also be found in related animals such as crocodiles, Merchant notes. In the future, he plans to study blood samples from alligators and crocodile species throughout the world to test their disease-fighting potential. The state of Louisiana and the National Science Foundation provides funding for this research.

Source: American Chemical Society

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