

Killing prions with ozone

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(L-R) Mohamed Gamal El-Din, Ning Ding, Mike Belosevic and Norman Neumann

When it comes to infectious agents, it doesn't get much worse than prions. These misfolded proteins are highly resistant to a wide variety of extreme disinfectant procedures. They have been identified as the culprits behind mad cow disease and chronic wasting disease in animals and humans, and are also implicated in Creutzfeldt-Jakob disease and other prion-related disorders.

But an interdisciplinary University of Alberta research team has come a step closer to finding a way of inactivating these highly infectious proteins.

The team, lead by environmental health professors Mike Belosevic and Norm Neumann from the School of Public Health and engineering professor Mohamed Gamal El-Din from the Department of Civil and Environmental Engineering, have demonstrated for the first time that

prions are highly susceptible to molecular ozone.

The discovery could have implications for decontaminating medical and dental surgical instruments or treating water and wastewater in settings where prions might appear, such as in slaughterhouse waste.

“Although we know that they have a very high-level resistance, it’s possible that we’ve discovered their Achilles’ heel,” said Neumann. “This means there might be simple solutions to dealing with contaminated medical instruments and waste products from slaughterhouses.”

Human transmission of these devastating infectious agents through patient exposure to surgical equipment and blood transfusions has been documented. If these proteins can be neutralized, the result will be improved patient care.

“Because ozone is already commonly used in the hospital environment, the technology for this disinfection process already exists,” says Neumann. “It is possible to take a medical instrument, put it in an ozone bath and very quickly destroy 99.99% of the prions that are there.”

However, there is still much work to do. “The only proof of final inactivation is to actually infect animals, and it may take years for the animal to start demonstrating the behavioural changes associated with these diseases caused by prions,” says Neumann. “We need more research in this area to increase our understanding of the relationship between [ozone](#) and all types of prions, including bovine spongiform encephalopathy or BSE, and that’s what we’re working on now.”

The interdisciplinary nature of the research proved to be crucial to the success. “Nobody has really taken the biological diagnostics and methods and then applied them in the engineering context, and that’s what we did here,” Neumann said.

The importance of the interdisciplinary approach to this research is echoed by Gamal El-Din. “We have the expertise in microbiology and engineering to make a difference. The ultimate goal is to protect the health of people as well as the environment.”

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More information: [aem.asm.org/content/78/3/613.a ... 72-834e-e557b232ed57](https://aem.asm.org/content/78/3/613.a...72-834e-e557b232ed57)

Provided by University of Alberta

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