

Study points to possible target for mad cow vaccine

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By Martin F. Downs

NEW YORK (Reuters Health) - As Canada grapples with an ongoing mad-cow disease crisis, researchers there report findings that may lead to new tests or possibly even therapies for the brain-wasting ailment.

Dr. Neil Cashman and colleagues at the University of Toronto say they have found a possible site where antibodies might bind to prions -- the rogue proteins that cause the fatal disease -- without also targeting normal prion proteins.

"This antibody binding site could be useful in diagnostic tests; it could be useful as a target for vaccines or immunotherapies, and it could be useful as a way to monitor the misfolding and distribution of prions in the body," Cashman told Reuters Health.

Mad cow disease, also called bovine spongiform encephalopathy (BSE), is one of a host of diseases believed to be caused by prions, a pathogen that is entirely different from the traditional suspects -- bacteria, viruses, parasites, and fungi.

Other prion diseases include variant Creutzfeldt-Jakob disease (vCJD), the so-called human form of mad cow disease, and several other rare degenerative brain diseases in people. Many animals other than cattle are vulnerable to prion diseases, including sheep, deer, elk and mink, as well as domestic and exotic cats.

Scientists believe these diseases are caused when a normal protein, a prion, folds itself in an abnormal way. The abnormal prion recruits all other proteins of its kind to become misshapen, ultimately destroying brain tissue and killing the victim.

"We discovered that there is a sequence of amino acids which are named tyrosine-tyrosine-arginine, which are preferentially exposed in the misfolded form," Cashman said. Amino acids are the building blocks of all proteins.

For the study, the researchers injected the tyrosine-tyrosine-arginine chain into rabbits, goats, and mice. The animals developed antibodies against it, suggesting they might be immunized against the disease, according to the report in the advance online publication of Nature Medicine.

In theory, a vaccinated animal's immune system could destroy prions before they had a chance to multiply in the body and cause any disease.

"It's in the conceptual stage at this point," Cashman said.

If this turns out to be true, it might be possible to vaccinate livestock, which would prevent vCJD in humans. Scientists believe that people get vCJD by eating the meat of cows or sheep that have been fed ground-up carcasses of prion-infected animals.

Cashman said he thinks no one would want to immunize the human population at large. Nevertheless, it might be possible to treat people already infected with vCJD and hereditary CJD by giving them antibodies that bind to the tyrosine-tyrosine-arginine chain.

With funding from the Canadian Institutes of Health Research, Cashman is now testing whether a vaccine protects prion-infected mice from developing disease. He said it will be more than a year until results are available.

Cashman is the founder and scientific advisor of Caprion Pharmaceuticals, which funded the study in conjunction with the Canadian Institutes of Health Research and McDonald's Corporation.

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