

Seizures in patients with pork tapeworm caused by Substance P

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A neuropeptide called Substance P is the cause of seizures in patients with brains infected by the pork tapeworm (*Taenia solium*), said Baylor College of Medicine researchers in a report that appears online in the open access journal *PLoS Pathogens*.

"Neurocysticercosis or the tapeworm [parasitic infection](#) in the [brain](#), is the major cause of acquired seizures," said Dr. Prema Robinson, assistant professor of medicine - infectious diseases, and corresponding author of the report. "It is particularly important to understand the source of these seizures in order to develop ways to treat and prevent them."

Substance P is a neuropeptide (a small protein-like molecule involved in neuron-to-neuron communication.) It is produced by neurons, endothelial cells (the cells that line blood vessels) and cells involved in host defense. Discovered in the 1930s, it has long been recognized as a pain transmitter. However, in recent years, it has also been found to play a role in many other functions.

Robinson realized that Substance P is involved in inflammation and wondered if it might be involved in seizure activity.

Robinson and her colleagues - including one from Tufts Medical Center in Boston - found Substance P in autopsies of the brains of patients who had the tapeworm infection. They did not find Substance P in uninfected brains.

"As long as the parasite is alive, nothing happens," said Robinson. However, once the worm dies, the body responds with chemicals that recruit immune system cells to the site of infection, causing inflammation. Her studies showed that the cells that produce Substance P are found mainly in areas of inflammation near the dead worms.

Animals injected with Substance P alone or with

extracts from the areas of inflammation (granulomas) near the worms in infected mice suffered severe seizures, she said.

When the rodents received the drug that blocks the Substance P receptor, they did not have seizures, she said.

In addition, mice that lacked the Substance P receptor did not have seizures even when injected with the extracts of granulomas from infected mice. In addition, granuloma extracts from mice that lacked the cells that make Substance P did not induce seizures.

These findings have implications for people, who often suffer seizures during treatment for the tapeworm infection, she said. As the worms die, inflammatory [cells](#) rush to the scene and the seizures begin. There are medications known to block the receptor for Substance P. These medications may prove to be the most effective means of treating and preventing seizures in these patients.

Robinson plans to look at the role Substance P may play in other diseases associated with [seizures](#) such as cancer and tuberculosis.

Provided by Baylor College of Medicine

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