Explaining chemotherapy-associated nausea

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A new study from the Monell Center increases understanding of the biological mechanisms responsible for the nausea and vomiting that often afflict patients undergoing chemotherapy. The findings could lead to the development of new approaches to combat these debilitating side effects.

“By increasing knowledge of what causes the nausea and vomiting that accompany chemotherapy treatment, we move closer to providing patients with less traumatic and hopefully more effective drug treatment regimens,” said lead author Bart De Jonghe, PhD, a Monell physiologist.

Anorexia (loss of appetite) and cachexia (a syndrome of physical wasting and weight loss) often accompany chemotherapy-induced symptoms of nausea and vomiting. These side effects can compromise the patient’s nutritional status and impede recovery.

The research, published online in the American Journal of Physiology, uses a rat model to identify a nerve that transmits signals of chemotherapy-associated illness from the small intestine to the brain.

To explore whether sensory nerves traveling from the intestinal system to the brain contribute to nausea and illness associated with chemotherapy, the Monell researchers examined the incidence of pica in rats that received the potent chemotherapy drug cisplatin. Cisplatin treatment, widely used for a variety of cancers, is highly associated with nausea and vomiting.

Pica is the term used to describe the eating of non-food substances, such as clay or dirt. Because rats – which do not vomit – eat clay when made sick by toxins, researchers measure pica behavior as an indicator of nausea and malaise in these animals.

In the Monell study, rats given cisplatin began to eat clay, decreased their food intake, and lost body weight.

The researchers found that cisplatin-associated pica was reduced by 60 percent when they cut a nerve that transmits sensory signals from the small intestine to the brain. Cutting the same nerve, known as the common hepatic branch of the vagus nerve, also lessened the reduction of food intake and loss of body weight.

These results suggest that the upper intestine is an important site for generation of the nausea and appetite loss associated with chemotherapy drugs.

The findings also help to define the neural systems involved in nausea and malaise, which can significantly impact the nutritional status of patients receiving potent drug treatments for diseases such as cancer or AIDS.

“This nerve may be part of a natural detection system that we use to detect toxins in food, and it is possible that we are activating it with these strong medications,” comments senior author Charles Horn, PhD, a behavioral neuroscientist at Monell.

Increased understanding of this system will enable development of specific blockers to reduce nausea and improve quality of life during chemotherapy and related therapeutic regimens.

Future studies also will evaluate whether the vagus nerve contributes to other side effects associated with chemotherapy, such as altered taste perception, fatigue, and stress.

Source: Monell Chemical Senses Center