

Love hormone also forms important link between stress and digestive problems

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New research published today in *The Journal of Physiology* shows that oxytocin, known as the love hormone, plays an important role in stress' disruption of digestion such as bloating, discomfort, nausea, and diarrhea.

Stress disrupts gastrointestinal functions and causes a delay in gastric emptying (how quickly food leaves the stomach). This delay in gastric emptying causes bloating, discomfort, and nausea and accelerates colon transit, which causes diarrhea.

Oxytocin, an anti-stress hormone, is released from the hypothalamus in the brain which acts to counteract the [effects of stress](#). For a long time, the actions of oxytocin were believed to occur due to its release into the blood with only minor effects on the nerves within the brain that regulate gastrointestinal functions.

The study used new ways to manipulate the neurons and nerves (neurocircuits) that oxytocin released from the hypothalamus acts upon and measured the effects on the response of gastric emptying to stress. They have shown that, contrary to previous assumptions, these oxytocin circuits play a major role in the response of the stomach to stress.

Activation of these oxytocin circuits reversed the delay in gastric emptying that occurs normally in response to stress, by increasing muscle contractions (motility) of the stomach, while inhibition of these neurocircuits prevented adaptation to stress.

The new research, conducted at Penn State University- College of Medicine and was sponsored by a grant from the National Institute of Health, U.S., employed cutting-edge tools that allow selective manipulation of the circuits that receive hypothalamic oxytocin inputs together with simultaneous measurements of gastric emptying and motility in response to stress.

The authors used a rat model of different types of stress—acute stress, appropriate adaptation to stress, and inappropriate adaptation to stress. The authors infected the neurons controlling the oxytocin nerves and neurocircuits with novel viruses that allowed them to be activated or

inhibited and measured muscle activity in the stomach, as well as gastric emptying (the time for food to leave the stomach).

The researchers have shown that these oxytocin neural circuits play a major role in the gastric response to stress loads. Indeed, their activation reversed the delayed gastric emptying observed following acute or chronic responses to stress, thus increasing both gastric tone and motility. Conversely, inhibition of these neurocircuits prevented adaptation to stress thus delaying gastric emptying and decreasing gastric tone.

These data indicate that oxytocin influences directly the neural pathways involved in the stress response and plays a major role in the gastric [response](#) to stressors.

The ability to respond appropriately to stress is important for normal physiology functions. Inappropriate responses to stress, or the inability to adapt to stress, triggers and worsens the symptoms of many gastrointestinal disorders including delayed gastric emptying and accelerated colon transit.

Previous studies have shown that the nerves and neurocircuits that regulate the function of gastric muscle and emptying respond to stress by changing their activity and responses.

In order to identify targets for more effective treatments of disordered gastric responses to stress, it is important to first understand how stress normally affects the functions of the stomach. Their study provided new information about the role that oxytocin plays in controlling these nerves and circuits during stress and may identify new targets for drug development.

Commenting on the study R Alberto Travagli said:

"Women are more vulnerable to stress and [stress](#)-related pathologies, such as anxiety and depression, and report a higher prevalence in gastrointestinal disorders. Our previous studies showed that vagal neural circuits are organized differently in males versus females. We are now finalizing a series of studies that investigate the role and the mechanisms through which [oxytocin](#) modulates gastric functions in stressed females. This will help to develop targeted therapies to provide relief for women with gastrointestinal disorders.

More information: Yanyan Jiang et al, Hypothalamic-vagal oxytocinergic neurocircuitry modulates gastric emptying and motility following stress, *The Journal of Physiology* (2020). [DOI: 10.1113/JP280023](#)

Provided by The Physiological Society

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