Carbon monoxide reverses diabetic gastric problem in mice

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Mayo Clinic researchers have shown that very low doses of inhaled carbon monoxide in diabetic mice reverses the condition known as gastroparesis or delayed stomach emptying, a common and painful complication for many diabetic patients. The findings will be presented on June 1 at Digestive Disease Week in Chicago.

"This is a significant finding, as it shows that loss of the enzyme that makes carbon monoxide is the actor in this process and that it provides us with a clear approach toward a possible new therapy for this condition," says Gianrico Farrugia, M.D., Mayo Clinic gastroenterologist and lead investigator on the study.

Gastroparesis occurs when the stomach retains undigested food for long periods. When that food eventually passes into the small intestine, insulin is released. Because the passage of food out of the stomach becomes unpredictable, maintaining a proper blood glucose level -- critical for controlling diabetes -- also becomes difficult. Gastroparesis can cause pain, nausea, vomiting, stomach spasms and weight loss due to inability to ingest enough nutrients. In some patients with diabetes, the abnormally high blood glucose levels cause chemical changes in nerves and in pacemaker cells, which regulate digestive processes in the gut, and damage blood vessels that carry oxygen and nutrients to cells.

Previous studies by the Mayo team showed that gastroparesis is associated with the loss of up-regulation of heme oxygenase-1 (HO1) and an increase in oxidative stress. It also causes a loss of Kit, a marker

for the pacemakers cells called interstitial cells of Cajal, which regulate muscle contraction in the digestive tract. When the team induced HO1 production, signs of oxidative stress dropped and gastroparesis was restored along with Kit.

The metabolite that normalized gastric functioning was not known. Suspecting carbon monoxide, the Mayo investigators studied ten mice with diabetes that had exhibited delayed gastric emptying. Five mice were given carbon monoxide by inhalation (100 parts per million) for six hours daily. Within three weeks gastroparesis reversed, oxidative stress decreased and Kit expression increased, all without increasing HO1 expression.

Source: Mayo Clinic (news : web)