

Insulin may reduce several inflammatory factors induced by bacterial infection

September 8 2010

Treating intensive care patients who develop life-threatening bacterial infections, or septicemia, with insulin potentially could reduce their chances of succumbing to the infection, if results of a new preliminary study can be replicated in a larger study.

A paper published online ahead of print in *Diabetes Care* reports that insulin lowered the amount of inflammation and oxidative stress in study participants who had been injected with a common bacteria, or endotoxin, known as LPS (lipopolysaccharide).

The study was conducted by University at Buffalo endocrinologists at Kaleida Health's Diabetes-Endocrinology Center of Western New York.

LPS, found in the outer membrane of various gram-negative bacteria, is known to increase the ability of the bacteria to cause hemorrhage, necrosis of the kidneys and shock, especially in immune-compromised patients.

The study involved 19 healthy subjects who were injected after an overnight fast with a dose of the endotoxin based on their weight. After the endotoxin injection, 10 participants were infused with insulin (plus dextrose to maintain normal glucose levels), and nine received saline to mimic the insulin infusion.

The infusions continued for six hours following the endotoxin injections. Participants then ate a 900 calorie meal and ate nothing else until the

following morning.

Researchers monitored the subjects' temperature, pulse, blood pressure, headaches, body aches and chills for 24 hours following the endotoxin injection. [Blood samples](#) were collected one hour before the injection, at the time of injection and at one, two, four, six and 24 hours afterwards.

Monitoring showed that the endotoxin raised body temperature by three degrees -- from 98 to a peak of 101.3 at the four-hour mark, and produced body aches and headaches, which peaked between one and two hours. Results showed that insulin reduced the body-aches score but had no effect on temperature,

In addition, the endotoxin induced a rapid rise in several destructive and inflammatory factors, including reactive oxygen species (free radicals) and products of nitric oxide and fat metabolism. The insulin infusion led to total elimination of several pro-inflammatory factors and to a significant reduction in generation of reactive oxygen species and the products of fat metabolism.

Paresh Dandona, MD, PhD, UB distinguished professor of medicine and senior author on the study, says this study confirms the expectations arising out of the researchers' initial discovery of the anti-inflammatory effect of insulin.

"This study lays the foundation for further studies based on insulin infusion and the normalization of blood glucose concentrations in patients with endotoxemia and [septicemia](#)," says Dandona.

"Our endocrinology group demonstrated previously that insulin also has anti-inflammatory and cardioprotective effects in patients who had a heart attack, and we currently are conducting a study on the potential beneficial effects of insulin on acute stroke.

"Clearly, [insulin](#) may emerge with roles beyond those conceived when it was discovered in 1921 as a metabolic hormone, and has since been used for the treatment of diabetes to lower and control blood glucose concentrations," Dandona notes.

Provided by University at Buffalo

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