

Baking soda could prevent deadly fungal infections in diabetic ketoacidosis

May 9 2016

Patients with diabetic ketoacidosis (DKA) face a much higher risk of succumbing to a deadly fungal infection, known as mucormycosis, than healthy patients. A new study suggests a simple treatment of sodium bicarbonate, or baking soda, could prevent the spread of mucormycosis in patients with DKA.

The study, published today in the *Journal of Clinical Investigation*, found sodium bicarbonate reversed the effects that promoted the spread of mucormycosis in DKA, a life-threatening condition that can affect people with diabetes. DKA occurs when the body cannot use sugar, or glucose, as a fuel source because there is no insulin or not enough insulin. Fat is used for fuel instead, triggering acids, called ketones, to accumulate in the body. In high levels, ketones are poisonous and can lead to a diabetic coma and death.

"The current guidelines for correcting acidosis of DKA patients doesn't indicate using sodium bicarbonate until the acidosis is severe," said Ashraf S. Ibrahim, PhD, an LA BioMed lead researcher and corresponding author of the study. "Our data strongly suggest that DKA patients suspected of having mucormycosis would benefit from adding sodium bicarbonate to the treatment regimen—regardless of whether they have severe acidosis or not—because sodium bicarbonate is likely to halt the growth of the fungus."

The researchers identified the processes in DKA that promoted the growth of mucormycosis and suppressed the effect of the phagocytes,

which are cells within the body capable of engulfing and absorbing invading microorganisms. They found fungal cell surface proteins, CotH, bind to the mammalian cell receptor, GRP78, during the invasion of host tissues.

In DKA patients, they also identified other host factors—including elevated glucose, iron and ketone bodies—that enhanced the expression of both the fungal and mammalian cell receptors in a way that promoted enhanced invasion and damage of host tissues.

In addition, the study noted that acidosis seen in DKA exerts an indirect effect by liberating iron from transferrin, which in turn augmented the expression of GRP78 and CotH, suppressed phagocyte function and enhanced growth of the fungus.

Collectively, these effects promoted rapid infection and progression of mucormycosis. Using disease models, the researchers found sodium bicarbonate reversed many of these effects and helped defeat the mucormycosis infection.

Their finding of elevated iron levels also suggested that reducing the amount of iron by the use of iron chelation, in conjunction with [sodium bicarbonate](#) treatment, would help prevent mucormycosis infections in patients with DKA. The researchers also noted that further studies are needed in well-designed clinical trials involving [patients](#) with DKA and mucormycosis infections.

More information: The full text of the study is available at: [www.jci.org/articles/view/8274 ... cb51a45b8d207c235e4b](http://www.jci.org/articles/view/8274...cb51a45b8d207c235e4b)

Provided by Los Angeles Biomedical Research Institute at Harbor

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