New study shows inflammatory food toxins found in high levels in infants

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Researchers from Mount Sinai School of Medicine have found high levels of food toxins called Advanced Glycation End products (AGEs) in infants. Excessive food AGEs, through both maternal blood transmission and baby formula, could together significantly increase children's risk for diseases such as diabetes from a very young age. A second study of AGEs in adults found that cutting back on processed, grilled, and fried foods, which are high in AGEs, may improve insulin resistance in people with diabetes. AGEs -- toxic glucose byproducts previously tied to high blood sugar -- are found in most heated foods and, in great excess, in commercial infant formulas.

The first report, published in Diabetes Care in December 2010, showed that AGEs can be elevated as early as at birth, indicating that infants are highly susceptible to the inflammation associated with insulin resistance and diabetes later in life. Helen Vlassara, MD, Professor and Director of the Division of Experimental Diabetes and Aging, working with Jaime Uribarri, MD, Professor of Medicine and colleagues at Mount Sinai School of Medicine, looked at 60 women and their infants to see if there was a passive transfer of AGEs from the blood of mothers to their babies. They found that newborn infants, expected to be practically AGE-free, had levels of AGEs in their blood as high as their adult mothers.

Within the first year of life, after switching from breast milk onto commercial formulas, the infants' AGEs had doubled to levels seen in people with diabetes, and many had elevated insulin levels. Formulas that are processed under high heat can contain 100 times more AGEs

than human breast milk, delivering a huge AGE surplus to infants, which could be toxic.

"Modern food AGEs can overwhelm the body's defenses, a worrisome fact especially for young children," said Dr. Vlassara. "More research is certainly needed, but the findings confirm our studies in genetic animal models of diabetes. Given the rise in the incidence of diabetes in children, safe and low cost AGE-less approaches to children's diet should be considered by clinicians and families."

The work led to a second report in *Diabetes Care*, in July 2011, which demonstrates that a modest cut in foods high in AGEs may improve insulin resistance in adults with diabetes. AGEs were found to be elevated in most grilled, fried, or baked foods. Cutting back on the consumption of foods that are heat-processed, but without reducing fat or carbohydrate consumption, improved insulin levels and overall health in patients already treated for, but remaining, insulin resistant. The findings are a dramatic departure from standard clinical recommendations for the management of diabetes.

For four months, 18 overweight people with type 2 diabetes and 18 healthy adults were assigned to an AGE-restricted diet or a standard diet consisting of the same calories and nutrients they ingested before beginning the AGE-restricted diet. An AGE-restricted diet emphasizes poached or stewed foods, such as mashed potatoes instead of fries, stewed chicken instead of grilled chicken, and boiled eggs instead of fried eggs.

The results showed that the subjects with diabetes assigned to the AGE-restricted diet had a 35 percent decrease in blood insulin levels, well beyond that achieved by their previous therapeutic regimen. This was associated with improved markers of inflammation and a restoration of compromised native defenses. This is the first study to show in humans

that AGEs promote insulin resistance and possibly diabetes. The study also shows for the first time that restricting the amount of AGEs consumed with food may quickly restore the body's defenses and reduce insulin resistance.

"This clinical study begins to expose the double role food AGEs play in obesity and in diabetes, a major concern for everyone today, particularly young children. It is especially exciting that a simple intervention such as AGE-restriction or future drugs that block AGE absorption could have a positive effect on these epidemics," said Dr. Vlassara. "The tenets of the diet could not be simpler; turn down the heat, add water, and eat more at home."

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