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Chromium Supplements Appear to Improve Glucose Sensitivity in Diabetics

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Aug. 29, 2003 (Paris) — The dietary supplement chromium picolinate may help patients with type 2 diabetes control their disease, according to a series of presentations here at the 18th International Diabetes Foundation Congress.

The presentations described the genetic and molecular mechanisms of how chromium picolinate reduces glucose resistance, as well as how the supplement can reduce glucose levels.

"I'm not diabetic," said Dr. Zhong Wong, MD, research assistant professor at the University of Vermont in Burlington, "but I sometimes have higher glucose levels that I want. I have been taking chromium myself because I think it helps."

Dr. Wong used gene microarray GeneChip technology from Affymetrix to determine which genes are upregulated and downregulated in human skeletal muscle. "That gene expression analysis suggests that chromium picolinate may down-regulate genes in human skeletal muscle that are potentially involved in cellular insulin action, specifically tumor necrosis factor (TNF)AIP6 and ubiquitin-associated proteins," he said those proteins are implicated in dysfunctional insulin production.

"We think that chromium picolinate can influence a person's diabetic treatment so that levels of insulin required may be reduced," he said.

In another presentation, researchers from the Netherlands studied the effects of chromium picolinate intake on metabolic control in 52 patients with type 2 diabetes, in a double-blind, placebo-controlled study. The six-month study enrolled patients who had hemoglobin (HbA1c) levels greater than 8 percent and were prescribed more than 50 IU of insulin per day. In addition to their usual oral antidiabetic medication, patients were also given 500 µg chromium picolinate, 1,000 µg chromium picolinate per day, or placebo.

S. T. Houweling, MD, from the department of internal medicine at Isala Clinic's Weezenlanden office in Zwolle, found a significant decrease in HbA1c levels in the group receiving higher doses of chromium picolinate supplements. HbA1c levels decreased from 9.5% to 9% during a six-month period in patients receiving a higher dose of the supplement, a difference that was statistically significant ($P = .032$). The study also showed a significant reduction in cholesterol levels and trends for improvement in triglycerides in both chromium picolinate groups as well as a reduction in blood pressure in all groups.

"Chromium treatment lowered HbA1c and improved the lipid profile in patients with type 2 diabetes in poor metabolic control in a Western society," he said in his poster presentation. But the study did not reveal significant differences between the chromium groups and those who took placebo.

The failure to show differences between the placebo and chromium groups is not surprising, said Amanda Adler, MD, a clinician and epidemiologist at the University of Oxford in the U.K. "When people are in clinical trials, they tend to recognize that they are being watched closely by their doctors and nurse, so they take their medicine when they are supposed to and they try to stay on proper diets," she said.

Dr. Adler suggested that behavior by the patients receiving placebo might have blunted the true differences between treatment effects of chromium compared with placebo.

In another study from the Vermont group, William Cefalu, MD, said his study in human subjects appears to confirm Dr. Wong's work

in the laboratory. "This study demonstrates that those individuals with type 2 diabetes who supplemented their diet with chromium picolinate had an enhanced activity of the protein compared to those who were on placebo," he said.

The double-blind, placebo-controlled trial studied patients with type 2 diabetes treated with sulfonylureas or a diet program. Both groups were randomized to receive either 1,000 µg chromium picolinate daily or placebo. Of the 16 subjects, those randomized to chromium picolinate had a mean increase in insulin sensitivity of 8.9%, while the placebo group had a mean decrease of 3.6%.

The researchers suggest that the potential in vivo mechanism of chromium picolinate on insulin action may be by increasing the activation of Akt phosphorylation, an intracellular insulin-dependent protein that facilitates the uptake of glucose into cells.

"As this intracellular pathway is implicated in contributing to insulin resistance, this represents a possible mechanism to explain chromium picolinate's beneficial effect on insulin sensitivity as observed in several clinical studies," Dr. Cefalu said.

Dr. Wong suggested that one reason chromium supplementation improves insulin's action is that it alleviates dietary chromium deficiency. In addition to over-the-counter products, chromium can be found in nuts and in red meat. Dr. Wong said that in general the supplements do not cause adverse effects aside from infrequent and mild gastrointestinal discomfort.

The University of Vermont studies were supported by grants from Nutrition 21, a marketer of chromium.

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