

Abstract

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Transcriptome of the subcutaneous adipose tissue in response to oral supplementation of type 2 Leprdb obese diabetic mice with niacin-bound chromium.

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OBJECTIVE AND METHODS: The effects of oral **niacin-bound chromium (NBC)** supplementation on the subcutaneous fat tissue of type 2 Lepr(db) obese diabetic mice were examined using high-density comprehensive mouse genome (45,101 probe sets) expression arrays. The influence of such supplementation on the plasma cardiovascular risk factors of these mice was also investigated.

RESULTS: Supplementation of NBC had no significant effect on age-dependent weight gain in the Lepr(db) obese diabetic mice. However, NBC lowered total cholesterol (TC), TC-to-HDL ratio, LDL cholesterol, and triglyceride levels while increasing HDL cholesterol in the blood plasma. No effect of NBC supplementation was observed on fasting blood glucose levels. Oral glucose tolerance test revealed a significantly improved clearance of blood glucose between 1 and 2 h of glucose challenge in NBC-supplemented mice. Unbiased genome-wide interrogation demonstrated that NBC resulted in the upregulation of muscle-specific gene expression in the fat tissue. Genes encoding proteins involved in glycolysis, muscle contraction, muscle metabolism, and muscle development were specifically upregulated in response to NBC supplementation. Genes in the adipose tissue that were downregulated in response to NBC supplementation included **cell death-inducing DNA fragmentation factor (CIDEA)** and uncoupling protein-1, which represent key components involved in the thermogenic role of brown adipose tissue and tocopherol transfer protein, the primary carrier of alpha-tocopherol to adipose tissue.

CONCLUSIONS: **The observation that CIDEA-null mice are resistant to obesity and diabetes suggests that the inhibitory role of NBC on CIDEA expression was favorable.** Further studies testing the molecular basis of NBC function and long-term outcomes are warranted.

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