Trinuclear Cr(III) Carboxylates Complexes Designed for Structural and Spectroscopic Study for Chromium Biochemistry

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The trinuclear cation $[Cr_3O(O_2CCH_2CH_3)_6(H_2O)_3]^+$ when given by gavage administration has recently been shown to lower fasting blood plasma LDL cholesterol, total cholesterol, triglycerides, and insulin levels and 2-hour plasma insulin concentrations after a glucose challenge in healthy male rats and in male Zucker obese rats (a model of the early stages of type 2 diabetes) and Zucker diabetic fatty rats (a model for type 2 diabetes). The lowering of plasma insulin concentrations with little effect on glucose concentrations suggests that the cation increases insulin sensitivity. The cation also lowers fasting blood plasma glycated hemoglobin levels in the diabetic model rats and thus can improve the glucose status of the diabetic models. The in vivo activity of the compound arises in part because the complex is efficiently absorbed (40-60%) and readily enters cells intact, where it serves as a source of chromium and potentially may interact directly with insulin receptor. In order to determine which elements of the trinuclear cation are essential for its activity, a variety of new "basic carboxylate" Cr and mixed metal complexes have been synthesized and characterized. Herein are described the properties of these new compounds.