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FILE: ■Cinnamon (*Cinnamomum verum*)
■Insulin
■Diabetes

HC 030441-263

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RE: Cinnamon Compounds with Insulin-like Activity

Anderson R, Broadhurst C, Polansky M, Schmidt W, Khan A, Flanagan V, Schoene N, Graves D. Isolation and characterization of polyphenol Type-A polymers from cinnamon with insulin-like biological activity. *J Agric Food Chem.* 2004;52:65-70.

The recommended use of plants for the treatment of diabetes dates back to approximately 1550 BCE. Plants are thought to be important not only for the control of type 2 diabetes, but also for its prevention, especially for people at high risk. Common species of plants, such as cinnamon (*Cinnamomum verum*), have been found to potentiate insulin activity in vitro. In addition to improving cellular glucose metabolism, cinnamon may provide additional benefits for people with diabetes through its antioxidant activity. Specific antioxidant phytochemicals that have been identified in cinnamon include epicatechin, camphene, eugenol, gamma-terpinene, phenol, salicylic acid, and tannins. Cinnamon, which is usually high in flavonoids, also may be synergistic with vitamins and trace minerals.

The purpose of this study was to isolate and characterize the insulin-enhancing complexes in cinnamon that may be involved in the alleviation or possible prevention and control of glucose intolerance and diabetes. Water-soluble polyphenol polymers from cinnamon are known to increase insulin-dependent in vitro glucose metabolism roughly 20-fold and display antioxidant activity. These polymers were isolated and characterized by nuclear magnetic resonance and mass spectroscopy. Insulin-enhancing activity was measured using the epididymal fat cell assay. The production of reactive oxygen species was determined using whole blood samples from rats.

The insulin-like biological activity of cinnamon was clearly evident and was compared with insulin. Maximal insulin-dependent activity was similar at both the highest levels of cinnamon and the highest level of insulin. The activities of the different species of cinnamon tested were not significantly different. Through a series of separation and isolation procedures, the insulin-potentiating compounds were isolated.

The analyses demonstrated that water-soluble polymeric compounds isolated from cinnamon have insulin-enhancing biological activity in the in vitro assay measuring the insulin-dependent effects on glucose metabolism and also function as antioxidants. These same compounds have been shown to inhibit phosphotyrosine phosphatase, to activate insulin receptor kinase, and to mimic insulin in fat cells.

During the completion of this study, the authors also finished a human study involving subjects with type 2 diabetes consuming cinnamon.¹ (See HC 020343-257) Subjects consumed 1, 3, or 6 grams of cinnamon per day for 40 days, with 3 placebo groups corresponding to the 3 groups. There were significant decreases in fasting serum glucose, triglycerides, total cholesterol, and LDL cholesterol in the cinnamon groups, and no significant changes in the placebo groups.

The authors conclude that compounds present in cinnamon may have beneficial effects on glucose, insulin, and blood lipids and may be beneficial for the prevention and treatment of diabetes.

-Densie Webb, PhD

¹ Khan A, Safdar M, Khan M, Khattak K, Anderson R. Cinnamon improves glucose and lipids of people with type 2 diabetes. *Diabetes Care*. 2003;26:3215-3218.

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