CINNAMON'S LINK TO DIABETES CONTROL

By Marsha McCulloch, MS, RD, LD, LN

Is this spice merely a folk remedy, or could it be a real help in diabetes management?

Dietitians probably won't find the American Diabetes Association (ADA) recommending cinnamon as part of its standard treatment guidelines for diabetes anytime soon, but cinnamon is viewed as an antidiabetes agent across much of the world.[1] Many patients are interested in exploring cinnamon as a potential therapy.

"About 10% to 20% of patients who come to our clinics either have tried cinnamon or are currently using it," says Brian Mowll, DC, CDE, a functional medicine practitioner at Sweet Life Diabetes Health Centers in the greater Philadelphia area. Similarly, an Australian survey of complementary and alternative medicine use among people with diabetes (primarily type 2) in Sydney found that 25% of respondents were using cinnamon to treat diabetes.[2]

The position of the ADA is that there's insufficient evidence to support the use of cinnamon in diabetes treatment, but there's research, including double-blind, placebo-controlled trials, suggesting a possible benefit.[3-7] As a result, it's important for dietitians to stay abreast of what research and clinical experience shows so they can effectively counsel clients and patients.

Science Behind Cinnamon

Although some clinical trial results have been equivocal, several have shown benefits of cinnamon on glucose, lipid, and insulin levels.[8-13] Studies also show cinnamon can potentiate insulin action and improve insulin resistance and glucose metabolism, although the detailed biochemical mechanisms aren't completely clear.[14]

Bioactive compounds in cinnamon affect several steps in insulin signaling pathways. For example, research has shown that certain water-soluble polyphenol compounds (type A polyphenols) extracted from cinnamon may increase insulin sensitivity by inhibiting an enzyme (a tyrosine phosphatase) that inactivates insulin receptors.[9] Other research has found that water-soluble cinnamon polyphenols increase insulin-dependent proteins (GLUT4) required for glucose uptake by adipose and muscle cells.[9] Cinnamon extracts also may decrease proteins involved in glucose production in the liver (gluconeogenesis).[9] In addition, cinnamon compounds have antioxidant and anti-inflammatory actions, which may play a role in reducing insulin resistance and diabetes complications.[2,8,9]

Across clinical trials, there are differences in varieties of cinnamon used, extraction methods, patients studied, and many other variables, which can lead to inconsistent results. This isn't surprising since supplements are less standardized than pharmaceuticals, and there's less funding for well-controlled clinical trials of supplements.

"There's quite a bit of research that suggests cinnamon does lower blood glucose levels, but at this point we really don't know enough about the [biochemical] mechanisms to say that we can replace any existing diabetes treatment," says Amy Stockert, PhD, a researcher and associate professor of biochemistry in the college of pharmacy at Ohio Northern University in Ada.

Mowll agrees, saying, "Cinnamon is typically used as an adjunct to pharmaceutical therapy, rather than [a replacement]." An exception may be in the early stages of diabetes.

Prediabetes and Type 2 Diabetes

Stockert and a colleague published a study of 18 untreated men and postmenopausal women with type 2 diabetes and found that those who took 1,000 mg of cinnamon (*Cinnamomum cassia*) capsules every morning for nine weeks (after a three-week washout period in addition to following a diabetes-appropriate diet) decreased their fasting blood glucose an average of 19.5% and their postmeal blood glucose 15.5%.[15] In contrast, those taking a placebo (but also following a diabetes diet), decreased their fasting blood glucose by only 0.7%, and increased their postmeal blood glucose by 3.9%, on average.

"Those who took the cinnamon supplement had results similar to what's seen with some oral diabetes medications," Stockert says.[16] Fasting blood glucose levels started to decrease within one week after starting cinnamon intake and continued to decline until plateauing in week nine of the study. "So, we wouldn't expect the benefits of cinnamon to keep increasing the longer you take it," she says.

Cinnamon also may help reduce the number of diabetes medications a patient needs. "There are many patients who have maxed out their doses of first- and second-line medications for diabetes, and they don't want to start paying

for more expensive medication or injectable medication, so they're often motivated to try other options, such as cinnamon," says Ryan Bradley, ND, MPH, assistant director of research at Helfgott Research Institute and an associate professor at the National College of Natural Medicine in Portland, Oregon.

Research does suggest 1,000 mg of supplemental cinnamon (or about ½ teaspoon cinnamon spice) daily may significantly lower hemoglobin A1c in type 2 patients with poorly controlled diabetes, including those taking oral diabetes medications and insulin.[17] Moreover, some studies suggest cinnamon may have the biggest impact on improving fasting blood glucose and A1c levels when they're relatively high.[5]

Clinically, Bradley finds that diabetes patients with lipid patterns characteristic of metabolic dyslipidemia (including elevated triglycerides, elevated LDL cholesterol, and low HDL cholesterol) respond well to cinnamon. "In some cases, these patients get some glucose lowering from cinnamon, but we often see more improvement in their lipids," he says.

Type 1 Diabetes

Patients with type 1 diabetes are not likely candidates for cinnamon therapy. "There are no studies to date that prove a benefit of using cinnamon in type 1 diabetes," says Jennifer Smith, RD, LD, CDE, director of lifestyle and nutrition at Integrative Diabetes Services in Wynnewood, Pennsylvania. She refers to a study of adolescent patients with type 1 diabetes who took 1,000 mg of cinnamon daily for 90 days; it failed to show significant differences in A1c levels or total daily insulin intake compared with placebo.[18]

"Type 1 diabetes is primarily due to a loss of insulin production, which is an autoimmune condition. Cinnamon can't restore insulin production in beta cells of the pancreas once they've been destroyed," Bradley explains. "However, cinnamon might be of benefit later in the course of type 1 diabetes if the patient has developed some insulin resistance and requires very large doses of insulin. In that case, adding cinnamon may help keep down insulin doses. It's not a common recommendation though."

If using cinnamon in type 1 diabetes, be especially careful with insulin dosing, otherwise a person could develop hypoglycemia, since cinnamon may make the insulin more effective, Mowll adds.

Types of Cinnamon

"There are two main varieties of cinnamon, which come from different plants," Smith says. "These include Ceylon cinnamon, referred to as true cinnamon, and Cassia cinnamon, which is lower in cost. Cassia is typically what you see in supplements and spice jars." Supplement bottles don't always specify which form has been used, so when in doubt, assume it's Cassia. You'll more likely find Ceylon cinnamon in health food stores, or it can be ordered online.

Mowll says both types of cinnamon have shown blood sugar lowering and lipid lowering benefits in studies. "However, Ceylon cinnamon is much safer when you get into larger doses, such as above 1,000 mg daily," he says. "Coumarin, a blood thinning agent, naturally occurs in much higher amounts in Cassia than in Ceylon cinnamon. Coumarin not only could cause excess bleeding in someone on blood thinning therapy, but in very high doses, coumarin can also have toxic effects on the liver and kidneys."

Further research on cinnamon in diabetes control, especially in type 2 diabetes, is warranted. Although not all human supplementation trials have shown benefits, three of four recent meta-analyses concluded that there are positive effects of cinnamon supplements and extracts in type 2 diabetes.[8] Patients' interest in cinnamon as an adjunct to diabetes management is worthy of discussion, and dietitians can help guide patients through appropriate cinnamon use to increase the likelihood of positive results and avoid harm. Clinical trials to date have shown no adverse effects of supplemental cinnamon extract when given to appropriate patient populations.[13]

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GUIDELINES FOR RECOMMENDING CINNAMON

• **Read cinnamon supplement labels.** "The active compound in cinnamon is believed to be polyphenol A," says Amy Stockert, PhD, a researcher and associate professor of biochemistry in the college of pharmacy at Ohio Northern University in Ada. CinSulin and Cinnulin PF are two brands of water-soluble cinnamon extracts containing polyphenol A (Type-A polymers) that have shown benefits in diabetes studies.[1-3] These branded extracts may be listed as ingredients.

• **Test one supplement at a time.** "A patient shouldn't experiment with other supplements at the same time as cinnamon because then it's hard to tell what's producing the effects," says Ryan Bradley, ND, MPH, assistant director of research at Helfgott Research Institute and an associate professor at the National College of Natural Medicine in Portland, Oregon.

• **Start low and build up.** "I typically start patients on 250 mg cinnamon (water-soluble extracts) twice a day with meals; if they're tolerating it well after a week, I increase it to 500 mg cinnamon twice a day," Bradley says. "The suggested daily dose of cinnamon in spice form is ¼ to ½ teaspoon." That's about 500 mg to 1,000 mg of cinnamon spice.[4] One of the early studies showing benefits of cinnamon in type 2 diabetes used whole cinnamon that was ground and packed into capsules.[5]

• **Take cinnamon with meals.** Cinnamon may help slow starch breakdown and glucose absorption, so patients can take cinnamon supplements or use the spice with meals,[6] says Brian Mowll, DC, CDE, a functional medicine practitioner at Sweet Life Diabetes Health Centers in the greater Philadelphia area. Stockert says the active compounds in cinnamon are heat tolerant and would hold up mixed into tea or baked in apple crisp.

• **Keep supplements and the spice on hand.** "If you're eating a meal of grilled chicken with broccoli and a salad, there may not be a great way to use cinnamon, so the capsules come in handy," Mowll says.

• **Monitor blood glucose.** "I generally like to see two-hour postmeal blood sugar reductions of at least 25 to 50 mg/dL on average over time before I conclude cinnamon is helping," Bradley says.

• **Give it a fair run.** "I generally do a cinnamon trial for six to eight weeks, then make a decision whether or not it's helping," Bradley says.

• **Avoid use in high-risk populations.** "Patients with liver damage, such as hepatitis or alcohol-related liver disease, wouldn't be good candidates for cinnamon supplements," Bradley says. "However, in patients with nonalcoholic fatty liver disease, where there's fat infiltration in the liver, cinnamon supplements may be helpful, but I would start them more slowly and monitor liver enzymes." In addition, be sure to inquire if patients are taking blood-thinning medication since the coumarin in cinnamon is a natural blood-thinning agent.

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For references, view this article on our website at www.TodaysDietitian.com.

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