

## **Can liyiyiu healing plants help with heart disease caused by diabetes? \***

### **What the study looked at**

A few years ago, someone listed 1,200 different plants that peoples around the world use to try to heal diabetes. Some of these plants help by lowering the amount of sugar in the blood, and others help by fighting the health problems that diabetes can cause (like numb feet or loss of vision). In this study, Sonia Grandi focused on one type of health problem that often goes along with diabetes: heart disease.

There were two main parts to the study. In the first part, Sonia asked 173 adults in Mistissini about how often they used various traditional foods and plants medicines. This gave her a list of the eight plants that people in Mistissini use most often to treat the symptoms of diabetes. In the second part of the study, she did lab tests on those eight plants to see if they might help prevent heart disease.

### **What people in Mistissini said about the healing plants**

Just over half the people Sonia spoke with said they had used traditional plants in the past year. Older people (age 60 and over) were twice as likely as younger ones to have used traditional medicines. Most people used the plants only when they needed them for a problem, not regularly. The exception was that some people used Labrador tea as a regular drink.

When asked why they didn't use traditional remedies, many people said they now use the western medicines instead. Some of the older people spoke about spirituality, while younger adults often said they didn't know how to use the plants. Almost everyone thought it would be a good idea to make the healing plants available in the clinic. They also said the plant remedies should be made available in their traditional form, not as pills.

Based on what people said, Sonia identified eight plants that were used most often to treat the symptoms of diabetes:

- Purple pitcher plant
- Tamarack
- Labrador tea
- Balsam fir
- Gray / speckled alder
- Black spruce
- Jack pine
- Showy mountain ash

In the second part of the study, she did lab tests on these eight plants. To understand the lab tests, we need to look first at how scientists think diabetes causes heart disease.

### **About diabetes and heart disease**

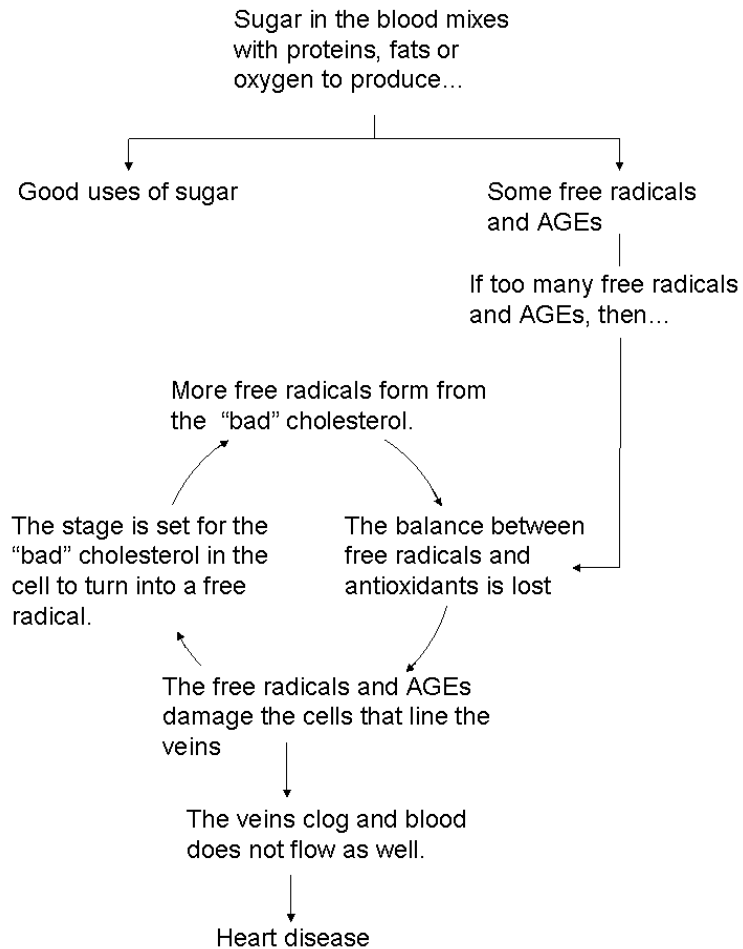
Our bodies turn food into sugar and use it in many ways. But occasionally, the sugar combines with other elements to form harmful particles called “free radicals.” Even a healthy person has some free radicals in their body, but too many of them can cause damage. Our blood vessels and veins are lined with a special kind of Teflon-like cell that reduces friction and helps the blood to flow through the veins. The free radicals attack the walls of these lining cells and damage them.

To keep the number of free radicals down, our bodies continually mop them up using other particles called “antioxidants.” But when people get diabetes, they have a lot of sugar in their blood. Because one of the basic ingredients of a free radical—sugar—is in oversupply, they produce more free radicals than normal. The usual balance between the free radicals and the antioxidants that mop them up is lost. When this imbalance goes on for too long, it sets up a chain reaction that produces more and more free radicals and ends up contributing to heart disease. Scientists think the process works like this:

1. Sugar mixes with oxygen or with the proteins and fats in our bodies. Most of the time this is good, but in a few cases the process produces harmful particles: either free radicals or other similar particles called AGEs (for “Advanced Glycation Endproduct”).
2. The free radicals and AGEs damage the walls of the special cells that line the blood vessels and the big veins that go to the heart (arteries).

3. The damage causes inflammation (heat and swelling) and some changes inside the cell. These changes prepare the ground for the “bad” cholesterol inside the cell to turn into a free radical. This sets off a chain reaction that creates more free radicals, which go out and damage cells in their turn.
4. After a while, so many of the special “lining” cells are injured that the whole lining is damaged and it no longer helps the blood to flow smoothly. Debris starts to build up inside the arteries, and eventually they get clogged (called “atherosclerosis”). The more clogged they are, the harder it is for blood to flow to the heart properly. This causes heart disease.

### How scientists think high blood sugar leads to heart disease



Our bodies have some defences against this cycle. For instance, we all produce some antioxidants (the particles that “mop up” free radicals). But as a general rule, antioxidants are found in the plants we eat. For instance, the Vitamin C in orange juice is a powerful antioxidant.

We already know that some of the Iiyiyiu healing plants are very high in antioxidants. The question now is whether the plants could help to reduce the damage that eventually leads to heart disease.

### **What the lab tests showed**

Sonia did lab tests on the eight Iiyiyiu plants to see if the antioxidants they contain could help fight heart disease. These tests looked at three questions:

1. Do the plants mop up free radicals?
2. Do the plants stop the chain reaction that produces more free radicals? (The circle in the diagram above.)
3. Do the plants protect cells walls against damage by free radicals?

#### ***First question: Do the plants mop up free radicals?***

How do you check if a plant destroys free radicals? In this test, Sonia focused on one particular free radical called DPPH. When DPPH is attacked by an antioxidant, it changes colour from purple to yellow. This makes it possible to tell if a plant destroys DPPH: you add plant extract to a lab dish that contains DPPH, and then count how many particles turn yellow. By repeating this process with different plants, you can learn which plants kill the most free radicals.

Of the eight plants that Sonia tested, four—Black spruce, Speckled alder, Jack pine and Labrador tea—were especially good at destroying radicals. They were as strong as Vitamin C, which is the “gold standard.”

***Second question: do the plants stop the chain reaction that produces more free radicals?***

The chain reaction that produces more free radicals also lets off specific chemicals. So by measuring the levels of those chemicals, you can tell how many new free radicals are being produced. In this test, Sonia looked to see if fewer free radicals are produced when you add plant extracts to the mixture. The results suggest that Balsam fir, Tamarack, Jack Pine and Labrador tea help stop the chain reaction that produces more and more free radicals.

***Third question: do the plants protect cell walls against damage from free radicals?***

The third test looked at a different aspect. Instead of asking if the plants help to reduce the number of free radical “attackers,” it asked: do the plants help protect the cells against the attacks?

The test relies on the fact that a damaged cell will leak an enzyme called LDH — much as a tiny crack in a teacup becomes obvious when tea starts leaking through. By measuring how much of this enzyme leaks into the dish, you can tell how many of the cells have been damaged.

- The first step is to put some vein-lining cells into a dish along with a free radical. The particular free radical that Sonia used for this test is the one that comes from “bad” cholesterol. She chose this one because we know it is associated with heart disease.
- The next step is to measure how much of the LDH enzyme has leaked out of the cells into the mixture. This tells you how many cells have been damaged by the free radical.
- Then you repeat the process, but you also add plant extracts. You measure to see if there is less damage to the cells when the plants are included in the mixture.

The test showed that all the plants helped to protect the cells against damage from free radicals. We don't know if they do this by disarming the free radical or by helping the cell to keep the free radical out, but either way the result is good.

Based on these three tests, Sonia concluded that the Iiyiyiu plants help keep the number of free radicals down and protect “lining” cells against damage (at least in the lab). Two of the plants—Jack pine and Labrador tea—seem to be especially good at this: they showed effects in all three of the tests. Sonia felt that these findings show that traditional knowledge about healing plants is still relevant for modern medicine. We need to make sure that this knowledge is not lost, and that it can be used to provide health care that fits with people’s traditions.

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\* This is a plain-language summary of an MSc thesis written by Sonia Grandi, entitled *Social and health implications of plant remedies of the James Bay Cree for symptoms of Type 2 diabetes mellitus*. The thesis was submitted to the School of Dietetics and Human Nutrition, McGill University, in October 2006. This summary was prepared for the Cree Health Board by Ellen Bobet in November 2007.