

## **The Anti-diabetic Plant Project: Using traditional knowledge and science to look at healing plants**

### **Purpose**

This article describes what the Anti-diabetic Plant Project did. At the end, we show how the Elders' knowledge and western science can come together to tell us which plants have the most promise for treating diabetes.

### **About diabetes and diabetes drugs**

When we are healthy, insulin helps move sugar out of our blood and into the different parts of our body. But in diabetes, either we do not make enough insulin, or our cells do not accept the insulin very well. Our sugar and insulin levels go out of balance, and our bodies start to handle fats differently. At first, the pancreas copes by making more insulin than usual. But over time, it gets exhausted and can no longer make enough insulin.

Diabetes doesn't harm you directly, but it sets off other changes that are harmful or even fatal. The high levels of sugar and fats in the blood help to

- Kill off the parts of the pancreas that make insulin
- Damage the veins and arteries, increase blood pressure and slow down blood flow. This can cause kidney disease, pain and tingling in the hands and feet, and eye problems.
- Create build-ups of fat and blood clots in the large blood vessels. These clots obstruct blood flow, and can lead to heart disease and strokes.

Further, diabetes tends to involve

- Constant, low-grade inflammation
- Numbness, poor circulation, and less ability to fight off infection. As a result, hand and foot wounds heal very slowly.

### **The CIHR Team in Aboriginal Antidiabetic Medicines (CIHR-TAAM)**

The Team in Aboriginal Antidiabetic Medicines began in 2003, to try to find treatments that would be culturally acceptable to Eeyouch. We know that for the Cree, healing means bringing physical, mental, emotional, and spiritual aspects into balance. But out of respect, we only looked at healing plants, not the other aspects.

### Talking with the healers about which plants to study

To begin, we made a list of 15 problems that tend to go with diabetes—like constant thirst. Then we talked with the Elders and Healers about what plants they would use to treat each of these problems. All told, we spoke with 104 Elders and Healers in four communities. The result was a list of 17 plants to be tested. Later in the project, we also asked the Elders which of these 17 plants they thought held the most promise for diabetes.

### Carrying out tests on the plants

Then we did a whole series of tests on those 17 plants. The western diabetes drugs use various “pathways” inside the body to produce their effects. We designed our lab tests to see if the Cree plants use any of the same pathways. First, we looked for direct effects on blood sugars and insulin. We wanted to see if the plants could

- Help the pancreas to make more insulin (as drugs like Glyburide do).
- Help the pancreas to regenerate, so it can keep on making insulin (blueberries, one Mediterranean plant, and drugs called “incretins,” all do this).
- Help the muscles and fat to accept sugar from the blood, using either the path insulin uses, or the one Metformin uses.
- Help create new fat cells where sugar can be stored (as Avandia does)
- Reduce the amount of sugar that the liver makes (the way insulin and Metformin do).
- Keep sugar from being moved out of the gut into the bloodstream (like Acarbose does).

We also checked for signs that a plant might interfere with western diabetes drugs. And we ran tests to see if the plants could

- Protect nerve cells against damage from sugar. This could help prevent the numbness and tingling that people get with diabetes.
- Fight “free radicals”—particles that damage our blood vessels and contribute to heart disease.
- Keep sugar from reacting with other things in our blood.
- Decrease inflammation.

Besides all our lab tests, we also did tests on live mice that had diabetes-like illness. These tests told us if the effects we saw in the lab were still there once the plant had been digested by a live animal.

## Which plants hold the most promise?

How can we use all this information to decide which plants have the most promise for treating diabetes? Table 1 shows the results for six of the plants (identified by letters, in order to protect Cree knowledge). The top line shows how the Elders ranked these plants. It can be seen that many of the plants that did well in the tests were also among the Elders' "top seven." This suggests a lot of common ground between traditional knowledge and western science.

**TABLE 1: Listing the plants by what effects we found**

			Plant identification					
			A	B	C	D	E	F
Elders' ranking (top 7 plants)				3	2	1		5
Primary actions	Mice	Lowers blood sugar	☺	☺	☺	☺	☺	?
		Reduces weight	☺	X	X	X	X	?
		Reduces fatty liver	☺	☺	☺	☺	?	?
	Cells	Moves sugar into muscle cells	X	☺	☺	☺	☺	☺
		Reduces sugar made by liver	☺	☺	☺	☺	Moderate	Moderate
		Helps build fat cells to store sugar and fats	X	☺	☺	☺	Moderate	X
		Decreases sugar absorbed from food	X	☺	☺	Moderate	X	☺
Secondary actions	Safe to mix with drugs	☺	Moderate	☺	Moderate	Moderate	☺	
	Fights free radicals	X	X	X	X	X	X	
	Fights inflammation	☺	X	☺	☺	X	☺	
	Protects nerves	☺	X	X	X	☺	☺	

Legend: ☺ = positive effect; X = no effect; ? = not yet determined

The rest of the table shows the results from the scientific tests, starting with the effects we thought were most important. We put the results from the mouse studies at the top, because tests on live animals are more convincing than tests in lab dishes. The top three things we were interested in were:

1. Whether a plant lowers blood sugar
2. Whether it lowers weight (because being obese is the biggest risk for getting diabetes)
3. Whether it reduces how much fat gets stored in the liver (because fatty liver plays a big part in creating diabetes).

As the table shows, some plants had more than one of these good effects. The results show us how useful it is to share knowledge between cultures. In fact, over the course of the project, we have

learned that what we are doing is not “testing” if the plants really work, but rather translating the Elders’ knowledge into a form that health workers can understand and accept.

This is a simplified summary of an article that has been sent to the journal *Evidence-based Complementary and Alternative Medicine*.

The original title is “Comprehensive evidence-based assessment and prioritization of potential antidiabetic medicinal plants: A case study from Canadian eastern James Bay Cree traditional medicine.”

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The original article is dedicated to the loving memory of Sam Awashish, Rene Coon Come, Smalley Petawabano, Sally Matthews, and all the Elders who departed in the course of the project.