Revised, April 21, 2010

Plants used for diabetes: differences between communities, and by where the plant grows*

Purpose

Ashleigh's thesis is divided into three main chapters:

1. A review of the literature (what other people have already found out about diabetes and plant medicines)
2. A chapter that looks at the extent to which healers in the different communities use the same plants
3. A chapter that looks in detail at how where a plant grows can affect its healing powers. For these tests, Ashleigh used black spruce.

The first chapter is based on what other people have already published; there is no new information in it. The plan is to turn the second and third chapters into articles for scientific journals later on. Once written, these articles will go through the usual review process so the elders can see what they say.

Chapter 1: literature review

About diabetes

There are three main types of diabetes.

- Type 1 diabetes happens when a person's immune system attacks their pancreas (the organ that makes insulin). This usually happens in childhood. Since the person can no longer make insulin, they have to inject it or they will die.
- Gestational diabetes is a type that happens only during pregnancy, and then goes away.
- Type 2 diabetes is the kind most people get. In this kind, the person still makes insulin (at least at first), but the cells resist it. Since insulin helps our cells store sugar, this means less sugar gets stored. Instead, the sugar stays in the blood and causes damage when levels get too high.

People with diabetes often get other problems, especially if their blood sugars stay high a lot. Diabetes can damage the nerves, kidneys, and eyes.

About diabetes in Canadian Aboriginal groups

Diabetes rates are high in many Aboriginal populations. Scientists think this is partly caused by genes (heredity). Some believe in the "thrifty gene" theory. This theory says that over time, Aboriginal people developed genes that help them store fat easily. This was useful when people were living off the land and faced periodic famines. Now that people can get food every day in grocery stores, being able to gain weight easily is no longer an advantage. Now it just sets people up to gain weight and get diabetes. There is some evidence for this theory. Scientists have indeed found a special gene in some Oji-Cree people. But we also notice that even people who don't have the gene get diabetes. So it looks like the gene, if it exists, is only part of the explanation.

Many people with diabetes do not follow all the advice they are given about how to control it. There can be many reasons for this. It may not be easy to see a doctor in their community, or people may not

* This is a simplified summary of Ashleigh Downing's thesis entitled "Inter and Intra-Specific Differences in Medicinal Plant Use for the Treatment of Type II Diabetes Symptoms by the Cree Elders of Eeyou Istchee (QC)" (version of April 8, 2010).

understand the treatment. The treatment may not fit with the way people in the community actually live. Some people—especially the older ones—may distrust western medicines. They feel that since the western diet and lifestyle helped cause diabetes, western medicine may not be the best answer. For all these reasons, some people prefer to use traditional medicines. Others use a mix of traditional and western remedies. We need to be able to offer people choice in their diabetes treatments.

Benefits of plant medicines

Diabetes makes a lot of things go wrong in the body. But some western medicines only attack one problem at a time. It's possible that plant teas would work better, because plant medicines might attack several of the problems at once. For instance, we know that people with diabetes make lots of "free radicals" — particles that damage our veins. And we know they have high blood sugars. But some plants seem to fight free radicals *and* lower blood sugar, all at the same time.

About how a plant's habitat affects its healing powers

Although a plant tea might attack several problems at once, individual plants vary in how well they do this. How much healing power a plant has depends partly on where it grows. Elders and plant scientists know this, but so far in this project, we've only studied it for one plant: lowbush cranberry. (Charles Leduc looked at this.) In this study, Ashleigh wanted to look at black spruce, to see if where the tree grows affects how well it fights nerve damage from diabetes.

Chapter 2: plants used in the different communities*

In this part of the study, Ashleigh looked at the extent to which healers in the four communities use the same plants for the same problems. The healers in Waskaganish and Nemaska told us about plants they would use to treat the kinds of problems that go with diabetes. Thirteen of these plants were used in both communities. Two were ones we hadn't been told about in Mistissini and Whapmagoostui. These new plants were cow parsnip [***Brian***: this is Wiipashtk] and white cedar. Healers in Waskaganish and Nemaska use the plants for these symptoms:

Plant	Symptom
Waskaganish	
Balsam poplar	abscesses/boils
Speckled (gray) alder	abscesses/boils
Jack Pine	inflammation
Balsam fir	infections
Black spruce	infections
Cow parsnip	infections
Tamarack	infections
Balsam fir	vision problems
White spruce	heart/chest pain

* We plan to turn this chapter into an article later. The authors will be Ashleigh Downing, Pierre Haddad, Timothy Johns, Janos Podani and Alain Cuerrier, and the article will be called "An ethnobotanical approach to finding culturally appropriate treatment options for Canadian Aboriginals suffering from diabetes: inter and intra-specific differences in medicinal plant use."

White cedar	heart/chest pain
White cedar	headache
Labrador tea	urination problems
Nemaska	
White spruce	headache
Speckled alder	arthritis/rheumatism
Speckled alder	inflammation
Balsam fir	vision problems
Tamarack	infections
Black spruce	foot sores
Showy mountain ash	diarrhea
Labrador tea	urination problems
Balsam poplar	urination problems
Jack pine	heart problems

We ranked the plants mentioned by each community in order, using two different methods. The first method just listed the plants in order of how often they were mentioned. The second list was based partly on how often a plant was mentioned, and partly on whether it was used for a symptom that is strongly related to diabetes. (For example, numb feet, as opposed to a symptom like headache that might be caused by many things.) The results suggest that the four communities are using a lot of the same plants, but not always for the same symptoms. There are some differences according to how easily available a plant is. For instance, white spruce is high on the list in the two coastal communities (Waskaganish and Whapmagoostui), but a lot lower in Mistissini and Nemaska. Some plants, like tamarack, are used for many different symptoms. These might be good plants to test further.

Other people have written articles about which plants Cree people elsewhere in Canada use for various problems. When we compare this to what the healers in Iiyiyiu Aschii said, we find a lot of similarities. It seems that Iiyiyiuch also use some plants in the same ways as Dene and Métis healers do.

Chapter 3: Black spruce and protection of nerve cells*

The healers have told us that when we collect healing plants, we need to pay attention to which specific plant we pick, and where it is growing. So in this part of the study, Ashleigh wanted to learn more about how a plant's environment affects its healing power. After all, there are nine communities in Iiyiyiu Aschii, so we need to know whether the plants will give the same benefit no matter where you pick them.

The high levels of blood sugar that go with diabetes damage nerve cells. When this happens, people get effects like pain, infections, and numbness. We do not have very good treatments for dealing with these

* We plan to make this chapter into an article later. It will be by Ashleigh Downing, Andrew Tang, Fida Ahmed, Cory Harris, Ammar Saleem, Steven Rennick, Pierre Haddad, Timothy Johns, Alain Cuerrier, John Arnason, Steffany Bennett. The title will be "Growth environment and organ specific variation in cytoprotective antidiabetic activities of Picea mariana: a plant used for teatment of diabetes symptoms by the Cree of Eeyou Istchee (Quebec, Canada)."

effects at present. However, we notice that the healers use black spruce for a lot of the problems that are signs of nerve damage: slow-healing infections, sores, and numbness. And an earlier study in this project found that black spruce cones from one location helped protect nerve cells against damage. So Ashleigh chose black spruce for her more detailed study. She looked to see if the plant's effectiveness changed depending on whether it was growing on the coast or inland, and in a bog or in a forest. She did these tests for three different parts of black spruce: cones, needles, and bark.

She found that like the cones, black spruce needles and bark also protect nerve cells against sugar damage. However, the needles have less effect than bark or cones. Perhaps it is not so surprising that black spruce protects nerve cells. A close "sister" tree that grows in north Africa, Maritime pine, is already being sold as an anti-diabetic. Since the two trees are closely related, we think they might have some ingredients in common. We don't know what ingredients in black spruce produce the good effects. The team has started trying to identify the ingredients, but has not yet finished.

Ashleigh found that black spruce's effects do vary with where the tree grows. About half the time, the tree had no effect in her tests. This probably doesn't mean those particular trees had no healing powers. More likely, it means that some black spruce are not as strong, and you would have to use more of the tea to get an effect. Growth location makes the most difference when you are using the bark. The bark from trees that grew in inland forest had more effect than bark from inland bogs, or bark from coastal areas (either forest or bog). For the needles, it doesn't make a difference where the plant grew.

We had thought black spruce's effects on nerve cells might be because it contains ingredients that fight free radicals. But Ashleigh's tests showed this was not the case. The samples that did best at fighting free radicals were not the ones that did best at protecting nerve cells.

To sum up, Ashleigh found that, as the elders told us, it makes a difference where a plant grows. This will be useful in future if black spruce starts to be more widely used in all nine communities. Now we know that, if people are using the bark, it would be best to take it from trees growing inland. If people use bark from coastal spruce, they will get more effect if they choose trees growing in a forest rather than in a bog.

Ashleigh also found that all parts of black spruce have an effect (at least in the lab). The goal of the Anti-diabetic Plant Project is not to develop new medicines for the market. But some of the elders have expressed interest in seeing the plants more widely used. Black spruce would be ideal for this, because there is so much of it. Even if it were to be used by people outside Iiyiyiu Aschii, it would be fairly easy to make sure that there is always enough left for future generations.