

## How Labrador tea affects diabetes in mice

### Purpose

Our previous tests showed that Labrador tea had some diabetes-fighting effects in lab dishes. In this study, we wanted to

- See if we could get the same effects in live animals (mice).
- Try to explain what the plant does inside our bodies to produce these effects.

### The reasoning behind the study

When we are healthy, three main parts of our body work together to keep our blood sugar levels in balance: our muscles, fat tissue, and liver. These three keep sugar in balance through a whole series of processes, many of which involve insulin. In this study, we first checked if Labrador tea worked on mice with diabetes. Then, to explain how the plant works, we looked at what it does inside muscle cells, fat tissue, and the liver. We did this by comparing the muscles, fat, and livers from five different groups of mice. The first group just got normal mouse food. The other four groups were fed a high-fat diet until they got fat and developed signs of diabetes. Then we compared what happened when we gave these mice either no treatment or Labrador tea at low, medium, or high doses.

### Does Labrador tea work in live mice?

The first step was to see if Labrador tea helps fight diabetes in live mice, not just lab dishes. We found that it did. As compared to the diabetic mice that got no treatment, those that got Labrador tea

- Had lower blood sugar and insulin levels.
- Were less likely to get fatty liver disease. All of the mice in the group that got high-fat food but no treatment came down with fatty liver disease. In the groups that got Labrador tea, only two-thirds of the mice got fatty liver disease, and it was less severe. The best results were in the group that got medium doses of Labrador tea; these mice were less likely to get fatty livers.

However, the mice that got Labrador tea ate just as much as the others: the plant did not help to reduce their appetite.

### How does Labrador tea produce its effects?

Next, we wanted to know how the plant produced these effects. By measuring different chemicals in the mice's muscles, fat tissue, and livers, we tried to find out what the plant was doing inside each of these body parts.

#### *What does Labrador tea do inside muscle cells?*

Our muscles take sugar out of the blood and store it. To do this, they use "trucks" (GLUT4 transporters) to move the sugar from the blood into the muscle. Some things—including exercise—affect the supply

of trucks and how many trips they make. Instructions telling a truck to make more trips often come through an insulin pathway. They may also come through a second path that does not depend on insulin, called AMPK. This path tells the trucks to make more trips and also supplies more trucks.

We wanted to find out if Labrador tea was influencing the trucks or their instructions. So we measured chemicals that would tell us about the number of trucks and whether their instructions were coming via the insulin pathway or the AMPK one. We found that Labrador tea was using the insulin pathway to tell the trucks to make more trips. In fact, sometimes the trucks were making twice as many trips as before. The end result was that more sugar was being brought into the muscles. This lowered the amount of sugar in the mice's blood.

#### *What does Labrador tea do inside fat tissue?*

For these tests, we looked at one kind of body fat, called White Adipose Tissue. This tissue stores some kinds of fats. This is a desirable effect, because otherwise the fat gets stored in the muscles or the liver, and makes them more resistant to insulin. Some diabetes drugs like rosiglitazone (Avandia) work by helping our bodies make more fat cells where fat can be stored. Besides this, fat tissue also gives off signals that affect how our bodies handle fats and sugars, and that affect our appetites. To detect all these things, we measured different chemicals in the fat.

Our previous lab tests suggested that Labrador tea could help the body to make more fat cells. But we did not get these effects in live mice. Nor did the plant help reduce the mice's appetites. Overall, Labrador tea seemed to have very few effects on fat tissue.

#### *What does Labrador tea do inside the liver?*

Our liver makes and stores one form of sugar, and also controls some things about how our bodies handle fats. As with muscle cells, the liver has "trucks" to move sugar around, and the instructions for those trucks can come via two pathways: a path that relies on insulin, or the AMPK path that doesn't involve insulin.

We found that Labrador tea affects both the insulin and the AMPK pathways in the liver, which is good. The plant also seems to have some good effects on inflammation, and to lower the risk of fatty liver disease.

### **Conclusions**

In sum, we found that Labrador tea definitely helps control blood sugars in mice that are on a high-fat diet. This is probably due to a combination of the liver making less sugar, and the muscles taking in more sugar than before. The plant seems to act mainly on the liver and muscles, and hardly at all on fat tissue.

Besides its effect on blood sugar levels, Labrador tea seems to help keep fat from accumulating in the liver. This improves the way the liver handles insulin, and helps prevent fatty liver disease.

All of this leads us to believe that Labrador tea could be a helpful, safe plant for Eeyouch to use in controlling their diabetes.

This is a plain-language summary of a more technical paper by Meriem Ouchfoun, Antoine Brault, Diane Vellerand, Lina Musallam, John Arnason, and Pierre Haddad, titled "*Rhododendron groenlandicum*, an antidiabetic plant of the Eastern James Bay Cree, attenuates insulin resistance in a diet-induced obesity mouse model." (Version of November 30<sup>th</sup>, 2010.)