

## Testing if teas and some traditional medicines could interfere with western drugs

### Background

Recall that the Foster lab looks at whether different plants might affect the way our bodies handle western drugs. This could happen if a plant or other food interferes with the enzymes in our guts that help us absorb medicines. There are many different enzymes, but one—an enzyme called CYP3A4—is very important, because it helps us break down almost half the drugs on the market. We focused on this enzyme.

Tea and coffee are the most popular drinks in the world, but we actually know very little about how they might affect our digestive enzymes. All we know is that some teas can change the way our bodies handle certain antibiotics. When we began this study, we planned only to look at teas and herbal teas. But later, we broadened out. First we added some traditional Chinese medicines to our tests. Then we added three plants that are used by First Nations people in Canada—Labrador tea, marsh Labrador tea, and juniper. We tested all these teas and plants to see if they interfere with the CYP3A4 enzyme. We also tested the Chinese plants on two other enzymes.

### About the plants used in this study

#### *Teas*

There are six main varieties of tea: green, black, white, yellow, oolong, and pu-erh. These all come from the same plant, but there are differences in how the leaves are processed. For green teas, the leaves are usually fried or steamed. For black teas, the leaves are fermented. This alters the proportions of particular ingredients that are present. The ingredients also vary a bit depending on when the tea is harvested, how it is prepared, and how long it is stored. We tested 19 types of black tea, 5 green teas, and 11 herbal teas (like mint or chamomile).

#### *Chinese traditional medicines*

We tested seven traditional Chinese medicines.

#### *Plants traditionally used by First Nations people*

Many First Nations in Canada use Labrador tea, marsh Labrador tea, or juniper as medicines. We had samples of Labrador tea from four different places in Canada (Saskatchewan, Manitoba, Ontario, and Eeyou Istchee). Our samples of marsh Labrador tea and juniper berries came from Eeyou Istchee.

### Results

#### *Results for the teas*

We found that many of the black teas interfered quite a lot with the CYP3A4 enzyme. The green teas interfered less, and the herbal teas—especially the chamomile ones—had the smallest effects.

### *Results for the traditional Chinese medicines*

The Chinese medicines we tested also interfered quite a bit with the CYP3A4 enzyme. They had less effect on the other two enzymes we tested them with.

### *Results for the traditional plants*

Both Labrador tea and marsh Labrador tea interfered with the CYP3A4 enzyme, with marsh Labrador tea being especially strong. The longer we boiled the leaves, the stronger the effects we found. However, these effects are temporary; the plants do not put the enzyme completely out of action.

Which ingredients in Labrador tea are doing this? We tested five ingredients that we know are in Labrador tea. Four of them had little or no effect. The fifth, an ingredient called “quercetin” had some effect.

Tea made by boiling juniper berries also had an effect on the CYP3A4 enzyme. This seemed to be especially true of tea made from dried, rather than fresh, berries—but it depends a bit on how long you boil the berries. (We boiled them for up to 3 hours, testing periodically.) We are not sure which exact ingredients in juniper berries are responsible for these effects.

### **Conclusion**

These results suggest that some teas and medicinal plants could change how our bodies handle western medicines, by acting on the CYP3A4 enzyme. The size of the effect is likely to vary with the type of tea and even with different batches of the same tea.

This is a simplified summary of a more technical article by Teresa Tam, Rui Liu, Jingqin Mao, Ammar Saleem, John Arnason, Anthony Krantis, Pierre Haddad, and Brian Foster, called “The effect of leisure and medicinal teas on the activity of human cytochrome P450-mediated metabolism.” (Version 5, September 12, 2010.)