

# Research Report

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## Determination of Aristolochic Acid in *Asarum canadense* (Wild Ginger)

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### ABSTRACT

Botanicals containing *Aristolochia*, *Bragantia*, or *Asarum* may contain aristolochic acid (AA), a known nephrotoxin and potential carcinogen. Meridian Institute analyzed samples of *Asarum canadense* (“wild ginger” a.k.a. “Canadian snakeroot”) for the presence of AA. Small quantities of wild ginger and herbal compounds containing this herb were sent to laboratories for assay using an FDA protocol for determining the presence of AA. All submitted samples of wild ginger were found to contain small amounts of AA, although there was some variability in the amounts reported by different labs. A water extract of wild ginger and compounds containing that extract had less than 1% of the concentration of AA found in the methanol/formic acid extract used in the FDA protocol. The implications of these findings are briefly discussed.

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### BACKGROUND

On April 9, 2001, the FDA released a public advisory warning the public that botanicals containing *Aristolochia*, *Bragantia*, or *Asarum* may contain aristolochic acid (AA), a known nephrotoxin and potential carcinogen. (1) The FDA concern was based on reports of serious health problems resulting from inappropriate use of Chinese herbs containing AA in a Belgian diet clinic and two cases of nephropathy linked to Chinese botanical preparations containing AA reported in the United Kingdom in July 1999. Heightened concern about the presence of aristolochic acid in botanical products used in the US led to FDA warning.

Although wild ginger is not specifically listed in the “Botanical Products Determined by FDA to Contain Aristolochic Acids,” (1) it belongs to the genus *Asarum*, and thus may contain AA. Due to interest in the possible use of this herb in an ulcerative colitis study, Meridian Institute tested samples of wild ginger for the presence of AA.

### METHODS

Meridian Institute obtained samples of wild ginger root from two commercial sources. Sample 1 came from Monteagle Herb Farm (Ontario, Canada). Sample 2 came from Wilderness Family Naturals (Finland, Minnesota). Each sample weighed approximately one pound. Both samples had been ground prior to purchase.

Approximately one ounce of each sample was sent to Alturas

Analytics, Inc. (Moscow Idaho) for analysis using an FDA protocol developed for this purpose (DFS/ORO/ORAN NO. 4212 – Determination Of Aristolochic Acid In Traditional Chinese Medicines And Dietary Supplements). (1) The FDA protocol specifies extraction of the aristolochic acid from the powdered herb using aqueous methanol/formic acid. In contrast, the essence of wild ginger used in the compounds is extracted using distilled water.

As a check on the first lab analysis, a small quantity of Sample 1 was sent to Enviro-Test Laboratories (Alberta, Canada) for assay using the same FDA protocol. In addition to the raw herb, Meridian Institute prepared two other samples for analysis, based on prescriptions provided by Edgar Cayce, an important figure in the development of holistic medicine. (2) The Cayce tonic (2085-1) has been linked to several remarkable healings, most notably in cases of ulcerative colitis. (3) See Appendices A and B for details on how the formula and ingredients were concocted by Meridian Institute.

### RESULTS

AA was detected in both wild ginger dry root samples sent to Alturas Analytics, Inc. at the following levels:

Monteagle Herb Farm dry root	11.1 mcg/g (parts per million)
Wilderness Family dry root	18.4 mcg/g

Subsequently, a sample from the Monteagle Herb Farm lot

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was sent to Enviro-Test Laboratories along with two compounds made with the herb sample. The levels of AA found using the FDA protocol were as follows:

Monteagle Herb Farm dry root	6.02 mcg/g
Essence of wild ginger	0.048 mcg/mL
Cayce herbal tonic 2085-1	not detected

## DISCUSSION

There are three primary findings of this project:

1. Wild ginger (*Asarum canadense*) does contain measurable amounts of AA.
2. The test results obtained using the FDA protocol produced variable results depending upon the source of the herb and the laboratory that did the testing.
3. Water extracts of wild ginger contain less than 1% of the AA found using the FDA methanol/formic acid extraction procedure.

The first result comes as no surprise considering the botanical family of the herb and its association with AA content. The variability of the results is also not surprising, given the natural variability of wild herbs. Variability of herb analysis due to differing sources, methods of collection and preparation, etc. is recognized as a confounding factor in this type of study. Thus, the variability between the two herb sources used by Meridian Institute underscores the importance of paying attention to this factor.

Variability due to laboratory procedures is also possible. The Monteagle Herb Farm samples sent to both labs came from a one pound lot of material stored at room temperature in an airtight plastic bag. The analysis (by Alturas Analytics, Inc.) was done on January 21, 2003. The analysis of material from the same lot (by Enviro-Test Laboratories) was done on June 13, 2003, less than five months later. The first result of 11.1 mcg/g is different from the second test result of 6.02 mcg/g, but without further analysis of duplicate samples, there is no way to tell whether this is due to variability in the samples or in the laboratory procedures.

The much lower concentration of AA found in the water extract is significant because the water extract is used in the form actually consumed by humans in the herbal compounds. Thus the FDA protocol may overestimate the amount of AA available in the products as they are used. Since the amount in the water extract was less than 1% of the amount in the methanol/formic acid extract, these compounds may contain a safe level of AA, even if derived from herbs with a substantially higher level in their raw form.

A broader question raised by our findings is the meaning of toxicity in a medicinal agent. Many, if not most, allopathic medi-

cines are associated with toxic effects. The word pharmacology is derived from an ancient Greek term for poison. Andrew Weil, M.D., has pointed out “the only difference between a drug and a poison is dose. All drugs become poisons in high enough doses, and many poisons become useful drugs in low enough doses.” (4)

With regard to wild ginger and AA, the question arises as to the possible therapeutic effects of AA. Is AA an active ingredient or primary medicinal component in any herb that contains this substance? If so, is there a safe dosage for AA? If not, can a reasonable substitute herb without AA be used in the various applications where such herbs are currently being used.

Major drug companies are familiar with this type of dilemma – what to do about a promising medicine with potential negative side effects. The standard solution is to spend enormous amounts of money to document the level of toxicity and potential efficacy. This usually involves a series of closely monitored trials with animals and eventually humans. Even a relatively high level of toxicity does not necessarily rule out a drug if the potential therapeutic benefit outweighs the risk to the patient.

Unfortunately, it is extremely unlikely that a drug company is going to invest resources to test and develop natural products such as the Cayce tonic that use an herb like wild ginger. The potential profit would not justify the investment.

Clearly, there is a need for research that addresses safety and efficacy issues surrounding herbs containing AA. Reducing variability in lab analysis and herb sources should be a priority in any future investigations.

## REFERENCES

1. Flurer RA Jones MB, Vela N, Ciolino LA, Wolnik, KA. Determination Of Aristolochic Acid In Traditional Chinese Medicines And Dietary Supplements. USFDA Forensic Chemistry Center, Cincinnati, Ohio.
2. Mein E. Keys to Health. New York: Harper & Row, 1989.
3. Meridian Institute. Meridian Institute News. 5(3), May, 2001
4. Weil A. Health and Healing. Boston: Houghton Mifflin Company, 1988.

## APPENDIX A: Essence of Wild Ginger Formula

The following instructions were used to make the essence of wild ginger analyzed by Enviro-Test Laboratories:

- Put one-half ounce of wild ginger in a glass container.
- Pour a pint of boiling distilled water over it.
- Let it stand for eight hours.
- Strain the solution. (We used a simple coffee filter.)
- Add grain alcohol as a preservative. (We used 1 and 1/2

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ounces to get close to a 10 % solution.)

## *Elixir of Lactated Pepsin*

### APPENDIX B: Cayce Herbal Tonic Formula

The following instructions for making an herbal tonic containing wild ginger was given by Edgar Cayce on January 20, 1940. This formula was used to create the tonic analyzed by Enviro-Test Laboratories.

Elixir of Lactated Pepsin is commercially available in some countries as an over the counter remedy. The product that we used was manufactured by Laboratoire Atlas, Inc. of Montreal, Quebec, Canada. It was sold as "Compound Pepsin Elixir."

- To 2 ounces of distilled water add a tablespoonful of honey.
- Bring to a boil, skimming off the dross or sediment as it rises to the top.
- Add 1/4 ounce of grain alcohol.
- Add in the following order:
  - Essence of wild ginseng.....1/4 ounce,
  - Essence of wild ginger .....1/4 ounce,
  - Tincture of stillingia.....1/4 ounce,
  - Elixir of lactated pepsin.....1/4 ounce.

In addition to the essence of wild ginger recipe listed in Appendix A, the other tonic ingredients were prepared or obtained as follows:

#### *Essence of Wild Ginseng*

- Put one-half ounce of Wild Ginseng in a glass container.
- Pour a pint of boiling distilled water over it.
- Let it stand for eight hours.
- Strain the solution. (We used a simple coffee filter.)
- Add pure grain alcohol as a preservative. (We used 1 and 1/2 ounces to get close to a 10 % solution.)

#### *Tincture of Stillingia*

- Mix 6 and one half ounces of 80 proof vodka with 9 and one half ounces of distilled water. (Alternately, 3 ounces of pure grain alcohol may be mixed with 13 ounces of water.)
- Measure 3.2 ounces of Stillingia by weight.
- Add the Stillingia to the pint mixture of alcohol and water.
- Keep out of sunlight. Shake occasionally.
- After at least two weeks, strain the mixture and discard the solid material.

The remaining liquid is a 20% solution of Tincture of Stillingia.