

DDT may be a contaminant in green tea from China

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The paper was written at the World Resources Institute with funds from the Breast Cancer Fund, the North Jersey Affiliate of the Susan B. Komen Foundation, and the Goldman Fund.

DDT-contaminated tea and breast cancer

ABSTRACT

This report documents increased levels of DDT metabolites in a breast cancer patient who drank green tea daily as part of a widely used treatment regime. A series of laboratory tests indicated that the green tea was the likely source of contamination. Since DDT has been identified as a breast cancer cell promoter, these findings raise concerns. They indicate that natural products are not necessarily free from contamination by toxic chemicals. Studies on the health benefits of green tea do not consider the possibility of contamination and/or what impact toxins might have on the tea's efficacy and on the general health of the consumer. Even though consumption of natural products and other materials imported from Asia is growing worldwide, few monitoring efforts are underway regarding possible contaminants with pesticides and other toxic materials, and the public is not informed about possible contamination. These findings highlight the inadequate monitoring of globally traded goods, confirm that national efforts to control toxics cannot reduce global distribution of such materials, and bolster the need for policy changes to limit the import and export of toxins across national borders.

KEY WORDS

Breast Neoplasms, Economics, Environmental Pollutants, Environmental Pollutants, Government Agencies, Health Promotion, International Cooperation, Pesticides

Introduction

A number of recent reports indicate that green tea appears to have anti-cancer properties. Several experimental and epidemiological studies demonstrate that polyphenols in the tea inhibit the growth of cancer cells (Chen et al 1998; Fujiki et al 1999; Nakachi et al 1998), while other studies find specific links between green tea consumption and decreased incidence of cancer (Imai et al 1999; Fujiki 1999). In the case of breast cancer, Nakachi et al (1998) and Fujiki (1999) found that green tea consumption reduced the reoccurrence of breast cancer among stage one and stage two patients.

Today, millions of women globally are consuming nutritional supplements, functional foods, and herbal teas and other preparations in an effort to prevent disease or to provide adjuncts to conventional treatment. No routine monitoring takes place to assess potential contaminants in these materials, which can be imported from many different countries. The natural products industry is one of the fastest growing sectors of developed countries today. In an effort to highlight a possible public health issue for those who regularly consume natural products such as green tea, this case study reports on DDT contamination of green tea that appears to be linked with increased DDT levels in a breast cancer patient.

Analysis

The patient is a 56 year-old female with a 1 centimeter tumor of infiltrating ductal cancer, treated in January of 1995, with a lumpectomy with clear margins and no nodal involvement. The patient's diet consisted of organic vegetables, some fish, filtered water, organic grains, and large amounts of non-organic green tea.

The patient had a serum chlorinated pesticide panel run by Accu-Chem Lab in December of 1996. Accu-chem laboratory is a state licensed laboratory in Texas, using quality assurance and quality control and high resolution gas chromatography (GC) coupled with detection by electron capture detector (ECD) to determine serum levels of chlorinated pesticides. Accu-Chem tests blank samples before and after running patient samples to assure that there is no contamination. The standard deviation that Accu-Chem uses is calculated from 1 ppb/2.5 ppb for DDT level of the compounds: +/-18.6%. The patient's levels of DDT were .9 ppb, with the population average being .4 ppb. Her levels of DDE, a toxic derivative of DDT, was 5.7 ppb., while the population average was 3.2 ppb.

In January 1996 the patient underwent 22 days of a treatment regimen consisting of ½ hour of exercise followed by 4 ½ hours in a low heat sauna with a temperature ranging from 140 to 180 degrees Fahrenheit. A second chlorinated pesticide panel in May 1997 showed that her levels of DDT had fallen and were now .3 ppb. Her DDE levels were now 2.4 ppb. The patient continued to adhere to a strict diet during this time, including 12 cups of non-organic green tea a day. She went for a re-test in December 1997 and it was discovered that her DDT levels were now 1.1 ppb and DDE was 1.6 ppb, indicating that she had been re-exposed. The only possible routes of re- exposure were from the farm-raised fish that she was occasionally consuming or the non-organic green tea that she was drinking each day. She stopped drinking the tea immediately.

The green tea was tested by Southwest Research Institute in San Antonio Texas, with 13.3 ng/g of 2,4'-DDT, 11.7 ng/g of 4,4'-DDE, and 26.9 ng/g of 4,4'-DDT being detected in the bulk tea. Each measurement of nanograms per gram (ng/g) is equivalent to the measurement of parts per billion (ppb). Since the tea sample was only analyzed once for DDT, a possible standard deviation of +/- 25% was used.

The patient reported drinking 12 cups a day of the tea. Given the levels of DDT noted above, per day exposures are estimated as follows: 312 ng of 4,4'DDT 160 ng of 2,4'DDT. Total exposure to DDT would be 472 ng. per day. Tests of drinking water by a state-certified lab detected no DDE, DDT or any other organochlorines.

After switching to an organic brand of green tea, the patient was re-tested after six months by Accu-Chem labs. DDT fell to levels that had occurred previously after using sauna for detoxification, to .3ppb, and DDE was 2.3ppb. (See Table 1).

Discussion

This report indicates that DDT-contaminated green tea appears to have increased a breast cancer patient's serum levels of DDT. In a number of studies DDT has been linked to increased breast cancer incidence (Hoyer et al 1998; Wolff et al 1996). More recently Hoyer et al (2000) found that breast cancer patients with relatively high serum levels of dieldrin, also a xenoestrogen, had decreased survival rates. In light of these studies, the findings of this report raise the question of what impact consumption of DDT-contaminated tea has on the tea's preventative and therapeutic properties, not to mention on the general health of its drinkers. Since the green tea studies that have found a beneficial effect either used organic green tea and/or did not study the effects from tea contaminated with DDT, the health impacts of DDT-contamination are not known.

This case study documents that natural products and supplements are not necessarily free from contamination of toxins such as DDT. Since 1972, the use of DDT has been banned in the U.S. The ban arose chiefly because of evidence for the persistence of this compound in the environment, its accumulation in lipids, and its capacity to disrupt the reproduction of wild birds

such as the Peregrine Falcon and the Bald Eagle by thinning egg shells. Today, DDT is still manufactured in the U.S. for export, and is not only widely used for agricultural purposes in a number of countries that export crops to countries such as the U.S., but is still the agent of choice in the eradication of mosquitoes in many countries. DDT is being manufactured in China today, and in some African countries. It has been targeted under the UN treaty for the Phase-Out of Persistent Organic Pollutants as one of the compounds that should be strictly limited and ultimately banned, early in this century.

The contamination of natural products and supplements by such toxic materials raises concerns in light of their growing popularity among consumers in the United States. Little has been done to raise awareness among consumers that so-called natural products are not necessarily free from toxins. In the cancer advisory books that recommend green tea, for instance, the possibility of DDT residues is not considered (Gaynor 1999). Consequently, it is crucial that complementary medicine industries and governments worldwide work to manufacture and provide toxin-free products to consumers, and in the meantime increase public awareness about possible contamination in non-organic products.

This case study also provides a clear example of environmental contaminants crossing national borders due to inadequate monitoring of globally traded goods. The U.S. today imports almost 600 different types of food from nearly 150 countries, including 6 billion pounds of fruits and 8 billion pounds of vegetables. The Food and Drug Administration only tests 8,000 imported samples of fruits and vegetables each year (Wargo, 1996). With respect to finished foods, surveillance is even less often undertaken. Recently, Health Canada responded to reports from British authorities concerning contamination of a popular oyster sauce from China found to contain 3,000 times the recommended level of 3-MCPD, a cancer causing chlorinated

compound. The company agreed to reformulate and stop selling the old product to the European Union, but did not withdraw existing stocks from sales in other regions, according to reports (see email reference: we will cite it when we locate its source). As circuits of global trade continue to develop and expand, it is vital that policies are created and implemented to control and reduce the import and export of harmful and banned substances.

Acknowledgements

The authors would like to thank Dr. David Camann, the Southwest Research Institute, and Accu-Chem Laboratories for performing the analytical chemistry that was used in this study. They would also like to thank the Breast Cancer Fund, the North Jersey Affiliate of the Susan B. Komen Foundation, and the Goldman Fund for funds that were used to support the writing of this article.

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TABLE 1:

DDT Levels Before and After Sauna Therapy and Consumption of Contaminated Green Tea

DDT levels before therapy	DDT levels after sauna therapy	DDT levels after drinking contaminated tea	DDT levels after stopping ingestion of contaminated tea
.9ppb	.3ppb	1.1ppb	.3ppb