

# Researching Tea and Papaya in Diabetes Patients



*School of Health Sciences  
Partners with Touro College  
of Pharmacy on Study of  
Health Benefits of Green  
Tea and Papaya Extract in  
Diabetes Patients*

**BY GAIL SCHILLER**

**O**n the heels of a promising Touro College of Pharmacy study indicating that black tea reduces the levels of two key clinical markers of cardiovascular disease, the principal investigator of the study has partnered with the Graduate School of Health Sciences to carry out a much more extensive study on the impact of green tea and papaya extract on cardiovascular complications and cognitive deficits in diabetes patients.

Along with his fellow researchers, Dr. Okezie Aruoma, professor of pharmaceutical and biomedical sciences at the Touro College of Pharmacy, published the results of the black tea study conducted on the Indian Ocean island nation of Mauritius in the November 2010 issue of the international scientific journal *Toxicology* (Volume 278, Issue 1).

Dr. Aruoma said the study is the first to show that tea consumption reduces the levels of C-reactive protein (CRP) and uric acid—indicators of the inflammation of the arteries that contributes to cardiovascular disease in high-risk patients—and may lead to promising supplemental dietary management of heart disease and reduce the amount of drug therapy needed by high-risk patients.

“We are the first study to really show a reduction in CRP and uric acids from tea consumption,” said Dr. Aruoma, co-principal investigator of the study with Dr. Theeshan Bahorun of the University

of Mauritius. “The findings of this study are extremely significant because they indicate that you can actually reduce two of the risk factors for cardiovascular disease without medical intervention,” Dr. Aruoma said.

**T**he Mauritius study found that black tea reduced the level of CRP—an indicator of the inflammation of the arteries that leads to cardiovascular disease—in high-risk patients by 53.4% among men and 41.1% among women. The black tea also decreased the levels of uric acid, another indicator of inflammation and heart disease, by 9.4% in men and 7.1% in women at high risk for developing coronary disease, heart attacks, stroke and other cardiovascular diseases.

According to the American Heart Association, individuals with CRP levels higher than 3.0 mg/liter or uric acid levels greater than 7 mg/liter have a high risk of developing cardiovascular disease. In average-risk patients with CRP levels of 1.6 to 3 mg/liter, there was also a statistically significant reduction of C-reactive protein levels of 43.4% in men and 21% in women.

“Tea supplementation-associated decrease in plasma uric acid and CRP levels may benefit humans at high risk of cardiovascular events and may augment drug therapy,” Dr. Aruoma and his colleagues wrote in the *Toxicology* article. “Moderate intake of black tea may improve the levels of independent predictors of the risk factors of cardiovascular events.”

Dr. Aruoma noted that flavonoids—chemical substances produced by plants to protect themselves against radiation from the sun—were largely responsible for the reduction in CRP and uric acid levels among patients in the study. Black tea leaves grown in the tropical climate of Mauritius, an island of volcanic origin off the southeast coast of Africa, contain relatively large amounts of flavonoids.

“The effects seem to be ascribed primarily to the synergistic effects of the tea phenolics (flavonoids). Given that tea is the most consumed beverage in the world after water, and that inflammation plays a role in every disease process, including arthritis, diabetes, cancer, heart disease and obesity, this finding on tea (the first of its kind to show that CRP levels are reduced by tea intake in humans) might be of importance from a public health perspective,” Dr. Aruoma and his colleagues wrote in *Toxicology*.

Dr. Aruoma, whose work at the Touro College of Pharmacy focuses on the role of dietary biofactors in managing diseases of inflammation, said that in the Mauritius study the black tea also produced a statistically significant reduction in lipid markers linked to cardiovascular disease.

The study was conducted in 2008 at the Cardiac Centre of the Sir Seewoosagur National Hospital in Pamplemousses, Mauritius, with 263 participants ranging in age from 25 to 60 years old. During a 12-week intervention period followed by a three-week washout period in which no additional tea was consumed, study participants consumed three grams of black tea, or one standard cup of tea, three times per day. The control group consumed the equivalent volume of hot water.

**D**ue to the promising findings, Dr. Aruoma is already embarking on a more extensive study of the effects of green tea and fermented papaya preparations on cardiovascular complications and cognitive deficits in diabetes patients. But this time the research is being done in partnership with the occupational therapy (OT) department of the Graduate School of Health Sciences and the study will take



Participants register for the green tea and papaya extract study at the Cardiac Centre of SSR National Hospital in Pamplemousses, Mauritius. Above, nurse draws blood from study participant

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place in New York and Vienna as well as Mauritius.

The first phase of the study, which launched in November 2010 in Mauritius, examined whether Mauritian green tea and papaya extract—which is believed to boost the immune system due to its high concentration of amino acids—has an impact on numerous biological markers of cardiovascular disease, as well as on cognitive and behavioral functioning in

latent or newly-diagnosed diabetic patients.

Cardiovascular disease is the leading cause of diabetes-related death and people with diabetes are two to four times more likely to develop cardiovascular disease due to a variety of risk factors. Diabetes has also long been recognized as a risk

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**Dr. Okezie Aruoma**

factor for vascular dementia, a type of cognitive decline caused by damaged blood vessels in the brain. More recently, research studies have indicated that people with diabetes, especially Type 2 diabetes, are at a higher risk of eventually developing Alzheimer's disease.

"I am bringing in the occupational therapy component to this new study because Dr. Aruoma

wants to really look at some of these dietary issues in a more global, holistic way," said OT Assistant Professor Diana Daus. "He wants to look at the specific biomarkers to see if they have a relationship to cognitive performance. The more data we're able to collect from biomarkers in the blood related to the patients' behavior in everyday life, the clearer the picture will be overall of the effects of green tea and papaya. It could have far-reaching implications if green tea proves to improve cognitive or functional performance in this specific population."

Assistant Professor Daus will be overseeing the OT components of the study in all three centers, including patient compliance and data review. Dr. Aruoma, who has a Ph.D. in biochemistry from the University of London's Kings College and a Doctor of Science (D.Sc.) in medical biochemistry from the University of London, is the overall coordinator of the study and the principal investigator in New York; Dr. Karl-Heinz Wagner is the principal investigator in Vienna, and Dr. Bahorun is the principal investigator in Mauritius.

The initial phase of the study, which just concluded in Mauritius this past March, lasted 14 weeks, with a 12-week intervention period and a two-week washout period. However, following this first phase, patients in the study will begin drug therapy and researchers will continue to monitor the effects of the green tea and papaya extract on the drug therapy. A select group of study participants will be followed for two to three years to determine the long-term effects of dietary supplementation on drug therapy. The clinical findings from the Mauritius research are currently being compiled.

Dr. Aruoma, who also has an MBA from the University of Warwick Business School in the UK and is a Fellow of both the Royal Society of Chemistry and the American College of Nutrition, is working on applications seeking funding for the study from the American Diabetes Association and the National Institutes of Health. In the meantime, he already has seed funding from Touro College, the Mauritius Research Council, the University of Vienna, the University of Mauritius, the University of the La Reunion, the Bois Cherie tea plantation of Mauritius, and the Osato Research Institute in Japan. ■

## Mauritian Tea Study Featured in Special Issue of *Toxicology* Dedicated to the Memory of Touro Founder Dr. Bernard Lander

The article detailing the promising results of the black tea study in Mauritius is one of three papers by Dr. Okezie Aruoma and his fellow researchers featured in a special issue of *Toxicology* dedicated to the memory of Dr. Bernard Lander, the founding president of Touro College who passed away in February 2010.

"Dr. Lander was a visionary leader with pioneering foresight who launched an institution that broke down barriers in higher education for thousands of students in the United States and around the world," Dr. Aruoma wrote in an introduction to the special November issue entitled "Functional Nutraceuticals" (Volume 278, Issue 1). "It is a great honor to make this dedication to Dr. Bernard Lander, in recognition of his invaluable legacy that never will be forgotten, and that will have a positive impact on many generations to come."

The three articles published in the special issue were the black tea study entitled, "Black tea reduces uric acid and C-reactive protein levels in humans susceptible to cardiovascular diseases"; "Applications and bioefficacy of the functional food supplement fermented papaya preparation," and "Bioactive phenolics and antioxidant propensity of flavonoid extracts of Mauritian citrus fruits: Potential prophylactic ingredients for functional foods application."

The fermented papaya preparation (FPP) article, which was co-authored by Dr. Luc Montagnier, the 2008 Nobel Prize laureate in medicine for his discovery of the HIV virus, indicated that FPP can improve immune function and modulate oxidative injury as well as injury due to inflammation. According to the article, patients suffering from cancer, diabetes, arthritis, cardiovascular dysfunctions, aging and neurodegenerative disorders such as stroke, Alzheimer's disease and Parkinson's disease could potentially benefit from FPP and other functional nutraceuticals (food supplements) that foster anti-inflammatory, antioxidant and immune-stimulatory responses.

The bioactive phenolics study found that extracts from 21 varieties of citrus fruits grown in Mauritius contained significant amounts of phenols and antioxidants that could help promote health and reduce disease.

"It's a huge honor for a special issue of a scientific journal to be dedicated to Dr. Lander," said Dr. Aruoma. "None of the previous tributes to Dr. Lander have been in the scientific domain but this special issue is a testament to Dr.