





an enzyme that degrades bile acids. It also directly affects the cell cycle and immune system.

Bostick became so interested in this research that he made a life-changing decision to close his medical practice in Beaufort, South Carolina,

and pursue a research career. That eventually led him to Emory, where he is a Georgia Cancer Coalition scholar and a professor in the Rollins School of Public Health.

He has continued to hone in on identification of new biomarkers for colon cancer. Among these discoveries are early alterations in the genes involved in the normal structure and function of the colon; subtle aberrations in the normal growth, repair, and death cycle of the cells themselves; the appearance of inflammation; and the rise of potent growth factors, hormones that stimulate proliferation and differentiation of cells.

### Growing evidence

Bostick's hunch about the chemopreventive effects of calcium is no longer a far-fetched hypothesis. In an initial groundbreaking study of 200 participants, he analyzed mucosal tissue to demonstrate that cell proliferation is a powerful biomarker of risk for developing colon cancer. He recently completed a study of the effects of calcium and vitamin D, separately and combined, on a panel of biomarkers in 88 Emory Clinic patients with precancerous colon polyps. The biomarkers are of protein expression such as p21 (colon cancer differentiation, or maturation) and COX-2 (colon cell inflammation). Initial data analysis indicates that treating patients with both calcium and vitamin D has a synergistic effect on the biomarkers.

Although the approach works for biomarkers, will it work in clinical outcomes? Bostick and colleague Jack Mandel are trying to find out as principal investigators of the South Carolina and Georgia components of a multicenter study involving 2,457 people who have regular colonoscopies.

Headed by Dartmouth's John Baron, the study investigates whether adding vitamin D to calcium supplementation will reduce polyp recurrence.

Bostick also won additional funding from the National Cancer Institute to piggyback biomarker research with this study. The additional research will confirm whether treating biomarkers actually leads to decreased polyp occurrence in a large population. It also will examine questions such as if and how the biomarkers vary over time, whether they appear differently in different places in the colon, and if the biomarker response to treatment varies in people with different vitamin D receptors or in those taking nonsteroidal anti-inflammatory medications.

### Just a little finger prick

Bostick is ready to take the next steps toward development of an effective biomarker screening test. That step involves a large prospective study of people who have never had a polyp, much less any sign of colon cancer, to determine if biomarkers can predict who will develop colon problems. As a part of this process, Bostick wants to develop a simple and easy test, such as identification of biomarkers in blood, urine, or mucosal tissue.

Nanotechnology may enable him to make such tests fast and cheap. Working with the quantum dot technology available at Emory and Georgia Tech, he is creating software that automatically scans slides to quickly and accurately quantify the presence and quantity of biomarkers in mucosal tissue. What used to take a researcher six hours can now be done by a machine in 15 minutes.

If Americans followed the American Cancer Society's recommendations for regular colonoscopies, gastroenterologists would be unable to meet the demand. While the finger prick screening test that Bostick envisions would not do away with colonoscopies, a cheaper, easier biomarker test would more likely be accepted and used by more people. The biomarker screening will provide better information on who needs a colonoscopy when and how often, and will provide additional motivation for those who most need a colonoscopy to get one, says Bostick.

So get ready to hold out your finger. ●