Genomic screening to detect preventable rare diseases in healthy people

March 6 2013

Experts from the UNC School of Medicine and the UNC Gillings School of Global Public Health propose that screening healthy adults for preventable diseases such as colorectal cancer, breast cancer, and several catastrophic blood vessel disorders, among others, could potentially prevent these diseases.

Millions of people unknowingly carry rare gene mutations that put them at high risk of developing preventable diseases such as colorectal cancer, breast cancer, and several catastrophic blood vessel disorders.

University of North Carolina experts from the School of Medicine and from the Gillings School of Global Public Health propose that screening healthy adults for these and other specific, rare genetic disorders could potentially prevent these diseases. Their commentary in the March 7, 2013 issue of *Genetics in Medicine* offers a framework for how such screening might be developed.

James Evans, MD, PhD, and first author, says, "With this commentary, we're issuing a call to the genomic and public health communities to investigate the feasibility of identifying individuals in the population who are, unbeknownst to them, at high risk of preventable disease. Such an effort could benefit millions of individuals in the US alone."

Dr. Evans is the Bryson Distinguished Professor of Genetics and Medicine and leader of the Clinical Cancer Genetics Program at UNC Lineberger Comprehensive Cancer Center.

The authors assert that rapid progress in affordable, robust DNA sequencing offers a promising opportunity to identify preventable rare diseases such as Lynch Syndrome, an inherited cancer of the digestive tract. "For example, just the roughly 0.2 percent of individuals in the US (over 600,000 people) who harbor deleterious mutations in any one of four Lynch-associated genes are at greater than 80 percent risk for preventable colon cancer," they state.

When other similar genetic conditions are considered, millions of individuals in the US are at risk for preventable diseases – if those risks are identified. At a current cost of approximately $200 per sample, such genomic screening may be warranted, given the high costs (in terms of both suffering and dollars) of these disorders once they occur.

They recommend a partnership of the public health and genomics communities to expand focus from one solely on common diseases and to embrace the newly developed power of genomics to identify those rare, but if taken in sum, substantial numbers of individuals who carry mutations for a high risk of preventable diseases.

Andrew Olshan, PhD, says, "Our commentary provides an exciting new way of thinking about relatively rare conditions that collectively may have broader public health implications. The revolution in DNA sequencing methods has put into reach new public health approaches previously unavailable. It's a very exciting prospect for public health genomics. "

Dr. Olshan is professor and chair of epidemiology and associate director for population sciences and leader of the UNC Lineberger Cancer Epidemiology Program.

The commentary cites challenges that must be addressed if this partnership is to succeed, including selection of those mutated genes that

confer the highest disease risk in the population and for which there are effective and acceptable preventive strategies. Another issue is minimizing false positives.

One issue that already exists with other screenings for cholesterol, blood pressure or cervical dysplasia is the worry factor. "While discovery doesn't equal diagnosis, patients who learn that they carry mutations may worry that getting the disease is inevitable. We will need to develop counseling resources to help patients understand their risk," explains Dr. Evans.

The authors point out that newborn screening has a defined process by which diseases that are candidates for inclusion are decided based on available evidence and perceptions by stakeholders, including patients and the public. A similar process would need to be established for adult screening.

Provided by University of North Carolina at Chapel Hill School of Medicine