

Why personalized medicine holds promise for preventing and treating diabetes

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With the trend in healthcare moving toward an era of personalized medicine, there is much anticipation and hope that customized approaches to prevention and treatment based on a person's genetic make-up will result in better health outcomes. Some advances, most notably with prevention and treatment of breast and colon cancer, have been widely heralded, raising questions about the potential for personalized medicine for other common diseases, such as diabetes.

To address the prospects for [personalized medicine](#) in [diabetes](#) – a disease that afflicts more than 25 million Americans – investigators from Albert Einstein College of Medicine of Yeshiva University have surveyed the field for existing research and published their findings in the January issue of Health Affairs. The authors are Allen M. Spiegel, M.D., the Marilyn and Stanley M. Katz Dean and former director of the National Institute of Diabetes and Digestive and Kidney Diseases at the National Institutes of Health, and Meredith Hawkins, M.D., professor of medicine and director of Einstein's Global Diabetes Initiative.

The issues they tackle are pressing. The Centers for Disease Control and [Prevention](#) (CDC) has estimated that, in 2007, diabetes cost the U.S. \$174 billion in direct and indirect costs. The problem is also global: a recent study estimated the number of worldwide cases at 347 million – a number greater than the entire U.S. population.

Drs. Spiegel and Hawkins propose that personalized medicine could offer a valuable tool to help combat the epidemic. Given the significant

medical, economic and social costs of managing diabetes, prevention is a more efficient strategy than treatment.

But to apply this strategy, there need to be practical and reliable methods to identify individuals at highest risk. While obesity, "impaired fasting blood sugar" (levels above normal but not yet sufficient to diagnose overt diabetes) and family history are known risk factors for type 2 diabetes, they are relatively inefficient predictors. For example, the CDC estimates that approximately 1 in 4 U.S. adults has an impaired fasting blood sugar level, but the annual rate of new diabetes cases among those individuals is reported to be less than 2 percent.

A way to target prevention efforts at people who are at highest risk for developing the disease would represent an important advance. "What are needed," Dr. Spiegel noted, "are innovative approaches for discovering accurate risk prediction markers. Progress also needs to be made in identifying methods – be they drugs or lifestyle interventions – that are effective in preventing and controlling the disease over the long term."

While advancements have been made, the search for specific genetic and other biomarkers for diabetes risk is still underway. Some DNA variants linked to higher risk have been identified, but they account for only a small fraction of genetic risk, and are therefore limited in their practical use. Recently, individuals with high blood levels of three specific amino acids were shown to have a greater than 5-fold increase in diabetes risk compared to the general population, highlighting the future promise of biomarkers for disease prediction.

"Public health initiatives are a critical tool in controlling obesity and diabetes but they are costly, especially in the developing world, where most new cases of diabetes are occurring," noted Dr. Hawkins, who has traveled extensively throughout South America, Asia and Africa studying the explosion of diabetes cases, including a poorly understood

form of the disease known as malnutrition diabetes. "While it would be helpful to target scarce resources to those who would mostly likely benefit, consideration must also be given to those who fail to be identified as high risk by existing screening tests but will develop the disease anyway."

More information: The *Health Affairs* paper is titled "'Personalized Medicine' To Identify Genetic Risks for Type 2 Diabetes and Focus Prevention: Can it Fulfill its Promise?"

Provided by Albert Einstein College of Medicine

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