One-size-fits-all is no fit for heart health

September 28 2020, by Annabel Mansfield

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From Weight Watchers to wearable tech, there are messages encouraging people to stay fit and healthy. But diets and training methods aside, when it comes to heart health, research from the University of South Australia shows that a far more personalized approach is needed... and it all starts with your genes.

Conducted in partnership with the University of New England and the University of Queensland, the study assessed the impact of lifestyle factors on cardiovascular disease (CVD), finding clear links between genetic predisposition of CVD and smoking, alcohol intake, physical activity and diet.

UniSA researcher, Associate Professor Hong Lee, leader of the statistical genetics group at the Australian Center for Precision Health, says the popular "one-size-fits-all" approach to heart health does not have uniform effects, and that a tailored, individualized approach to CVD is essential.

Globally, CVD is the number one cause of death, claiming an estimated 17.9 million lives a year. Most deaths are due to heart attacks and strokes, with a third of these occurring prematurely in people under 70 years of age. In Australia, heart disease kills one Australian every four minutes.

"Every day, we're exposed to information that promotes positive lifestyle factors for better health. But what we don't hear, is how individual genetic differences can negate positive effects, often to detriment of the individual," Assoc Prof Lee says.

"Between 20 to 60 percent of risk factors for CVD are attributed to genetics which are far better addressed through personalized and individual interventions than broad-stroke lifestyle adjustments. For example, genetics show how the level of your cholesterol can be controlled by a lifestyle modification, given your genotypes and the underlying genetic link between cholesterol and lifestyle factors. This will help you make a decision about which lifestyle intervention is most suitable for you, for example, more exercise might be a better choice than reducing smoking. However, this does not necessary mean that exercise is uniformly recommended for other people who may have

different genes and genetic effects that are more sensitive to smoking exposure. It's all about understanding how individual genetic risks can change in line with different lifestyle adjustments, and consequently how cardiovascular health can benefit."

Using a novel whole-genome approach, researchers analyzed 23 cardiovascular health-related traits and 22 lifestyle characteristics using the ARIC (Atherosclerosis Risk in Communities) Study (N=8291) and validating results via the UK Biobank (N~500,000). 34 significant CVD trait-lifestyle pairs were identified.

While Assoc Prof Lee agrees that positive lifestyle changes are good for overall health, including cardiovascular health, he says tailored interventions based on individual differences will be most successful for managing CVD.

"As precision health practices advance, we are likely to see more personalized health treatments that are based on individual genetic profiles," Assoc Prof Lee says.

"We are currently in the process of developing tools that can predict genetic risk based on genotypes and how lifestyle changes can modulate these. Incorporating individual (genetic) differences into CVD interventions will absolutely increase the predictive power of lifestyle changes on individual health."

More information: Xuan Zhou et al. Whole-Genome Approach Discovers Novel Genetic and Nongenetic Variance Components Modulated by Lifestyle for Cardiovascular Health, *Journal of the American Heart Association* (2020). DOI: 10.1161/JAHA.119.015661

Provided by University of South Australia