Primordial Prevention and Genetic Profiling

PRIMORDIAL PREVENTION AND GENETIC PROFILING

Cardiovascular disease is the leading cause of death and disability in the world. We know a lot about what predisposes people to coronary artery disease. In spite of that, doctors cannot predict heart attack very accurately. Some people who appear prone to heart disease, never have one while others succumb to heart disease despite having no obvious risk .

Primordial prevention is a concept which focuses on preventing heart disease very early in life. Instead of waiting until people develop risk factors such as high blood pressure, high cholesterol, or diabetes and treating them, we could identify and prevent the development of those conditions in the first place.

Primary prevention on the other hand, refers to treating risk factors like high blood pressure, diabetes, and high cholesterol to prevent the development of cardiovascular disease. Secondary prevention applies to people who already have the disease like heart attack. Idea here is to prevent recurrence or complications .

Question is whether genetic profiling would help in primordial prevention. American heart Association looked at this in a statement in 2022. Using a small sample of blood or saliva, these test analyze millions of common variants in your DNA to create what is known as polygenic risk score (PRS).

One can have zero, one or two copies of any gene variant, each of which may either raise or lower your risk of coronary artery disease. Scientists have discovered variants, by comparing the genetic codes of people with established heart disease to those without coronary artery disease.

Many of these variants occur in genes, known to affect heart disease, such as those related to cholesterol, blood pressure, and blood clotting.

POLYGENIC RISK SCORE (PRS): A polygenic risk score reflects the overall impact of all the variants together and is expressed as a percentile. But high score, for instance, the 95percentile, doesn't mean you have 95% chance for developing the disease. It means that out of hundred people, your score is higher than 95 people and the same as or lower than five.

There is some evidence that polygenic risk score for coronary artery disease may offer some improvement for predicting the development of risk in people who are middle-aged or younger. For example, standard risk calculators to guide statin treatment, don't apply to people under the age of 40. But polygenic risk score can help to decide if and when a person should start statin therapy.

WHO MAY NEED POLYGENIC RISK SCORE (PRS)EVALUATION: PRS may be useful for identifying someone's genetic predisposition to heart disease before standard risk factors appear. It is most useful in specific conditions for example, those with families history of early coronary artery disease.

Even if you don't have symptoms or abnormal lab results, a high PRS can flag elevated risk based on your DNA. -people with normal health metrix but unsuspected early disease in the family, like heart attack before age 40 with normal cholesterol or sudden cardiac death or stroke in a healthy sibling.

In these cases, PRS can help to detect hidden inherited risk One limitation is that the scores are based mainly on people with European ancestry, which means the score may not be reliable for people of different ethnicities. For older people, PRS aren't helpful as decades of lifestyle habits have shaped their risk and genetical factors are less relevant in this age group.

One example, if a baby has genes linked to the development of hypertension by age 30, one could modify that child's diet, encouraging exercise, and preventing obesity, early in life may prevent the problem. Focusing on prevention very early in life could make a huge difference in reducing cardiovascular disease.

Polygenic risk factor analysis can be useful, not only for heart disease, but also for type two diabetes, hypertension, hyperlipidemia including metabolic syndrome ,certain cancers, including breast and prostate cancer, Alzheimer's disease, certain Autoimmune diseases like Lupus, Rhuematoid Arthritis and so on.

Who does PRS testing? There are providers like Allelica, GenomicMD, Mass General at Brigham do this test. Insurance doesn't pay for this. It may cost $250-300. In future, this test may be less expensive and may be available for non-Europian population.

This information is for educational purpose only and future will tell us more about the utility of this test for general use. The information above is obtained from medical podcasts and Internet.

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