

Heart Disease Q&A

WHAT DO RESEARCHERS AIM TO LEARN BY STUDYING THE GENETICS OF HEART DISEASE?

Heart disease is a leading cause of death across the world. While a great deal is known about what causes heart disease, there is still much to be learned about the illness – especially about how to effectively treat it. For example, statins, the well-known family of cholesterol-lowering drugs, can be very effective for some people. Others, however, cannot take them because of medical reasons, or the drugs are simply not effective in lowering blood cholesterol levels. New avenues for therapy are needed, and that requires a deeper knowledge of disease biology. Human genetics offers a promising approach to gaining new ground in both of these areas.

WHAT TYPES OF INSIGHTS HAVE BEEN UNCOVERED SO FAR?

Using a powerful combination of genomic approaches, Broad Institute researchers have made several important contributions over the past several years. They have identified nearly 100 genes involved in regulating the levels of lipids in the blood, including LDL cholesterol (so-called “bad” cholesterol), HDL cholesterol (so-called “good” cholesterol), and triglycerides. One of the critical findings to flow from this work is the notion that raising HDL levels may not in fact be a sure route to lowering heart disease risk, as previously thought.

In addition, Broad Institute researchers and their colleagues have harnessed technologies for sequencing exomes, the protein-coding portions of the genome. Using this approach, they have uncovered rare variants in a gene called APOC3 that lower the levels of triglycerides in the blood and also protect against heart disease. This result suggests a powerful new strategy in developing drugs against heart disease. It also sheds light on the biological role of triglycerides and contributes to a growing body of knowledge that suggests that high triglyceride levels – rather than low HDL – are a major culprit in heart disease.

HOW MANY GENES ARE LIKELY TO CONTRIBUTE TO THESE CONDITIONS?

It is still too early to know for certain, but based on what we know today, it is likely that scores of genes, if not hundreds of them, contribute to a person's risk of developing coronary heart disease.

WHAT TOOLS ARE AVAILABLE FOR THIS TYPE OF WORK? IS TECHNOLOGY A CONTRIBUTING FACTOR?

DNA sequencing technologies have certainly revolutionized human disease research. Over the past several years, the technology has rapidly declined in cost and increased in throughput, making it possible to study diseases in increasingly large populations. That capability has dramatically boosted scientists' ability to discover new things.

One area of sequencing technology that has become particularly important is exome sequencing, that is, the ability to decode just the protein-coding portions of the genome. This approach is quicker and cheaper than sequencing the whole genome, yet still yields a vast amount of information about the genome's most important working parts.



WILL THIS RESEARCH GUIDE THE DEVELOPMENT OF FUTURE THERAPIES? IF SO, WHEN CAN WE EXPECT THOSE THERAPIES TO BE AVAILABLE TO PATIENTS?

We believe this work is critical for developing new and more effective therapies, but it is important to remember that it is a beginning. Drug discovery and development unfold over several years. Once a successful drug candidate has been developed, it must then undergo years of clinical testing before it can gain approval for use in the clinic.

Last updated December 2014