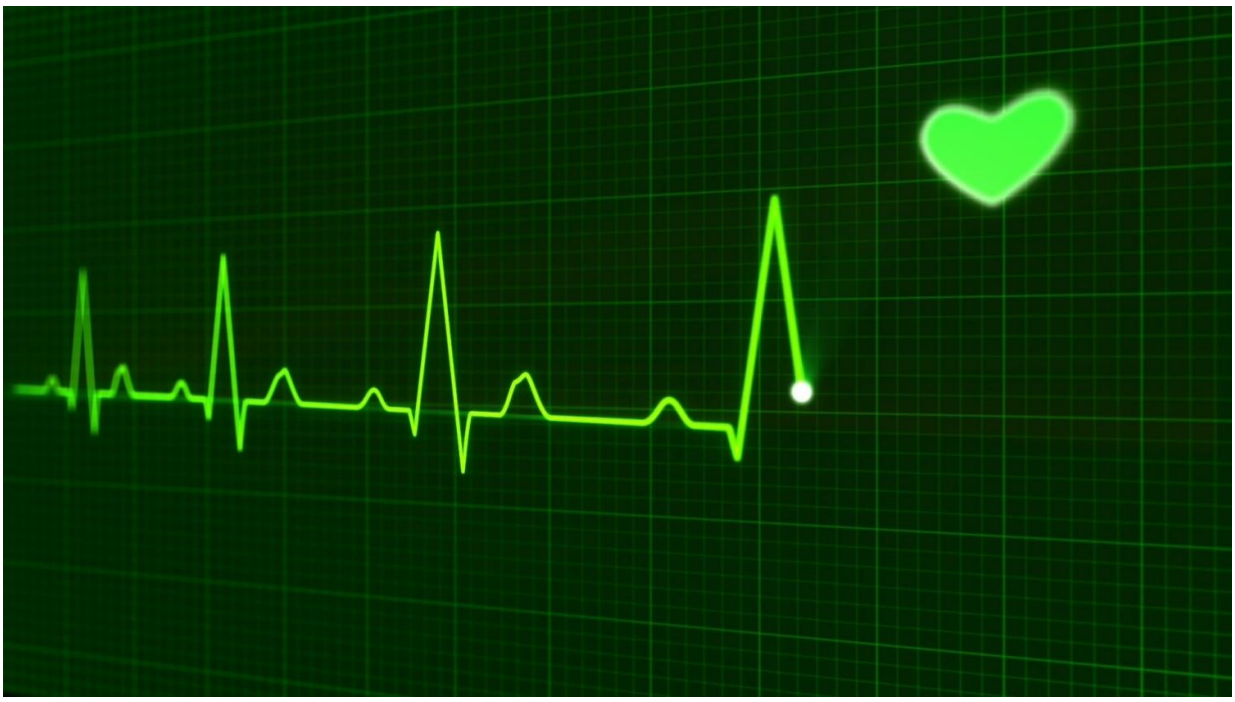
Emerging practice of precision medicine could one day improve care for many heart failure patients

September 12 2019



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The emerging practice of precision medicine could one day personalize heart failure care by identifying groups of patients more likely to develop heart failure and tailoring which medications and other therapies could be most effective for them, according to a new scientific statement

from the American Heart Association, published in the journal *Circulation: Genomic and Precision Medicine*.

Precision medicine uses information about a person's genetic make-up, metabolism and other biological and environmental factors to determine what strategies can better prevent or treat a health condition. The goal is to provide personalized treatment that is more likely to be successful for each individual patient, rather than a one-size-fits-all approach.

This new American Heart Association statement provides a state-of-the-science overview of heart failure as it relates to the different aspects of precision medicine, including how variations in genes, biomarkers in the blood or bacteria in the gut can predict the risk of heart failure and how a person may respond to various treatments.

"We aim to improve care for everyone with heart failure by more clearly defining the best treatment options for specific groups of people," said Sharon Cresci, M.D., chair of the statement writing group and associate professor of medicine and genetics at Washington University in St. Louis, Missouri. "This statement details the potential of precision medicine to improve patient outcomes."

The prognosis for people with heart failure has improved in recent decades as research studies have demonstrated the effectiveness of various medications. However, within those clinical trial populations are groups of people who are less likely to benefit from the drug and some who may have serious side effects.

"Major clinical trials often treat large numbers of patients with one medication, and if there is a positive result, the use of that medication is likely to be incorporated into guidelines for treatment," Cresci said. "Yet, within the large group of clinical trial participants, there are often some with no response and some with an adverse response. Precision

medicine approaches can help us identify who those non-responders or adverse responders are likely to be so we can find different treatment options for them."

To do this, it is important that clinical trials enroll a diverse group of participants, according to Cresci.

"Historically, clinical trial participants have been predominantly white people with particular genetic variants. People with different racial and ethnic ancestry have different genetic variants, therefore, they may not have the same response to a medication or other treatment," she said. "Researchers conducting clinical trials recognize this issue and are trying to increase diversity among clinical trial participants so we can find the optimal treatment approaches for each population group."

Some aspects of precision medicine are already routinely used by healthcare providers treating heart failure. For example, the blood level of a biomarker called B-type natriuretic peptide is a sensitive indicator of whether heart failure is worsening or if treatments are helping. It can also help determine whether symptoms such as shortness of breath are due to heart failure rather than another medical problem.

"The use of biomarkers is probably the most advanced aspect of precision medicine currently used in the treatment of heart failure. Most others are still in their infancy, and we hope in the future to combine multiple aspects of precision medicine to improve patient care and outcomes," Cresci said.

Because health professionals may be unfamiliar with one or more precision medicine approaches, the statement aims to be an educational resource by combining information on how each applies to heart failure.

"This statement also outlines how advances in technology have and can

be used to precisely define variability within population groups, and how these advances can be applied to specific patients with heart failure," said Naveen L. Pereira, M.D., vice-chair of the scientific statement writing committee and professor of medicine and associate professor of pharmacology at the Mayo Clinic College of Medicine in Rochester, Minnesota. "A composite of results from these various precision medicine techniques may also allow us to identify previously undiscovered biology that could lead to the discovery of new medications and treatments for people with heart failure."

Recognizing the value of this multi-faceted and personalized approach to heart disease, the American Heart Association established the Institute for Precision Cardiovascular Medicine in 2015. It provides:

- Training in new skills that medical researchers will need, such as data science and artificial intelligence;
- A cloud-based platform for scientists to collaborate and share data internationally;
- An initiative to involve women across the United States in health research; and
- A drug discovery center to use the power of supercomputing to rapidly predict the outcomes of possible new treatments.

"The field of precision medicine is still in its infancy, with infrastructure and programs to be built. We'll need specialized training for clinicians, processes for sharing information across large databases and guarantees for patient privacy," Cresci said. "It's exciting to realize the potential life-saving innovations on the horizon through precision medicine."

More information: *Circulation* (2019). DOI: 10.1161/HCG.0000000000000058 ,

Provided by American Heart Association