

## "Warning signs for the risk of future heart attack"; showing new hope

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"This is important because past studies, focusing on a single test, failed to identify most people at risk," said Derek V. Exner, M.D., M.P.H., a heart rhythm specialist and an associate professor at the University of Calgary's Libin Cardiovascular Institute of Alberta, in Canada. "We developed a simple method of identifying approximately twice as many people at risk. That means we can potentially save more lives."

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The research found that by examining both the nervous system and the heart's electrical system, cardiologists could better identify which patients were at highest risk of cardiac arrest or death, even years after a heart attack.

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The REFINE study--formally named the Risk Estimation Following Infarction, Noninvasive Evaluation--assessed two factors critical to the development of serious cardiac arrhythmias. An electrical system that has been damaged by a heart attack sets the stage for serious disturbances in the heart's rhythm. At the same time, a nervous system that's on high alert, even without a patient realizing it, makes it more likely that a serious arrhythmia will take hold and progress to cardiac arrest and death.

For the study, Dr. Exner and his colleagues enrolled 322 patients who had suffered a heart attack and had at least a mild abnormality in the heart's pumping ability. Within 2 to 4 weeks of the heart attack, and again at 10 to 14 weeks, they performed a variety of tests to measure the status of both the nervous system and the heart's electrical system. They then tracked patients for an average of nearly four years.

Having patients wear a heart monitor for 18 to 24 hours as they went about their daily activities turned out to be both a simple and effective way to identify high-risk patients. Using the all-day electrocardiogram, researchers analyzed the heart's electrical system by looking for T-wave alternans (TWA), an abnormality in the heart's rhythm so subtle it must be detected by a computer. Researchers also analyzed the electrocardiogram for evidence that the nervous system was on high alert by looking for abnormalities in "heart rate turbulence" (HRT), a measure of the heart's ability to adapt to change.

Early after a heart attack, TWA and impaired HRT were not accurate warning signs of future risk. At the 10- to 14-week mark, however, TWA and impaired HRT clearly identified patients at increased risk--and they were particularly powerful when used in combination. The 20 percent of patients who had both TWA and impaired HRT on the all-day heart monitor and, in addition, had a persistent abnormality in the heart's pumping ability, faced more than six times the risk of cardiac arrest or death during follow-up when compared to other patients in the study.

Using an exercise test to detect TWA was also effective, but not as simple and efficient as using the all-day heart monitor to look for both impaired HRT and TWA at the same time.

Studies that are expected to begin in 2008 will evaluate whether an implantable cardioverter-defibrillator (ICD) can save the lives of patients with abnormalities in both the nervous system and the heart's electrical system. Until then, those at highest risk should receive intensive follow-up, Dr. Exner said.

"The outlook is good for most heart attack survivors. However, the one in five patients in our study who had abnormal tests were at high risk of serious problems," he said. "Close follow-up with a physician and the use of medications known to be beneficial after a heart attack--aspirin, beta blockers, ACE inhibitors, and statins--are very strongly recommended."

The research appears in the issue of the Journal of the American College of Cardiology.