

Face Time for A-Fib Diagnosis



The results of a pilot project were recently published in the journal *Heart Rhythm* and demonstrate that subtle changes in skin colour can be used to detect the uneven blood flow caused by atrial fibrillation. This technology, developed in a partnership between the University of Rochester School of Medicine and Dentistry and Xerox, uses a web camera and software algorithms to determine from the face if an individual is experiencing atrial fibrillation.

According to Jean-Philippe Couderc, PhD, of the University of Rochester's Heart Research Follow-up Program, "This technology holds the potential to identify and diagnose cardiac disease using contactless video monitoring. This is a very simple concept, but one that could enable more people with atrial fibrillation to get the care they need."

More than three million Americans suffer from atrial fibrillation, an irregular or rapid heart rate that causes poor blood flow to the body. Despite the fact that the condition can be readily diagnosed, there are still many cases where it remains undetected. This could be either because it comes and goes, or because its symptoms (fatigue and weakness) are too common to warrant concern. It is estimated that nearly 30 percent of people with atrial fibrillation do not know they suffer from the condition.

Atrial fibrillation is treated both by medication and through a procedure that resets the electrical activity of the heart. However, it needs to be detected first. Also, in many individuals with this condition, there is a chance of re-occurrence. If untreated, this condition can place individuals at a higher risk for blood clots and stroke.

The new technology used in this study employs a software algorithm that has been developed by Xerox. It scans the face and detects changes in skin colour that are imperceptible to the naked eye. The subject needs to remain still for only 15 seconds for this technology to work.

Digital camera sensors are designed to record three colours: red, green and blue. It appears that haemoglobin absorbs more of the green spectrum of light and this change can be detected by the camera's sensor. The face is considered to be the ideal place to do so because the skin is thinner there than on other parts of the body. Also, blood vessels on the face are closer to the surface.

During the study, participants were hooked up to an ECG so that the results from the facial scan could be compared to the actual electrical activity of the heart. The study showed that the colour changes detected by video monitoring corresponded with an individual's heart rate on the ECG. The irregular electrical activity of the heart in patients with atrial fibrillation could be identified by observing the pulses of blood flowing through the veins on the face as it absorbs or reflects green light with each heartbeat.

The technique is being called videoplethymography. It has an error rate of 20 percent which is comparable to the 17 to 29 percent error rate generally associated with ECG measurements. The initial pilot study has been conducted on eleven people. However, the researchers are in the process of further evaluating it on a large study population that will also include subjects without atrial fibrillation.

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