

Doctors devise method of testing blood pressure using ultrasound

June 16 2011, by Bob Yirka

(PhysOrg.com) -- In what can only be described as insightful, two doctors from The Netherlands, working with Italian imaging companies, have devised a means to use ultrasound to measure blood pressure. The technology, more known for peering into the womb to check on babies still growing in utero, should allow physicians to check the blood pressure of patients at literally any point in the body without subjecting them to uncomfortable or invasive procedures. The doctors, Nathalie Binjens and Frans van de Voss from Eindhoven University of Technology, have published their results in the scientific journal *Ultrasound in Medicine and Biology*.

The new technique works by using mathematical based software to measure blood flow and vein or [artery wall](#) movement as the heart beats, based on images generated by the [ultrasound device](#). It can also be used to monitor blood flow over entire systems by moving the measuring points, thus allowing doctors to see what is going on with [blood flow](#) as the heart pushes it through the [vascular system](#).

Traditionally, there are but two methods to check blood pressure; the familiar cuff around the arm that always seems to get just a bit too tight for comfort, and the even more uncomfortable method of having a pressure sensor inserted through the skin via catheter. In contrast, the new method involves the application of a little bit of gel followed by the ultrasound scanner being pressed lightly against the skin.

Dr. Binjens notes that the new method should allow for on-the-spot

tests of important sites, such as the carotid arteries in the neck that carry most of the blood that the brain uses, or in the extremities to look for signs of thrombosis or even aneurysms. In addition, because it can monitor blood as it's actually pulsed, the device should be able to help spot heart ailments as well.

More testing will have to be done before the device goes commercial, however, as one not so well known side effect of ultrasound devices, is the slight heating of soft tissue that occurs when the ultrasonic energy is sent into the body, resulting in a very slight levels of inflammation; whether this might be harmful to patients, especially as scanners are used closer to the brain, remains to be seen.

More information: Toward Noninvasive Blood Pressure Assessment in Arteries by Using Ultrasound, *Ultrasound in Medicine & Biology*, Volume 37, Issue 5, May 2011, Pages 788-797, [doi:10.1016/j.ultrasmedbio.2011.01.020](https://doi.org/10.1016/j.ultrasmedbio.2011.01.020)

Abstract

A new method has been developed to measure local pressure waveforms in large arteries by using ultrasound. The method is based on a simultaneous estimation of distension waveforms and velocity profiles from a single noninvasive perpendicular ultrasound B-mode measurement. Velocity vectors were measured by applying a cross-correlation based technique to ultrasound radio-frequency (RF) data. From the ratio between changes in flow and changes in cross-sectional area of the vessel, the local pulse wave velocity (PWV) was estimated. This PWV value was used to convert the distension waveforms into pressure waveforms. The method was validated in a phantom set-up. Physiologically relevant pulsating flows were considered, employing a fluid which mimics both the acoustic and rheologic properties of blood. A linear array probe attached to a commercially available ultrasound scanner was positioned parallel to the vessel wall. Since no steering was used, the beam was perpendicular to the flow. The noninvasively

estimated pressure waveforms showed a good agreement with the reference pressure waveforms. Pressure values were predicted with a precision of 0.2 kPa (1.5 mm Hg). An accurate beat to beat pressure estimation could be obtained, indicating that a noninvasive pressure assessment in large arteries by means of ultrasound is feasible.

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