USING AN ENDOTHELIAL MACHINE TO MEASURE YOUR HEART HEALTH

FOUNDATIONS OF HEALTH
Research Center

Quick Summary

Flow Mediated Dilation (FMD) measures the elasticity of the artery by using an endothelial machine's ultrasound camera to record the diameter of the artery while at rest versus when there is increased blood flow. This measurement is an indicator of heart health and in adults has been **linked to future cardiovascular risk.**

What is an Endothelial Machine?

An endothelial machine relies on flow mediated vasodilation to predict your health by using an ultrasound. In the same way that doctors use an ultrasound to track a pregnancy by capturing images of the unborn baby, an endothelial machine allows researchers to **track your heart health by capturing images of your arteries**. Both work by sending a sound wave through an object and observing the change in the sound wave that returns. You can think of this like an echo. Whenever the sound wave hits the artery, it will bounce back in a way that reveals information about its structure and properties. When your cells are compacted into tissues, more waves bounce back, making the tissue appear white in the image. This is why the walls of your arteries are white in the image, allowing us to easily locate them and measure their diameter.
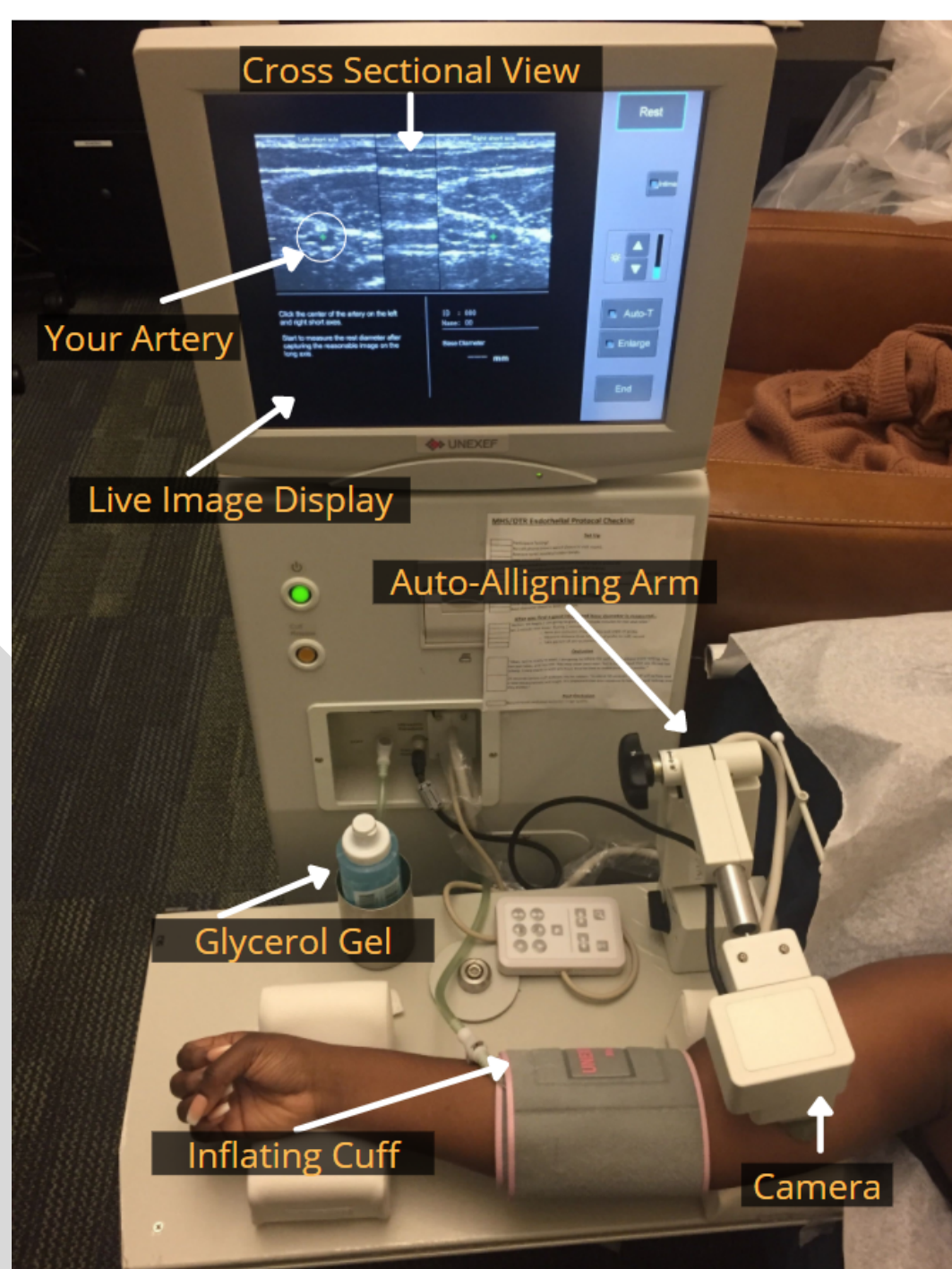

Cross Sectional View
Your Artery
Live Image Display
Auto-Alligning Arm
Glycerol Gel
Inflating Cuff
Camera

Fig 1. The Endothelial Machine at our research center

How Do We Use It?

We measure the elasticity or flexibility of the artery. You can think of your arteries as streams whose size varies depending on the rainfall: when the stream is full of water, its banks expand and it gets wider. Our arteries are no different, expanding and contracting as your heart beats to accommodate the varying volumes of blood that pass through them. To measure your artery's elasticity, **we take two measurements of the artery's diameter: first when your arm is at rest and once more several minutes after the inflation of a blood pressure cuff**. Measuring the difference in diameters tells us about Flow Mediated Vasodilation (FMD), a vital predictor of a person's cardio-vascular health.

What Are the Outcomes?

The studies at the Foundations of Health Research Center are some of the first to use the endothelial machine on younger people. This emerging technology shows promise in being linked to heart complications later in adulthood. In other studies, a correlation was found between adults' FMD score and the likelihood of adverse cardiovascular events (Kajikawa et al, 2016). This means that the lower an FMD score, the more likely someone is to face a heart complication, like a stroke or heart failure. **FMD measurements are used to supplement other data, ensuring that we are able to get a complete picture of a participant's health.** This is why our researchers take height, weight and blood pressure measurements in addition to the data collected from the endothelial machine.

Publications

Kajikawa, M., Maruhashi, T., Hida, E., Iwamoto, Y., Matsumoto, T., Iwamoto, A., . . . Higashi, Y. (2016). Combination of Flow-mediated vasodilation And NITROGLYCERINE-INDUCED vasodilation is more effective for prediction of cardiovascular events. Hypertension, 67(5), 1045-1052. doi:10.1161/hypertensionaha.115.06839

Additional Sources

UNEX Corporation. (2016). Introduction of UNEX EF. Retrieved May 11, 2021, from https://unex.co.jp/ENG/unexef.html?id=01

Raitakari, O. T., & Celermajer, D. S. (2000). Flow-mediated dilatation. British journal of clinical pharmacology, 50(5), 397–404. https://doi.org/10.1046/j.1365-2125.2000.00277.x

About This Summary

This summary was prepared by Sonya Voloboi on behalf of the Foundations of Health Research Center at Northwestern University. **You can access all of our research for free at our website,**
www.foundationsofhealth.org/publications.