

The last decade has seen a steady improvement in ultrasonic imaging of vasculature including arterial beds such as the carotids and the brachials as well as the venous systems. The technical areas of improvement include the introduction of higher frequency arrays reaching out to 15 MHz with the associated resolution gains. Among the methods needed to achieve such high frequency operation are several forms of coded excitation, which will be reviewed. Along with this trend is the development of novel flow imaging methodologies which permit higher frame rates and flow imaging close to arterial walls and other clutter type reflectors.

Increasingly the more peripheral vasculature is imaged as surrogates for the coronary arteries and with a goal of getting a measure of likely cardiac status. In this role, high frequency ultrasound technologies can be used to measure the intima-media thickness more reliably as well as to perform assessments of the vascular endothelium with methods such as flow-mediated dilation. This area has received a lot of attention for the potential of automation of the measurements. Key results will be discussed.

To some degree the clinical emphasis of vascular ultrasound is changing from detection of the impact of obstructive plaque to trying to identify vulnerable plaque. While the definition of vulnerable plaque is in the process of firming up, several key characteristics have been identified and are suitable targets for high frequency ultrasound imaging. Some recent results in this area will be reviewed.

Educational Objectives:

1. Appreciate the recent technology trends in vascular ultrasound.
2. Understand new and more functional roles of vascular ultrasound.
3. Understand possible roles of ultrasound with vulnerable plaque.

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