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This Week's Citation Classic

Strandness D E, Jr., Schultz R D, Sumner D S & Rushmer R F. Ultrasonic flow detection: a useful technic in the evaluation of peripheral vascular disease. *Amer. J. Surg.* 113:311-20, 1967. [Depts. Surgery and Physiol. and Biophys., Univ. Washington Sch. Med., and Third Univ. Surgical Serv., Veterans Admin. Hosp., Seattle, WA]

This paper describes the use of the ultrasonic velocity detector in the evaluation of patients with a wide variety of vascular disorders. The great appeal of this method is that it is safe, noninvasive, and can be applied to study arterial and venous disease involving all segments of the upper and lower extremities. [The ***SCI***® indicates that this paper has been cited over 155 times since 1967.]

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"This paper was the end result of a fortuitous happening which occurs so often in the lives of many of us. As a young surgeon, I was convinced there had to be better objective methods of evaluating patients with peripheral vascular disease. The traditional, time-tested approaches were clearly inadequate in describing the pathophysiology of vascular disease and monitoring the effects of therapy.

"Because of my training in surgery, I was ill-prepared to launch myself into more quantitatively oriented disciplines such as physiology and engineering which would provide me with the necessary background. Fortunately, R.F. Rushmer had an intensive summer course in electronics, physics, and bioengineering which introduced me to a whole new field and most importantly changed my outlook and approach to applied research.

"It was during this time that I was first exposed to ultrasonic techniques as available for both experimental and early clinical application.1,2 I immediately recognized that ultrasound could and would with time become one of the most useful modalities available to those interested in studying peripheral vascular function, both in the normal state and as affected by disease. For the first time, we had access to arteries and veins at all levels of the limbs and could safely and repetitively study patients with a wide variety of diseases.

"Initially, and even to some extent today, these methods were considered unnecessary by those favoring more traditional approaches. However, with time and improvements in the technology, ultrasound has come to occupy a very important place in the evaluation of patients with peripheral vascular disease. Advances in the field are continuing to occur at a very rapid pace.3

"This publication has been so widely cited because it was possibly the first to describe in some detail the potential application of ultrasonic methods to evaluate vascular disease. It presented an entirely new approach which with time has become commonplace to those persons interested in this important area. Fortunately, most of the conclusions reached at the time it was published remain true today."

1. **Franklin D L, Schlegel W A & Rushmer R F.** Blood flow measured by Doppler frequency shift of backscattered ultrasound. *Science* 134:564-5, 1961.
2. **Rushmer R F, Baker D W & StegaD H F.** Transcutaneous Doppler flow detection as a non-destructive technique. J. *Appl. Physiol.* 21:554-66, 1966.
3. **Strandness D** E, J**r.** The use of ultrasound in the evaluation of peripheral vascular disease. *Progr. Cardiovasc. Dis.* 20:403-22, 1978.