

## Publication Brief

# Predicting Thrombosis Formation in 1-mm-Diameter Arterial Anastomoses with Transit-Time Ultrasound Technology

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### BACKGROUND

Thrombosis commonly causes failures in anastomoses, flaps, and vascular grafts. Therefore, vessel patency is critical to the success of microvascular procedures. Any tool that can accurately predict the patency of an anastomosis intraoperatively will enable a surgeon to detect and correct flow restrictions while the patient is still in the operating room.

### OBJECTIVE

To investigate whether a minimal cutoff value for quantitative postoperative blood flow (in milliliters per minute) using transit-time ultrasound technology could be established that would reliably predict sustained vessel patency at 24 hours postoperatively.

### STUDY

- Surgical end-to-end anastomoses were performed on fifty-six Sprague-Dawley rat femoral arteries. Diameters of the femoral arteries ranged from 0.6 to 1.2 mm.
- To assess the patency of the vessels, postoperative volume blood flow measurements were taken at twenty-minute intervals up to one hour, and then again at twenty-four hours.

### RESULTS

- Forty-seven of the fifty-six total anastomoses (83.9%) were patent twenty-four hours after surgery.
- Nine anastomoses (16.1%) thrombosed within twenty-four hours.
- The optimal cutoff value for immediate postoperative flow for predicting thrombosis within twenty-four hours of a microvascular anastomosis is 0.21 ml/minute based on a receiver operating characteristic curve analysis.

### CONCLUSION

At twenty minutes postoperatively, blood flows greater than 0.30 ml/minute are highly suggestive of patency, and flows less than 0.21 ml/minute are highly suggestive of failure. Therefore, the authors recommend a minimal cutoff flow value of 0.30 ml/minute for vessels ranging from 0.6 to 1.2 mm in diameter in order to predict long-term postoperative vascular patency.

### TRANSONIC® OBSERVATIONS

A landmark study that publishes the findings of using the .07mm microvascular flowprobe to study the patency of femoral vessels following anastomosis in rats.

### REFERENCE

Shaughness G, Blackburn C, Ballestin A, Akelina Y, Ascherman JA, "Predicting Thrombosis Formation in 1-mm-Diameter Arterial Anastomoses with Transit-Time Ultrasound Technology," *Plast Reconstr Surg.* 2017; 139(6): 1400-1405. (Transonic Reference # 11200A)

