Signature Hemodialysis References

The Gold Standard

Garland JS *et al,* "Are Hemodialysis Access Flow Measurements by Ultrasound Dilution the Standard of Care for Access Surveillance?" Advances in Renal Replacement Therapy 2002; 9(2): 91-98. (Transonic Reference # HD263A) *Ultrasound indicator dilution is the current Gold Standard for measurement of vascular access recirculation and access flow. Ultrasound indicator dilution is the method of choice for monthly surveillence of vascular access grafts in adherence to NKF-K/DOQI guidelines*

Vascular Access Flow

Aragoncillo I *et al,* "Adding access blood flow surveillance reduces thrombosis and improves arteriovenous fistula patency: a randomized controlled trial," J Vasc Access. 2017 Apr 20:0. (Transonic Reference # HD11190) *"QA-based surveillance combining Doppler ultrasound and ultrasound dilution reduces the frequency of thrombosis, is cost effective, and improves thrombosis free and secondary patency in autologous AV."*

McCarley PB *et al,* "Vascular Access Blood Flow Monitoring Reduces Access Morbidity and Costs," Kidney Int 2001; 60: 1164-7. (Transonic Reference # HD11190) *"Vascular access blood flow monitoring along with preventative interventions should be the standard of care in chronic hemodialysis patients."*

Recirculation

MacDonald JT et al, "Identifying a New Reality: Zero Vascular Access Recirculation Using Ultrasound Dilution," ANNA J 1996; 23(6): 603-8. (Transonic Reference # HD4T) *Zero recirculation is a reality, thanks to ultrasound dilution's ability to separate CPR from access recirculation.*

Cardiac Output

Haag S, Artunc F *et al*, "Systemic haemodynamics in haemodialysis: intradialytic changes and prognostic significance," Nephrol Dial Transplant. 2018 Mar 26. (Transonic Reference # HD112305A))*Hemodynamic monitoring identifies a significant number of HD patients with cardiac impairment who are at risk for increased mortality*

MacRae JM *et al*, "The Cardiovascular Effects of Arteriovenous Fistulas in Chronic Kidney Disease: A Cause for Concern?" Seminar in Dialysis 2006; 19: 349-352. (Transonic Reference # HD7337A) *A thorough cardiac assessment should be performed in patients with CAD prior to placing an AVF. Regular careful evaluations are necessary in patients with cardiac disease and AVFs. Patients with high flow fistulas (flow greater than 2L/min) and increasing LVEDV are recommended to have a flow reduction procedure on their AVF.*

Pediatric

Ashoor IF *et al,* "Arteriovenous Access Monitoring with Ultrasound Dilution in a Pediatric Hemodialysis Unit," Blood Purif 2015; 39(1-3): 93-8. (Transonic Reference # HD10296) *"UD screening is very sensitive in detecting hemodynamically significant stenosis and can decrease AV access thrombosis rates."*

Goldstein SL, Allsteadt A, "Ultrasound Dilution Evaluation of Pediatric Hemodialysis Vascular Access," Kidney Int 2001; 59: 2357-2360. (Transonic Reference # HD11190) *Ultrasound indicator dilution (UD) is a valid indicator of access flow in children. "When the uncorrected flow value reported by UD is corrected for patient body surface area, UD is predictive for the presence or absence of severe AV graft stenosis, regardless of patient size."*

Comparison of Methodologies

Lopot F *et al,* "Comparison of Different Techniques of Hemodialysis Vascular Access Flow Evaluation," Int J Artif Org 2003; 12:1055-1063. *"Ultrasound dilution (Krivitski Method): Very high reproducibility and the negligible impact of changes in blood flow on the accuracy of vascular access flow measurement justifies its current status as the reference method for vascular access flow evaluation. "*

Pressure Versus Flow

Spergel LM *et al,* "Static Venous Pressure Ratio Does Not Correlate with Access Blood Flow," Kid Int 2004; 66(4): 1512-1516. (Transonic Reference # HD382A)*"Therefore, an absolute SIAVPR at any level should not be used as a surrogate for low flow or access dysfunction."*