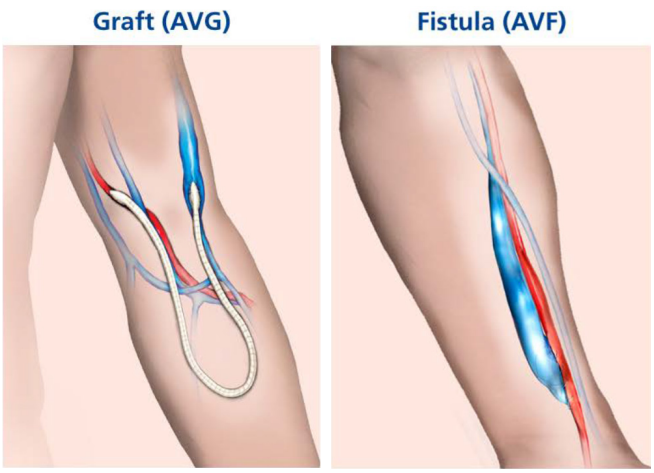
HD03 Monitoring of Dialysis Adequacy in Arteriovenous Grafts and Fistulas

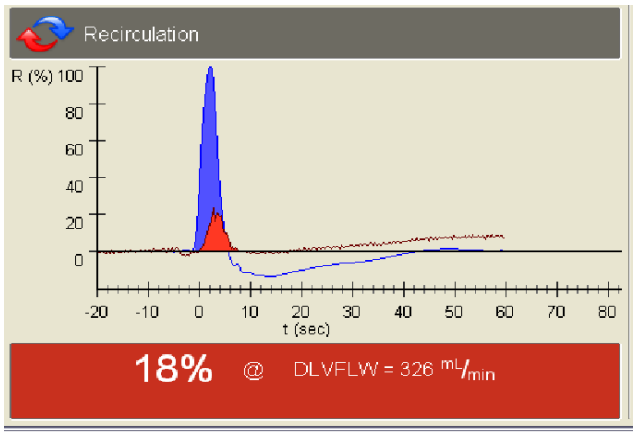
- Measure True Delivered Blood Flow to Optimize Dialysis Delivery
- Measure Recirculation to Identify Formation of Stenoses



Measure Access Recirculation

With a single infusion of saline, the Transonic Hemodialysis® Monitor detects and quantifies access recirculation, a late indicator of a failing access. Because Transonic® ultrasound dilution technology can separate cardiovascular recirculation from cardiopulmonary recirculation, 0% recirculation can be quantified. Measurement of recirculation will:

- Identify inadvertent reversal of blood lines (see box at right);
- Confirm proper needle placement;
- Confirm 0% recirculation, or identify recirculation percentage, if present.



Indicator concentration curves showing 18% access recirculation.

Measure Delivered Blood Flow

Pump flow errors and recirculation compromise dialysis delivery of a KT/V prescription. The Transonic® Hemodialysis Monitor measures true delivered blood flow through dialysis tubing using transit-time ultrasound technology. By comparing true delivered blood flow to the pump's reading, any flow limiting cause such as small needle diameter or incorrect needle placement can be identified and corrected. Delivered Blood Flow is used to:

- Determine the most appropriate blood pump setting for a low flow access when it is not feasible to increase access flow;
- Find the cause of excessive negative arterial pressure;
- Test blood pump calibration and its "effective flow" algorithm;
- Diagnose tubing set flow restrictions that could cause hemolysis.

Case Report:
Inadvertent Reversal of Blood Lines

When a routine Transonic® hemodialysis screening of a 41-year-old female ESKD patient with an AV graft reported a vascular access recirculation of 22%, the nurse reversed the blood lines and performed a second recirculation measurement. Zero percent recirculation registered. This demonstrated that the hemodialysis lines had been inadvertently reversed when they were first connected for hemodialysis. By leaving the lines in the correct position for the duration of the dialysis session, the patient received her prescribed dialysis prescription.

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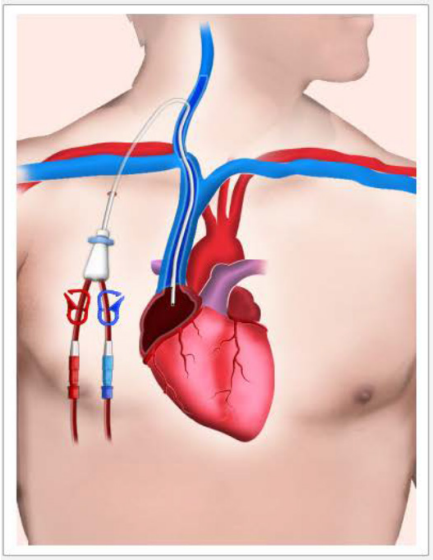
HD03 Monitoring of Dialysis Adequacy in Central Venous Catheters (CVCs)

Measure True Delivered Blood Flow and Recirculation in CVCs On-the-Spot to Optimize Dialysis Delivery



Catheter Adequacy

Most End-Stage Kidney Disease (ESKD) patients will undergo, at some point, dialysis administered through a Central Venous Catheter. Whether dialysis is emergent and temporary, acute or chronic, CVCs will often underdeliver dialysis due to:

- a discrepancy between a dialyzer's pump setting and its true delivered flow;
- and/or the presence of recirculation during dialysis delivery.

Example: Flow-QC Adequacy Test Detects Hemolysis Risk

75-year-old woman with Central Venous Catheter: Blood Lines: normal line position; Pump Setting: 300 mL/min; Delivered Blood Flow: 190 mL/min; Recirculation: 0%.

A 35% disparity between 300 mL/min pump setting and 190 mL/min delivered blood flow indicated significant hemolysis risk.

Response: Lines were checked to see that they were not kinked. Blood lines were then reversed; the pump was reset to 300 mL/min. Delivered blood flow & recirculation were again measured.

- Delivered Flow: 290 mL/min
- Flow-QC Recirculation: 2-3%

Results: The patient received better treatment with the lines in a reversed position and the pump delivering 290 mL/min.

Take Home: Treatment of patients with CVCs can be optimized with Flow-QC Delivered Flow and Recirculation measurements.

Transonic HD03 Flow-QC® Monitoring of Catheter Dose Delivery

Two potential pitfalls plague the use of catheters for dialysis delivery.

1. A fibrin sheath can occlude the lumen of the catheter's arterial entry port, impeding flow and causing a severe drop in dialysis dose delivery. This can be identified on the spot and often corrected with an HD03 measurement of true delivered blood flow.
2. The close proximity of the catheter's arterial entry and venous return ports make recirculation possible in some catheter designs. For instance, if there is 10% recirculation, the amount of blood cycled through the dialyzer is effectively 10% less and underdialysis can occur. Since the HD03 Monitor can measure recirculation, recirculation in catheters can be identified and optimized to provide the most efficient dialysis possible.

Transonic's HD03 Hemodialysis Monitor Measurements Optimize Dialysis Catheter Delivery by:

- Helping to establish a maximum dialysis pump setting before recirculation occurs;
- Using known values for flow and recirculation to adjust the length of dialysis;
- Identifying flow restrictions;
- Finding the best catheter configuration between the catheter blood lines (regular or reversed).

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