Publication Brief

Detection of Vascular Access Stenosis by Measurement of Access Blood Flow from Ionic Dialysance

BACKGROUND:
The study introduced the Diascan® non-invasive method to measure vascular access flow based on ionic dialysance without the need for a saline bolus. The method uses ionic dialysance calculated from dialysate conductivity values (how well ions conduct electricity) at the dialyzer inlet and outlet with blood lines in normal and then in reversed position.

STUDY:
- 30 patients: six with AVG; 24 with AVF.
- Dialysis was conducted with Integra dialysis monitor equipped with Diascan® module that each 30 minutes automatically provided a value for effective ionic dialysance from recorded dialysate conductivity values.
- During same session vascular access flow was measured twice by ultrasound dilution (UD)(Transonic® HD01 as reference) and by the Diascan® module with blood lines consecutively in normal line position and then 30 minutes later in reversed position. Diascan® Vascular access flow (Qa) was calculated by:
\[
\frac{D \times D_{\text{rev}}}{D - D_{\text{rev}}}
\]

RESULTS:
- Two patients were excluded from study because the Transonic HD01 Monitor detected no recirculation even when the blood lines were reversed. In the first patient, Diascan® indicated that ionic dialysance was the same (160 mL/min vs 162 mL/min) even after line reversal. The patient was shown to have a fistula drained by cannulated cephalic and basilic veins. In the second patient venous drainage took place by a vein different from the one cannulated. Diascan® registered a vascular access flow of 670 mL/min.
- From the remaining 28 patients, a linear regression analysis between the two methods was expressed:
\[
Q_{\text{a-UD}} = 1.24 \times Q_{\text{a-ID}}
\]
- Vascular access flows measured by Diascan® ionic dialysance ranged from 160 to 2190 mL/min. Vascular access flow measured by Transonic® ultrasound dilution ranged from 230 to 1400 mL/min. The average difference between the two measurements was 107 ± 387 mL/min (mean ± SD).

STUDY'S CONCLUSIONS:
- Dialysance is a non-invasive way to measure access flow without a saline bolus.
- Dialysance correlates with ultrasound dilution but shows higher discrepancy at higher access flow rates.
- Dialysance cannot measure recirculation.

Reference
Mercadal L et al "Detection of vascular access stenosis by measurement of access blood flow from ionic dialysance." Blood Purif, 2002; 20(2): 1777-81. (Transonic Reference: HD259A)