A Simplified Negative Pressure Single Pass Twin-Coil Kidney

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The apparatus consists (Figure 1) of a plexiglass cylinder and a 0.5 HP dialysate pump. The dialysate is flushed by the pump through the Travenol Ultraflow 145 Twin-coil Kidney at 30-50 litres/min rate from top to bottom, i.e. in the opposite way to the conventional one. The Coill Kidney is covered with a tightly adjusted circular plexiglass plate (Figure 2), punched with 6mm diameter holes to secure passage for blood lines, inflated cuff and negative pressure control tubings. Three supplementary holes are drilled through the plate; they can be obliterated at will to adjust the negative pressure from 50 to 300 mm Hg. Fresh dialysate is brought beneath the covering plate through its centre, at 1 litre/min rate. Used dialysate is syphoned off from the free space situated above the covering plate. The cost of the apparatus approximates 400 US dollars. It may be completed with a monitor controlling dialysate temperature and negative pressure, as well as blood pressure of venous line.

Performances of the apparatus were studied in 31 six hour dialyses in 4 Brescia-Cimino fistula-patients and 1 Quinton-Scribner shunt-patient, using the Travenol Ultraflow 145 Twin-coil Kidney. They were compared to performances obtained by identical coils used in the same patients with conventional recirculation single pass apparatus (Figure 3). Statistical analysis of the data showed identical performances in both systems for urea and creatinine extraction, but ultrafiltration was significantly higher with the negative pressure apparatus.
Figure 1. General scheme of the negative pressure single pass twin-coil Kidney

Figure 2. Covering plate to increase negative pressure; an increasing number of holes are obliterated by rotating upper part of plate.
Figure 3. Mean decrements of serum urea and creatinine concentration and mean ultrafiltration in control (○) and negative pressure (●) dialyses.