NOVEL HEMODIALYZER DELIVERS HEMODIAFILTRATION USING STANDARD DIALYSIS EQUIPMENT

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Introduction and Aims: High volume exchange HDF is becoming the gold standard for the treatment of renal failure, however, HDF requires specialized equipment and is complicated by additional connections, filters and sampling. We have developed an innovative double fiber bundle (DFB) dialyzer that is designed to deliver high volume exchange HDF using standard dialysis equipment and treatment setup. The goal of this study was to measure the Cl and exchange volume characteristics in order to evaluate this dialyzer as a treatment modality for HDF, using standard dialysis equipment.

Methods: The Apollo DFB Dialyzer (n = 3) was evaluated for Cl and Total Uf rates at different Qb rates. Cl, filtration and pressure testing were performed using packed human red blood cells reconstituted with saline to a Hct = 32% ±2% and albumin concentration > 6 g/dL. Urea, creatinine, phosphate and vitamin B12 clearances were performed at Qb = 300, 400, and 500 ml/min, and Qd = 500 ml/min. Total Uf was calculated using the changes in Hct between arterial and inter fiber bundles blood samples. Filtration Fraction of Qb (Total Uf/Qb, FF%) was calculated for each Qb. Studies were performed using a standard Fresenius 2008H dialysis machine. TMP and pressures along the blood circuit were also measured. Kuf was calculated by slope of the Uf vs TMP curve, over four different Uf rates.

Results:

FP502 Table 1: Clearances and FF%, Qd = 500 ml/min.  

<table>
<thead>
<tr>
<th></th>
<th>Qb = 300 mL/min</th>
<th>Qb = 400 mL/min</th>
<th>Qb = 500 mL/min</th>
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<tbody>
<tr>
<td>Urea</td>
<td>287.3 ± 15.1</td>
<td>375.6 ± 7.8</td>
<td>435.0 ± 11.2</td>
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<tr>
<td>Creatinine</td>
<td>280.5 ± 16.1</td>
<td>369.0 ± 7.1</td>
<td>434.9 ± 13.5</td>
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<tr>
<td>Phosphate</td>
<td>272.1 ± 14.1</td>
<td>375.6 ± 24.5</td>
<td>416.0 ± 16.6</td>
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<tr>
<td>Vit B12</td>
<td>225.3 ± 26.9</td>
<td>251.7 ± 19.5</td>
<td>225.4 ± 13.1</td>
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<tr>
<td>FF%</td>
<td>34.6%</td>
<td>32.1%</td>
<td>29.2%</td>
</tr>
</tbody>
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The Apollo DFB Dialyzer delivers Cl that exceed 90% removal at Qb = 400 ml/min and Qd = 500 ml/min. The FF%, between 25% - 35%, will yield a total Uf volume exchanged of greater than 100 ml/min, which equates to greater than 24 L over a four (4) hour treatment. Kuf was calculated to be 42.9 ± 7.0.

Conclusions: The Apollo DFB Dialyzer is capable of providing high volume exchange HDF, using standard dialysis equipment, opening this therapy to millions of patients.