VALUE OF BIOCHEMICAL MEASUREMENTS ON THE RESIDUAL PERITONEAL FLUID IN PATIENTS ON CHRONIC INTERMITTENT PERITONEAL DIALYSIS

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Repeated blood biochemical studies contribute to the anaemia of patients on chronic intermittent peritoneal dialysis (CIPD).

To verify the extent to which the measurements made on residual peritoneal fluid (RPF) reflect those made on plasma, various biochemical measurements were made simultaneously on 33 specimens of RPF and plasma (P) taken just before connecting patients on CIPD.

Results

The results are summarised in Table I. There was no significant difference between RPF and P values except for calcium, chloride, bicarbonate and protein.

TABLE I.

<table>
<thead>
<tr>
<th></th>
<th>Mean ± SEM</th>
<th>Sodium (Na⁺) mEq/l</th>
<th>Potassium (K⁺) mEq/l</th>
<th>Chloride (Cl⁻) mEq/l</th>
<th>Bicarbonate (HCO₃⁻) mEq/l</th>
<th>Protein (P) g/dl</th>
<th>Calcium (Ca++) mg/dl</th>
<th>Phosphate (PO₄⁻) mg/dl</th>
<th>Urea (U) mg/dl</th>
<th>Creatinine (Cr) mg/dl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasma (P)</td>
<td>134±0.5</td>
<td>4.6±0.1</td>
<td>99.8±1</td>
<td>25.8±0.7</td>
<td>6.7±0.1</td>
<td>9.1±0.1</td>
<td>4.6±0.2</td>
<td>176±6</td>
<td>8.3±0.5</td>
<td></td>
</tr>
<tr>
<td>Peritoneal residual fluid (PRF)</td>
<td>134±0.6</td>
<td>4.6±0.1</td>
<td>104 ±1</td>
<td>23.5±0.7</td>
<td>3.7±0.05</td>
<td>7.1±0.1</td>
<td>4.5±0.2</td>
<td>178±6</td>
<td>8.2±0.5</td>
<td></td>
</tr>
<tr>
<td>Difference (paired t test)</td>
<td>NS</td>
<td>NS</td>
<td>&lt;0.001</td>
<td>&lt;0.01</td>
<td>&lt;0.001</td>
<td>p&lt;0.001</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Correlation coeff. (r)</td>
<td>0.58</td>
<td>0.93</td>
<td>0.85</td>
<td>0.95</td>
<td>0.44</td>
<td>0.82</td>
<td>0.96</td>
<td>0.99</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Plasma calcium, chloride and bicarbonate can be calculated with 5% error from RPF values because of the significant correlation, with r value greater than 0.80.

\[ P(\text{Ca}^{++}) = 28 + 0.9 \, \text{RPF (Ca}^{++}) \, (r = 0.82) \]
\[ P(\text{Cl}^-) = 17 + 0.8 \, \text{RPF (Cl}^-) \, (r = 0.85) \]
\[ P(\text{H CO}^-_3) = 4 + 0.9 \, \text{RPF (HCO}^-_3) \, (r = 0.95) \]

Because of the poor correlation \((r = 0.44)\) plasma protein cannot be accurately calculated from RPF protein concentration. RPF total anions \((\text{Cl}^- + \text{HCO}^-_3 + \text{protein} = 135\text{mEq/l})\) are lower than plasma total anions \((141\text{mEq/l})\). This is apparently in opposition to the Gibbs-Donnan rule but may be explained in RPF by stagnation of lactate which is used as buffer in the dialysate.

**Conclusions**

1. Except for proteins, biochemical measurements made on RPF are correct for routine monitoring of uraemic patients on CIPD.
2. Measurements on RPF avoid unnecessary blood loss.
3. Measurements on RPF are especially practical for the patients dialysed at home because of the simplicity of sampling.