kidney- and liver-transplant recipients, both as inpatients and outpatients.

Sera from digoxin-free transplant patients and healthy volunteers, as well as protein-free filtrates from these groups prepared by ultrafiltration (Centrifree Micropartition System; Amicon, Danvers, MA), were analyzed for DLIS with a fluorescence polarization immunoassay by detection limit, 0.26 nmol/L (Digoxin II; Abbott Laboratories, North Chicago, IL).

We examined the potential cross-reactivity of putative DLIS materials with the digoxin antibody in this assay. Substances investigated (5) included nonesterified fatty acids (palmitic, palmitoleic, stearic, linoleic, linolenic, oleic, and arachidonic), cortisol, and lysophosphatidylcholine (Sigma Chemical Co., St. Louis, MO). The compounds, at their maximum physiological concentrations (6), were added to DLIS-negative serum.

As Table 1 shows, the DLIS positivity rate in healthy volunteers was significantly lower than in either the liver- or kidney-transplant inpatient groups, and significantly lower in liver-transplant outpatients than in liver-transplant inpatients. The DLIS positivity rates in healthy volunteers and outpatients were not significantly different. Moreover, no differences were seen in the rates between liver- and kidney-transplant inpatients or liver- and kidney-transplant outpatients. Although no conclusive—i.e., statistically significant—difference in DLIS positivity rates was demonstrated between inpatient and outpatient kidney-transplant recipients at the 95% confidence level (P was 0.059), the results strongly suggest that detectable DLIS is found more frequently among the inpatient than the outpatient groups. The statistical significance of kidney-transplant inpatient and outpatient DLIS positivity rates will be re-examined with an increased number of kidney-transplant recipients.

None of the proposed DLIS candidates that we tested exhibited cross-reactivity in the assay. Thus, these compounds do not appear to be responsible for the DLIS activity detected in this study. The protein-free filtrates of serum from healthy volunteers as well as those from the two transplant groups were free of DLIS activity, reflecting the strongly protein-bound nature of this immunoreactive material.

These results demonstrate an increased rate of DLIS positivity in kidney- and liver-transplant inpatients vs the rate in comparable outpatient populations or healthy volunteers, as measured by our assay. Further, they suggest a possible role for this type of analysis in monitoring recovery from these transplant procedures or in correcting the underlying clinical conditions for which organ transplant was originally performed.

Table 1. DLIS Positivity Rates in Healthy Volunteers and Transplant Recipients

<table>
<thead>
<tr>
<th>Status</th>
<th>Inpatient</th>
<th>Outpatient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy volunteers</td>
<td>3 of 22</td>
<td>0.26-0.37</td>
</tr>
<tr>
<td>Liver post-transplant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inpatient</td>
<td>10 of 14</td>
<td>0.26-0.79</td>
</tr>
<tr>
<td>Outpatient</td>
<td>2 of 14</td>
<td>0.27-0.33</td>
</tr>
<tr>
<td>Kidney post-transplant</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inpatient</td>
<td>5 of 8</td>
<td>0.28-0.46</td>
</tr>
<tr>
<td>Outpatient</td>
<td>1 of 8</td>
<td>0.27</td>
</tr>
</tbody>
</table>

* Fisher's exact test, one-tailed (P > 0.05 suggests no significant difference between groups).

References


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Effect of Sex-Hormone-Binding Globulin on No-Extraction Immunoassays for Testosterone

To the Editor:

The report of Masters and Hahnel (1) concerning errors in the radioimmunometry of testosterone (T) in serum interested us. We also have investigated the influence of sex-hormone-binding globulin (SHBG) on the measurement of T in the immunchem assay (2).

We proved this effect by use of a slightly different method: Two specimens of pooled sera from women with low endogenous concentrations of T (<0.7 nmol/L) and SHBG concentrations of 253 and 10 nmol/L were used for analytical-recovery studies. A T stock solution with [1α, 2α(3)HT as tracer was added to both sera, giving a final total T concentration of 87 nmol/L. Then serial dilutions were performed with the same pooled sera. Beta-counting of the tritiated tracer confirmed the uniformity of the T content in the different samples. Analytical recovery of the added T was then measured by use of the Immunchem no-extraction RIA assay and an extraction RIA kit supplied by Baxter Dade.

Figure 1 (top) illustrates the influence of SHBG on the determination of T in the no-extraction assay (assay no. 1). The quantity of T measured in the serum with high SHBG content is diminished by >50% in comparison with the serum with low SHBG content. This interference can be seen throughout the whole range of T concentrations. In contrast to this, the SHBG effect cannot be detected in the extraction-assay (Figure 1, bottom). The di-
Fig. 1. Effect of SHBG on analytical recovery of T in radioimmunoassays with (top) and without (bottom) extraction in two sera with high (253 nmol/L, - - -) and low (10 nmol/L, ---) content of SHBG.

Table 1. Effect of SHBG on Testosterone Recovery

<table>
<thead>
<tr>
<th>Testosterone, µg/L</th>
<th>SHBG, nmol/L</th>
<th>Unsuppl.</th>
<th>Suppl.</th>
<th>Recovered, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.0</td>
<td>1.00</td>
<td>4.04</td>
<td>98%</td>
</tr>
<tr>
<td>B</td>
<td>1.0</td>
<td>0.00</td>
<td>4.34</td>
<td>103%</td>
</tr>
<tr>
<td>C</td>
<td>3.0</td>
<td>0.02</td>
<td>4.38</td>
<td>104%</td>
</tr>
<tr>
<td>D</td>
<td>30</td>
<td>0.14</td>
<td>4.48</td>
<td>103%</td>
</tr>
<tr>
<td>E</td>
<td>90</td>
<td>0.40</td>
<td>4.65</td>
<td>101%</td>
</tr>
<tr>
<td>F</td>
<td>180</td>
<td>0.88</td>
<td>4.73</td>
<td>92%</td>
</tr>
</tbody>
</table>

References

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No SHBG Interference with the "Coat-A-Count Total Testosterone" Direct RIA Kit

To the Editor:

In their recent article, Masters and Hähnel (1) reported on sex-hormone binding globulin (SHBG) interference in direct radioimmunoassays for testosterone, and supporting data were provided for the Farmos, Mallinckrodt, and Immuchem kits. Although additional data were not provided, the authors reiterated conclusions previously published by Slaats et al. (2), which identified a similar SHBG interference in Diagnostic Products Corporation’s "Coat-A-Count Total Testosterone" assay. However, Masters and Hähnel seem to be unaware that this kit was reformulated over a year ago and that since June 1988 this assay no longer has a significant SHBG interference up to the highest concentration tested, i.e., 180 nmol/L. Table 1 documents the absence of such an SHBG effect and should correct any remaining false impressions.

SHBG calibrators obtained from the Diagnostic Products Irma-Count SHBG kit were each supplemented to contain an additional 4.2 µg of testosterone per liter. Recoveries of testosterone are based on differences between the results before and after this supplementation.

References

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Association between Paracetamol and Pyroglutamic Aciduria

To the Editor:

Creer et al. (1) recently described an adult patient with pyroglutamic aciduria in whom an enzyme defect (namely glutathione synthetase or 5-oxoprolinase deficiency) was considered unlikely. They concluded that an unidentified exogenous agent was most likely the cause of the patient’s pyroglutamic aciduria. A routine drug screen showed the presence of paracetamol in the urine of this patient. Another adult patient with pyroglutamic aciduria and normal enzyme activities is also known (case report in