THE EFFECT OF STORAGE TIME AND TEMPERATURE ON THE T-3 UPTAKE AND T-4 TESTS FOR THYROIDAL HORMONES

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ABSTRACT

Serum and clotted blood from nine subjects were subjected to different conditions of temperature and storage times for up to two weeks to investigate the shipment of blood samples to a reference laboratory for T-3 uptake and T-4 tests. The T-3 uptake and T-4 values were not affected by the time or temperature conditions, except in the case of the whole blood, which developed gross hemolysis. Gross hemolysis gave lowered T-4 values, while not affecting the T-3 uptake values.

RESULTS

Visual observation of all serum samples which were incubated for T-3 uptake and T-4 analysis indicated no visible change in the serum appearance. Clotted blood incubated at 40°C produced increasing hemolysis after 72 hours. Following two weeks' incubation, the hemolysis was marked. Serum from clotted blood incubated at 25° and 4°C was not altered in appearance from the initial sample.

T-3 values in serum removed from the clot within one hour after collection and storage at 40°, 25°, 4°, and ~20°C for up to four weeks were not significantly changed and were within normal limits (Table I). T-3 values in serum removed from the clot following incubation of the whole blood for up to two weeks at 40°, 25°, and 4° were not significantly changed and were within normal limits (Table II).

T-4 values in serum removed from the clot within one hour after collection and storage at 40°, 25°, 4°, and ~20°C for up to two weeks were not significantly changed and were within normal limits (Table III). T-4 levels in serum removed from the clot following incubation of the whole blood for up to two weeks at 25° and 4°C were not significantly changed (Table IV).

DISCUSSION

The manufacturer of the TRI-TAB and TETRA-TAB tests cautions that while a small amount of hemoly- sis does not affect the T-4, sera containing greater than 100 mg hemoglobin/100 ml tend to yield a decreased value. Our data supports these findings. After 48 hours' incubation of clotted blood, the sera contained 36.80± 8.05 mg hemoglobin/100 ml. The T-4 levels were reduced in these sera, but not significantly. Following 72 hours' incubation of clotted blood, the sera contained

TABLE 1: The Effect of Storage Time and Temperature on Triiodothyronine (T-3) Uptake in Serum Removed from the Clot. Values Expressed as Percent Uptake of T3Labeled T-3.

<table>
<thead>
<tr>
<th>Storage Time</th>
<th>Storage Temperature</th>
<th>T-3 Labeled T-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>40°C</td>
<td>25°C</td>
<td>4°C</td>
</tr>
<tr>
<td>Initial</td>
<td>35.97±0.68</td>
<td>37.53±0.69</td>
</tr>
<tr>
<td>24 Hours</td>
<td>36.0±0.68</td>
<td>37.56±0.79</td>
</tr>
<tr>
<td>48 Hours</td>
<td>37.14±0.79</td>
<td>37.68±0.88</td>
</tr>
<tr>
<td>72 Hours</td>
<td>36.14±0.57</td>
<td>37.62±0.79</td>
</tr>
<tr>
<td>96 Hours</td>
<td>37.16±0.57</td>
<td>37.83±1.13</td>
</tr>
<tr>
<td>1 Week</td>
<td>39.35±1.96</td>
<td>39.15±1.05</td>
</tr>
<tr>
<td>2 Weeks</td>
<td>40.15±2.11</td>
<td>39.15±1.05</td>
</tr>
</tbody>
</table>

Values represent the mean ± SE of nine individual patients, assayed in duplicate. Significant difference between means at the 0.05 (*) or 0.01 (**) level of confidence as determined by t test.

TABLE II: The Effect of Storage Time and Temperature on Triiodothyronine (T-3) Uptake in Serum Stored on the Clot. Values Expressed as Percent Uptake of T3-Labeled T-3.

<table>
<thead>
<tr>
<th>Storage Time</th>
<th>Storage Temperature</th>
<th>T-3 Labeled T-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>40°C</td>
<td>25°C</td>
<td>4°C</td>
</tr>
<tr>
<td>Initial</td>
<td>35.21±0.71</td>
<td>37.57±0.79</td>
</tr>
<tr>
<td>24 Hours</td>
<td>35.94±0.69</td>
<td>38.12±0.70</td>
</tr>
<tr>
<td>48 Hours</td>
<td>37.30±0.87</td>
<td>38.55±0.65</td>
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<tr>
<td>72 Hours</td>
<td>34.98±0.81</td>
<td>38.65±0.65</td>
</tr>
<tr>
<td>96 Hours</td>
<td>35.45±0.94</td>
<td>38.55±1.42</td>
</tr>
<tr>
<td>1 Week</td>
<td>35.70±1.02</td>
<td>38.67±0.80</td>
</tr>
<tr>
<td>2 Weeks</td>
<td>35.60±1.23</td>
<td>38.67±0.80</td>
</tr>
</tbody>
</table>

Values represent the mean ± SE of nine individual patients, assayed in duplicate. Significant difference between means at the 0.05 (*) or 0.01 (**) level of confidence as determined by t test.
TABLE III: The Effect of Storage Time and Temperature on Thyroxine (T-4) Levels in Serum Removed from the Clot. Values Expressed as µg T-4 per 100 ml.

<table>
<thead>
<tr>
<th>Storage Time</th>
<th>Storage Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40°C</td>
</tr>
<tr>
<td>Initial</td>
<td></td>
</tr>
<tr>
<td>24 Hours</td>
<td>7.27±0.27</td>
</tr>
<tr>
<td>48 Hours</td>
<td>7.11±0.32</td>
</tr>
<tr>
<td>72 Hours</td>
<td>7.54±0.30</td>
</tr>
<tr>
<td>96 Hours</td>
<td>7.10±0.26</td>
</tr>
<tr>
<td>1 Week</td>
<td>7.40±0.25</td>
</tr>
<tr>
<td>2 Weeks</td>
<td>7.65±0.31</td>
</tr>
</tbody>
</table>

Values represent the mean ± SE of nine individual patients, assayed in duplicate. Significant difference between means at the 0.05 (*) or 0.01 (**) level of confidence as determined by t test.

TABLE IV: The Effect of Storage Time and Temperature on Thyroxine (T-4) Levels in Serum Stored on the Clot. Values expressed as µg T-4 per 100 ml.

<table>
<thead>
<tr>
<th>Storage Time</th>
<th>Storage Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40°C</td>
</tr>
<tr>
<td>Initial</td>
<td></td>
</tr>
<tr>
<td>24 Hours</td>
<td>7.07±0.35</td>
</tr>
<tr>
<td>48 Hours</td>
<td>6.26±0.34</td>
</tr>
<tr>
<td>72 Hours</td>
<td>6.02±0.45*</td>
</tr>
<tr>
<td>96 Hours</td>
<td>5.40±0.23**</td>
</tr>
<tr>
<td>1 Week</td>
<td>4.04±0.27**</td>
</tr>
<tr>
<td>2 Weeks</td>
<td>4.14±0.50**</td>
</tr>
</tbody>
</table>

Values represent the mean ± SE of nine individual patients, assayed in duplicate. Significant difference between means at the 0.05 (*) or 0.01 (**) level of confidence as determined by t test.

ACKNOWLEDGMENTS

This study was supported in part by a grant from the Faculty Research Committee.

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