Differences in Heart Rate Profile during Exercise among Subjects with Subclinical Thyroid Disease

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Conflict of interest

- none
Study Hypothesis and Aim

• Hypothesis:
  – Subclinical thyroid disease is associated with changes in heart rate profile among healthy subjects

• Aim:
  – Evaluate heart rate profile of asymptomatic and apparently healthy patients with SCTD during routine exercise stress tests.
Study population:
Annual screenings of healthy subjects

- **Inclusion criteria:**
  - Complete thyroid function tests (TSH FT3 FT4) at first visit
  - Maximal treadmill exercise (Bruce protocol) at first visit

- **Exclusion criteria:**
  - Known or suspected thyroid disease
  - Extreme TSH levels (above 10 or below 0.03 mIU/Liter)
  - The use of thyroid related drugs

- **Final study sample:** 3,799 patients
Differences in heart rate profile

- Normal (N=3,456)
- SubHyper (N=71)
- SubHypo (N=273)
Propensity score matching

Hyper (N=71) Matched (N=140)

Hypo (N=273) Matched (N=546)

(*) P<0.05
Conclusions

Healthy subjects with subclinical thyroid disease have a significantly different heart rate profile during rest, exercise and recovery.

Subclinical hyperthyroidism patients have higher resting heart rate, lower heart rate reserve and higher heart rate during recovery. Careful observation is warranted in this population.
## Results (propensity score matching)

<table>
<thead>
<tr>
<th></th>
<th>SCHyperT (N=70)</th>
<th>Normal matched (N=140)</th>
<th>P value</th>
<th>SCHypoT (N=273)</th>
<th>Normal matched (N=273)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting Heart rate (bpm)</td>
<td>83±17</td>
<td>76±12</td>
<td>0.006</td>
<td>76±13</td>
<td>77±15</td>
<td>0.091</td>
</tr>
<tr>
<td>Exercise duration (minutes)</td>
<td>537±126</td>
<td>567±166</td>
<td>0.179</td>
<td>549±169</td>
<td>545±156</td>
<td>0.786</td>
</tr>
<tr>
<td>Maximal heart rate (bpm)</td>
<td>163±15</td>
<td>163±15</td>
<td>0.655</td>
<td>158±18</td>
<td>159±17</td>
<td>0.357</td>
</tr>
<tr>
<td>Heart rate response (% of expected)</td>
<td>96.4±10.8</td>
<td>95.4±5.3</td>
<td>0.382</td>
<td>94.1±7.2</td>
<td>94.7±6.3</td>
<td>0.380</td>
</tr>
<tr>
<td>Systolic BP at maximal exercise</td>
<td>161±22</td>
<td>164±26</td>
<td>0.504</td>
<td>166±24</td>
<td>165±24</td>
<td>0.707</td>
</tr>
<tr>
<td>Diastolic BP at maximal exercise</td>
<td>77±9</td>
<td>76±9</td>
<td>0.450</td>
<td>77±10</td>
<td>77±10</td>
<td>0.831</td>
</tr>
<tr>
<td>METS</td>
<td>10.8±2.1</td>
<td>11.2±2.8</td>
<td>0.342</td>
<td>11±2.6</td>
<td>10.9±2.6</td>
<td>0.859</td>
</tr>
<tr>
<td>Recovery heart rate (bpm)</td>
<td>94±12</td>
<td>90±12</td>
<td>0.045</td>
<td>88±12</td>
<td>90±13</td>
<td>0.035</td>
</tr>
<tr>
<td>Recovery systolic BP</td>
<td>121±14</td>
<td>121±14</td>
<td>0.791</td>
<td>125±17</td>
<td>124±18</td>
<td>0.931</td>
</tr>
<tr>
<td>Recovery diastolic BP</td>
<td>73±7</td>
<td>74±8</td>
<td>0.847</td>
<td>75±9</td>
<td>75±8</td>
<td>0.691</td>
</tr>
<tr>
<td>Heart rate reserve</td>
<td>80±20</td>
<td>87±18</td>
<td>0.006</td>
<td>82±20</td>
<td>82±19</td>
<td>0.637</td>
</tr>
</tbody>
</table>