# 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 included:**
  - known or suspected thyroid disease
  - extreme TSH levels (above 10 or below 0.03 mIU/Liter)
  - the use of thyroid related drugs

- The final study sample included **3,799 patients**:
  - 3,456 (91%) normal thyroid function tests
  - 70 (1.8%) patients had subclinical hyperthyroidism
  - 273 (7.2%) patients had subclinical hypothyroidism

# Results (propensity score matching)

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

# Conclusions

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

Subclinical hyperthyroidism patients had:

- higher resting heart rate
- lower heart rate reserve
- higher heart rate during recovery

all three parameters are correlated with adverse cardiovascular outcome. Therefore, careful observation is warranted in this population