

## A high normal TSH is associated with the metabolic syndrome.

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### Abstract

**OBJECTIVE:** Obesity and insulin resistance are key features of the metabolic syndrome. In euthyroidism, the relationships between TSH and insulin resistance or the metabolic syndrome are less clear. We investigated the associations between TSH and the features and prevalence of the metabolic syndrome in euthyroid German subjects.

**METHODS:** In a cross-sectional study, glucose metabolism was defined by an oral glucose tolerance test (oGTT) (except for those with evident diabetes) in 1333 subjects with TSH values between 0.3 and 4.5 mU/l who did not take any thyroid medication. Lipid parameters were measured, blood pressure and anthropometric parameters were taken, and insulin resistance was quantified as HOMA%S.

**RESULTS:** TSH was weakly correlated with BMI ( $R = 0.061$ ,  $P = 0.025$ ). This association remained significant after adjustment for sex, age, and impaired glucose metabolism ( $P = 0.002$ ). Subjects with a TSH in the upper normal range (2.5-4.5 mU/l,  $n = 119$ ) had a significantly higher BMI (30.47  $\pm$  0.57 vs. 28.74  $\pm$  0.18 kg/m<sup>2</sup>),  $P = 0.001$  and higher fasting triglycerides (1.583  $\pm$  0.082 vs. 1.422  $\pm$  0.024 mmol/l,  $P = 0.023$ ), and their likeliness for fulfilling the ATP III criteria of the metabolic syndrome was 1.7-fold increased (95% CI: 1.11- 2.60).

**CONCLUSION:** In euthyroidism, subjects with a TSH in the upper normal range (2.5-4.5 mU/l) were more obese, had higher triglycerides, and had an increased likeliness for the metabolic syndrome. Therefore, a TSH below 2.5 mU/l is associated with a favourable metabolic profile. Whether lowering TSH to levels below 2.5 mU/l improves metabolism needs to be investigated in intervention trials.

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