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High circulating Thyrotropin levels in obese women are reduced after body weight loss induced by caloric restriction

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Context: Previous clinical studies concerning the impact of body weight loss on single plasma TSH concentration measurements or the TSH response to TRH in obese humans have shown variable results.

Objective: The objective of this study was to investigate the effect of weight loss induced by caloric restriction on diurnal TSH concentrations and secretion in obese humans.

Design: This was a clinical, prospective, crossover study.

Setting: The study was conducted at the Clinical Research Center of Leiden University Medical Center.

Participants: Eleven obese premenopausal women (body mass index, 33.3 ± 0.7 kg/m²) were studied.

Intervention: The study intervention was weight loss (50% reduction overweight by caloric restriction).

Main Outcome Measure(s): Twenty-four-hour plasma TSH concentrations (10-min intervals) and the 24-h TSH secretion rate, calculated by a waveform-independent deconvolution technique (Pulse), were determined.

Results: The 24-h TSH secretion rate was significantly higher in obese women than in normal weight controls, and weight loss was accompanied by diminished TSH release (before weight loss, 43.4 ± 6.4 mU/liter·24 h; after weight loss, 34.4 ± 5.9 mU/liter·24 h; $P = 0.02$). Circulating free T3 levels decreased after weight loss from 4.3 ± 0.19 to 3.8 ± 0.14 pmol/liter ($P = 0.04$). Differences in 24-h TSH release correlated positively with the decline of circulating leptin ($r^2 = 0.62$; $P < 0.01$).

Conclusions: “Elevated TSH secretion in obese women is significantly reduced by diet-induced weight loss. Among various physiological cues, leptin may be involved in this phenomenon. The decreases in TSH and free T3 may blunt energy expenditure in response to long-term calorie restriction, thereby frustrating weight loss attempts of obese individuals.”

This study demonstrates that there is a significant reduction in thyroid levels with dieting that is not detected by standard thyroid testing and the use of standard normal ranges.