

A kinetic study on secretion and elimination of endogenous thyrotropin in the thyrotropin-releasing hormone test

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Serum thyrotropin (TSH) concentrations in normal young men were measured by a high-sensitivity immunoradiometric assay before and after intravenous administration of 500 μg of TSH-releasing hormone (TRH). A kinetic model was applied to evaluate the secretion rate both before (V_0) and after (V_0+V^* at maximum rate) the administration of TRH, the elimination constant (K), the latent time (L) between TRH administration and start of the stimulated secretion, and the total amount of TSH (T) released in response to TRH. V_0 , V^* and T varied widely from individual to individual, but correlated well with TSH before TRH administration ($r=0.93$, 0.80 and 0.87 , respectively). A few minutes (1.89 ± 1.30 min) after the administration of TRH, the secretion of TSH (0.025 ± 0.016 $\mu\text{U}/\text{min ml}$) was stimulated, and the total release over about 1 h was 12.5 ± 5.6 $\mu\text{U}/\text{ml}$. Serum TSH was maximum at 31.5 ± 5.7 min. The half-time of disappearance of TSH was 42 ± 9 min. These data confirm that the stimulated secretion continues for more than 30 min, and that the pituitary releases 43.2 ± 22.9 mU of TSH (assuming the distribution volume of TSH is 5.8% of body weight) in response to TRH, an amount which correlates closely ($r=0.91$) with TSH before TRH administration.

Key words: Kinetic study, TSH secretion, TRH test, High sensitivity RIA