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Biological Variation and Reference Change Values of TSH, Free T3, and Free T4 Levels in Serum of Healthy Turkish Individuals

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Abstract: Aim: Thyrotropin (TSH), thyroxine (T4) and triiodothyronine (T3) levels in serum are important for diagnosis of thyroid dysfunction. Thyroid function tests have considerable biological variations. Evaluation of the components of biological variation is essential to assess the usefulness of reference values and to evaluate significance of changes in serial results from an individual. Published estimates may show disagreement about the values of biological variations. Not many studies exist at present that evaluate the reference change values (RCV) of these parameters. The aim of this study was to determine the biological variations of TSH, free T3, and free T4 and to calculate their RCV values in serum of healthy individuals in our population. Materials and Methods: The study group included 46 healthy volunteer subjects (mean age 33.5 ± 9 years). During six consecutive weeks, four blood samples were obtained for each subject at two-week intervals. Serum TSH, free T3, and free T4 levels were measured by an immunoluminometric assay on a random-access analyzer. Results: The intra-individual/inter-individual biological variations (defined in terms of percent coefficient of variation, CV) for serum TSH, fT3, and fT4 were 37.21/37.6%, 22.32/2.43%, and 13.26/7.47% respectively. The RCVs for TSH, fT3, and fT4 were 104.0%, 63.1%, and 38.8%, respectively ($P < 0.05$). Conclusions: TSH, fT3, and fT4 showed a significant intra-individual biological variation. The utility of population-based reference intervals for TSH would be of limited use. During evaluation, especially when monitoring thyroid functions, the estimates of biological variations and the RCV values should be considered.

Key Words: Biological variation, TSH, free T3, free T4

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