

## Establishing reference intervals for thyroid associated hormones and evaluating the prevalence of thyroid diseases by data mining- Yutong Zou, Peking Union Medical College Hospital, China

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**Background:** Thyroid diseases are highly prevalent worldwide, but their diagnosis remains a challenge. We established reference intervals (RIs) for thyroid-associated hormones and evaluated the prevalence of thyroid diseases in China. **Methods:** After excluding outliers based on the results of ultrasound screening, thyroid antibody tests, and the Tukey method, the medical records of 20,303 euthyroid adults, who visited the Department of Health Care at Peking Union Medical College Hospital from January 2014 to December 2018, were analyzed. Thyroid-associated hormones were measured by the Siemens Advia Centaur XP analyzer. The RIs for thyroid-associated hormones were calculated according to the CLSI C28-A3 guidelines, and were compared with the RIs provided by Siemens. The prevalence of thyroid diseases over the five years was evaluated and compared using the chi-square test. **Results:** The RIs for thyroid stimulating hormone (TSH), free thyroxine (FT4), free triiodothyronine (FT3), total thyroxine (TT4), and total triiodothyronine (TT3) were 0.71-4.92 mIU/L, 12.2-20.1 pmol/L, 3.9-6.0 pmol/L, 65.6-135.1 nmol/L, and 1.2-2.2 nmol/L, respectively. The RIs of all hormones except TT4 differed significantly between males and females. The RIs of TSH increased with increasing age. The prevalence of overt hypothyroidism, overt hyperthyroidism, subclinical hypothyroidism, and subclinical hyperthyroidism was 0.5% and 0.8%, 0.2% and 0.6%, 3.8% and 6.1%, and 3.3% and 4.7% in males and females, respectively, which differed from those provided by Siemens. **Conclusions:** Sex-specific RIs were established for thyroid-associated hormones, and the prevalence of thyroid diseases was determined in the Chinese population. **Method:** From January 1, 2014, to December 31, 2018, 280,206 apparently healthy subjects were retrieved from the department of Health Care in Peking Union Medical College.

Hospital (PUMCH). With ultrasound screening results, thyroid related antibody results and Tukey method being used to exclude outliers, 20,192 apparently euthyroid adults with thorough demographic and thyroid associated results were finally included in this study. Thyroid associated hormones were detected by the Siemens ADVIA Centaur XP automatic chemiluminescence immunoassay analyzer. According to the Clinical Laboratory and standard institution (CLSI) C28-A3, the RIs were calculated as the 2.5th and 97.5th percentiles (P2.5, P97.5) with nonparametric analysis, and compared with the RIs provided by the manufacturer. Additionally, the prevalence of thyroid diseases during whole five consecutive years was evaluated.

**Results:** The RIs for TSH, FT4, FT3, TT4, and TT3 were 0.71-4.80 mIU/L, 12.2-20.0 pmol/L, 3.9-6.0 pmol/L, 65.6-134.8 nmol/L, and 1.2-2.2 nmol/L, respectively. Expect for TT4, they all showed significant differences between males and females. Respectively, the prevalence of clinical hypothyroidism was 0.5% in males and 0.8% in females, clinical hyperthyroidism was 0.3% in males and 0.6% in females, subclinical hypothyroidism was 3.6% in males and 5.6% in females, and subclinical hyperthyroidism was 2.4% in males and 2.9% in females according to the RIs established in this study, which were different from those reported by the manufacturer. Furthermore, the prevalence of thyroid diseases took on difference for women of childbearing age.

**Conclusion:** Sex-specific RIs were established for TSH, FT4, FT3, TT4 and TT3 in the Chinese population, and the prevalence of both clinical and subclinical thyroid diseases was evaluated. More attention should be paid to thyroid disorders.