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Concentration of Thyroglobulin and Thyroglobulin-Specific Autoantibodies in Patients With Differentiated Thyroid Cancer After Treatment With Radioactive Iodine 131

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Abstract

Background: Measurement of serum thyroglobulin (Tg) is primarily used as a tumor marker in the postoperative management of patients with differentiated thyroid cancer (DTC), while thyroglobulin autoantibodies (TgAbs) are elevated in some patients as well. The aim of this study was to evaluate the concentrations of Tg and TgAbs in DTC patients 3 and 6 months after radioiodine therapy and to analyze whether the development and course of TgAbs is related to the clinical status of DTC patients or Tg levels before and after radioiodine therapy.

Methods: Pre-treatment measurements were made in conditions of stimulation of Tg secretion with endogenous thyroid-stimulating hormone (TSH) (TSH>25 mIU/L), while the measurements after the treatment were obtained in conditions of suppression of Tg secretion (TSH<0.15 mIU/L).

Results: Concentrations of Tg were decreased in the sera of all patients with DTC 6 months after radioiodine treatment, as well as the mean concentration TgAbs. Thyroglobulin autoantibody concentrations in sera of patients without metastasis were higher than in those with DTC metastases. Individual values of TgAbs in patients without metastases after the radioiodine treatment were decreased, increased, or unchanged.

Conclusion: The development and course of TgAbs in DTC patients cannot be predicted by Tg levels before and after radioiodine therapy

Keywords: thyroglobulin, antithyroglobulin autoantibodies, differentiated thyroid cancer, radioiodine therapy

Differentiated thyroid cancer (DTC) types (papillary and follicular) constitute more than 90% of malignant cancers of the thyroid gland.[1] Since they originate from follicular thyroid epithelium, the malignantly transformed cells retain some functional characteristics of thyrocytes, depending on the degree of differentiation. Thus, they have receptors for thyroid-stimulating hormone (TSH) and participate in iodine metabolism as well as in the production of thyroglobulin (Tg) and thyroid hormones. Although there can be differences in the conformation of the Tg released from malignantly transformed cells and the Tg of healthy people,[2-4] determining the concentration of Tg in patients with DTC is at the moment the best serum marker of the success of the applied treatment.[5-9] In effect, detection of Tg in the serum of patients who have had a total thyroidectomy is an indicator of the presence of normal or malignant thyroid tissue. Combined with the results of other diagnostic procedures (primarily Iodine-131 [^{131}I] scintigraphy of the complete body), this guides the clinician concerning therapeutic application of radioactive ^{131}I. Those patients who have undergone surgery for well-DTC and have remaining thyroid tissue are often treated with ^{131}I. In the post-operative period, regardless of whether the patient has been treated or not, the concentration of Tg in serum is monitored in order to detect recurrent or persistent disease.[10] Apart from having increased concentrations of Tg, some patients exhibit high concentrations of thyroglobulin-specific autoantibodies (TgAbs) as well. The majority of studies analyzed TgAb and Tg in cross-sectional data to investigate the influence of TgAbs on Tg measurements,[11-16] and there are longitudinal studies on TgAb development in patients with DTC.[17-19] Peak values of TgAb could be expected in the early follow-up period after radioiodine treatment.[19]

The aim of this investigation was to evaluate the concentrations of Tg and TgAbs in our DTC patients 3 and 6 months after radioiodine therapy and to analyze if the development and course of TgAbs depends on the clinical status of DTC patients (with or without metastasis) or Tg levels before and after radioiodine therapy.

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Abbreviations

Tg, thyroglobulin; DTC, differentiated thyroid cancer; TgAbs, thyroglobulin autoantibodies; TSH, thyroid-stimulating hormone; 131I, Iodine-131; IRMA, immunoradiometric assay; Tg mAb, thyroglobulin monoclonal antibody; CRM 457, Certified Reference Material 457; WHO, World Health Organization

Patients and Methods

The research included 41 patients with DTC, treated in the Centre for Nuclear Medicine, Kragujevac Clinical