Alterations of Circulating Thyroid Hormone Levels in Dialysis Patients: Another Piece to Solve the Puzzle

S.	Sergio	De Marchi ^a
E.	Emanuela	Cecchin ^b

^aDepartment of Internal Medicine, Hospital of Codroipo; ^bDepartment of Nephrology and Dialysis, Hospital of Pordenone, Italy

Sergio De Marchi, MD, via Tartagna, 39, I-33100 Udine (Italy)

Dear Sir,

Weissel et al. [1] investigated thyroid hormone serum concentrations in uremic patients of 4 hemodialysis centers. They found highly significant differences between the mean thyroid hormone concentrations of the 4 different centers. Particularly, total 3,3',5'-triiodothyronine (reverse T₃; RT₃) levels were normal in two centers, below normal and at the upper limit of normal, respectively, in the other two centers. They concluded suggesting that the reported differences of thyroid hormone levels are center-specific and possibly due to differences in metabolic control as well as to unknown factors arising from the patient population and from the technique of dialysis.

We report here our experience because we believe that it may contribute to clarify, at least in part, such apparently controversial results. It is evident that circulating thyroid hormones in uremia may be influenced by a multitude of clinical conditions such as the state of chronic illness, the coexistent catabolism and undernutrition, the metabolic consequences of uremia and dialysis therapy and the ingestion of medications [2]. Recently, we suggested that the glucose intolerance, which frequently occurs in uremia, may influence circulating thyroid hormones and particularly serum RT₃ [3–5]. In order to investigate such a relation between carbohydrate metabolic state and thyroid hormone metabolism we undertook a study in two groups of patients with end-stage chronic renal failure (CRF) receiving hemodialysis (HD) and intermittent peritoneal dialysis (IPD), respectively [6]. In order to avoid the influence of other factors on thyroid hormones, we included in the study only patients well-nourished and without evidence of other systemic illnesses such as chronic liver disease, malignancies, and systemic lupus erythematosus. None of the patients was taking any medication known to influence thyroid hormones and no acute illness was present at the time of the study. Carbohydrate metabolic state was assessed by measuring fasting glucose and insulin levels and by performing an oral glucose tolerance test (OGTT). The mean serum RT₃ concentration for the whole group of CRF patients was slightly lower than that of the control group composed by healthy subjects well matched for age and sex. Three fourths of CRF patients had serum RT₃ levels within the normal range for our laboratory (13.5–27 ng/ dl) while in the remaining patients serum RT₃ was elevated in 8% and lowered in 17%. These data confirm, at least in part, the variations of serum RT₃ concentration reported by Weissel et al. [1]. In our experience there was no significant difference in the mean serum concentration of total 3,5,3'-triiodothyronine (T₃), RT₃, total thyroxine (T₄), thyrotropin (TSH) and thyroxine-binding

globulin as well as in the mean molar serum concentration ratio of T_3/T_4 , RT_3/T_4 and RT_3/T_3 between HD and IPD patients. These results suggest that the alteration of thyroid hormones, which frequently occurs in CRF patients, is unrelated to the technique of dialysis therapy. We found glucose intolerance in 42% of CRF patients. However, in most of these patients, although it was common to observe plasma glucose levels in excess of 200 mg/dl following glucose ingestion, it was infrequent to find fasting plasma glucose concentrations above 140 mg/dl. According to the criteria of the National Diabetes Data Group [7] these uremic patients would be classified as having impaired glucose tolerance. In our patients glucose intolerance was associated with a significantly lower serum T_3 and a higher RT_3 level. Moreover the comparison of molar serum concentration ratio of T_3/T_4 and RT_3/T_4 demonstrated that in patients with glucose intolerance T_3/T_4 was significantly lower whereas RT_3/T_4 was higher than in patients with normal OGTT response. This is somewhat similar to the alterations of serum thyroid hormones reported in diabetes mellitus [8]. Finally, our experience suggests that the decreased Alterations of Circulating Thyroid Hormone Levels in Dialysis Patients: Another Piece to Solve the Puzzle

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utilization of glucose by tissues is important in the regulation of peripheral thyroid hormone metabolism in uremia and may explain, at least in part, some controversial reports on serum thyroid hormone levels in dialysis patients.

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