

# Dynamic Thiol/Disulfide Homeostasis In Patients With Autoimmune Subclinical Hypothyroidism

Ihsan Ates<sup>1</sup>, Mustafa Altay<sup>1</sup>, Fatma Meric Yilmaz<sup>2,3</sup>, Canan Topcuoglu<sup>2</sup>, Salim Neselioglu<sup>3</sup>, Ozcan Erel<sup>3</sup>, Nisbet Yilmaz<sup>1</sup>

<sup>1</sup>Ankara Numune Education and Research Hospital, Department of Internal Medicine, Ankara, Turkey

<sup>2</sup>Ankara Numune Education and Research Hospital, Department of Biochemistry, Ankara, Turkey

<sup>3</sup>Yildirim Beyazıt University Medical Faculty, Department of Biochemistry, Ankara, Turkey

## Objectives:

Abnormal thiol/disulphide homeostasis has been shown to be responsible for a number of diseases in which chronic inflammation is predominant. However, the role of thiol/disulphide homeostasis in the pathogenesis of Hashimoto thyroiditis, which is also a chronic inflammatory disorder, is not known. In this study, we aimed to investigate dynamic thiol/disulphide homeostasis in patients with subclinical hypothyroidism using the new and automatic method developed by Erel & Neselioglu.

## Methods:

Fourty eight patients with newly diagnosed subclinical hypothyroidism due to Hashimoto thyroiditis and not yet on any treatment and 48 healthy subjects without any known disease were enrolled. Thiol/disulfide homeostasis [native thiol(-SH) –disulphide(-S-S-) exchanges] was measured in both groups with new method developed by Erel and Neselioglu. The half of the difference between total thiol (-SH + -S-S-) and -SH concentrations gave the -S-S- bond amount.

**Table 1. Levels of thiol/disulphide homeostasis parameters between groups**

Variables	Control (n=48)	Subclinical Hypothyroidism (n=48)	p
-SH (µmol/L)	398±49.8	375.1±38.7	0.014*
-SH + -S-S-(µmol/L)	432.4±51.3	416.7±40.9	0.101
-S-S- (µmol/L)	17.2±6	20.8±6	0.004*
-S-S-/-SH (%)	4.4±1.7	5.6±1.7	0.001*
-S-S-/(-SH + -S-S-) (%)	4±1.4	5±1.4	0.001*
-SH/(-SH + -S-S-) (%)	92±2.8	90±2.7	0.001*

Parameters were expressed as mean±SD and median [interquartile range].

\*p<0.05 was considered significant for statistical analyses

## Results:

In patients with subclinical hypothyroidism, -SH level and -SH/(-SH+-S-S-) ratio was found to be lower than that of the control group. -S-S- level (p=0.004), -S-S-/-SH (p=0.001) and -S-S-/(-SH + -S-S-)(p=0.001) ratio was higher in patients with subclinical hypothyroidism as compared to that of the control group. A positive correlation was found between anti-TPO and anti-Tg levels and -S-S-/-SH ve -S-S-/(-SH + -S-S-) levels while a negative correlation was found with -SH/(-SH + -S-S-) level.

## Conclusions:

Thiol/disulfide homeostasis was found to have a tendency towards -S-S- formation in patients with subclinical hypothyroidism and thyroid autoantibodies were correlated positively with thiol oxidation. Abnormal thiol/disulfide homeostasis in patients with Hashimoto thyroiditis, is whether a cause or a consequence, may be illustrated by using thiol-containing drugs and following autoantibody levels. The efficacy, dose and duration of thiol drugs may be monitored easily, effectively, quickly and cheaply by the method developed by Erel and Neselioglu.

## References:

1. Erel, O. and S. Neselioglu, *A novel and automated assay for thiol/disulphide homeostasis*. Clin Biochem, 2014. **47**(18): p. 326-32.
2. Hollowell JG, Staehling NW, Flanders WD, Hannon WH, Gunter EW, Spencer CA, et al. (2002) Serum TSH, T(4), and thyroid antibodies in the United States population (1988 to 1994): National Health and Nutrition Examination Survey (NHANES III). *J Clin Endocrinol Metab* **87**, 489-499.
3. Weetman AP (2004) Cellular immune responses in autoimmune thyroid disease. *Clin Endocrinol (Oxf)* **61**, 405-413.

