

Hemithyroidectomy for benign euthyroid goiter increases the mitochondrial membrane potential of peripheral mononuclear blood cells

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Introduction

Patients are considered euthyroid after hemithyroidectomy, if levels of TSH and thyroid hormones remain within the reference ranges. Thyroid hormones are major regulators of mitochondrial function¹, and the mitochondrial membrane potential (MMP) can be measured by flow cytometry analysis of peripheral mononuclear blood cells (MNBCs)².

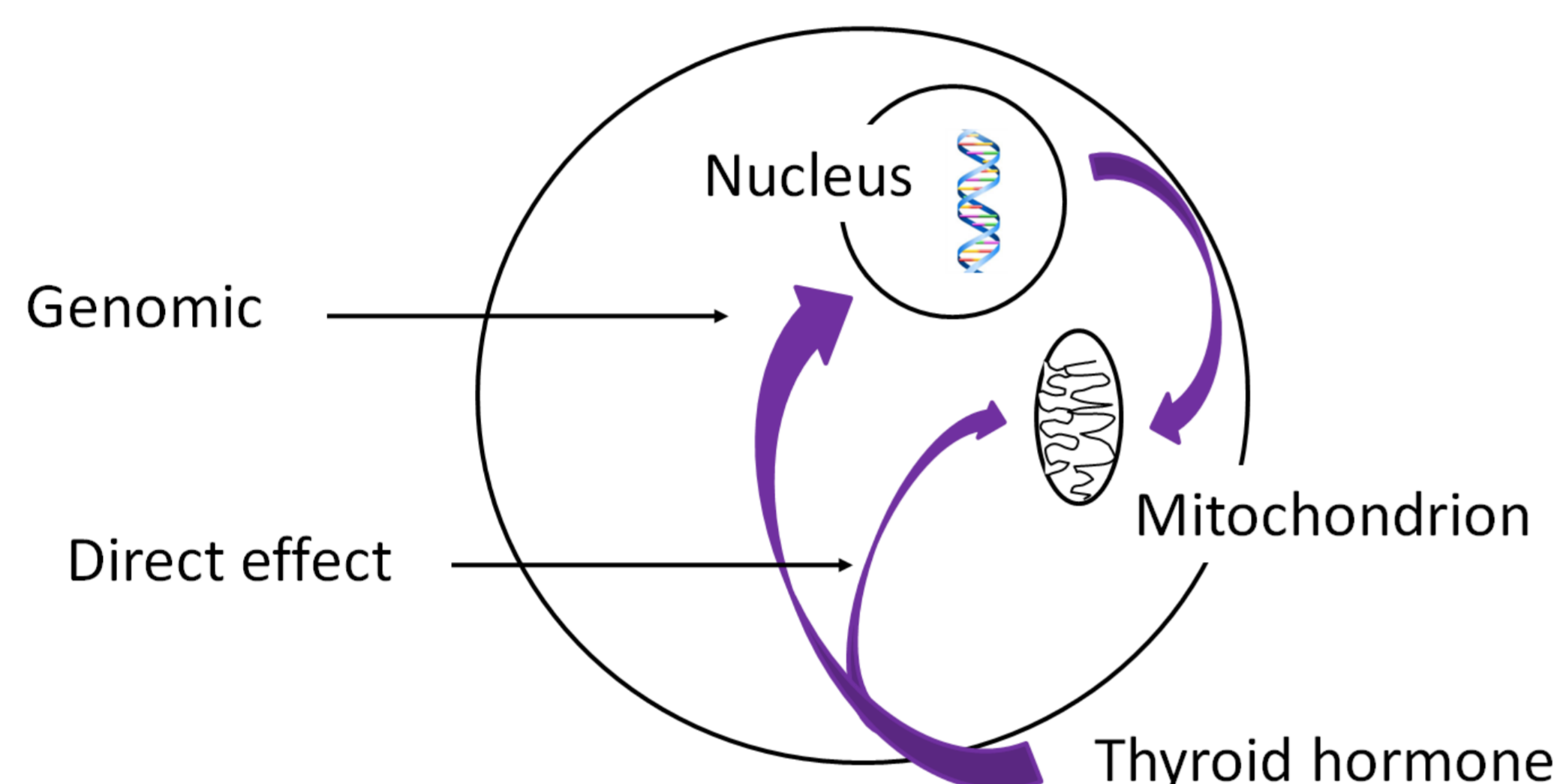


Figure 1. Thyroid hormone regulates mitochondrial function.

Previously, increased MMP of MNBCs has been demonstrated in patients with spontaneous subclinical hypothyroidism³. Increased MMP might represent increased production of reactive oxygen species, rather than of ATP.

Objective

To determine if the hemithyroidectomy-induced changes in TSH and thyroid hormones affect the mitochondria of peripheral MNBCs.

Methods

In an ongoing prospective study, patients are examined at one time point before, and at four time points (1, 3, 6, and 12 months) after hemithyroidectomy for benign euthyroid goiter.

TSH, fT4 and tT3 are measured, and the MMP is determined as the fluorescence intensity of Tetramethylrhodamine methyl ester (TMRM)-stained MNBCs by flow cytometry analysis.

Results

Figure 2 presents thyroid function and MMP of 23 hemithyroidectomized patients (17 women, six men) who do not receive levothyroxine treatment. Median (IQR) age was 50 years (43-58 years).

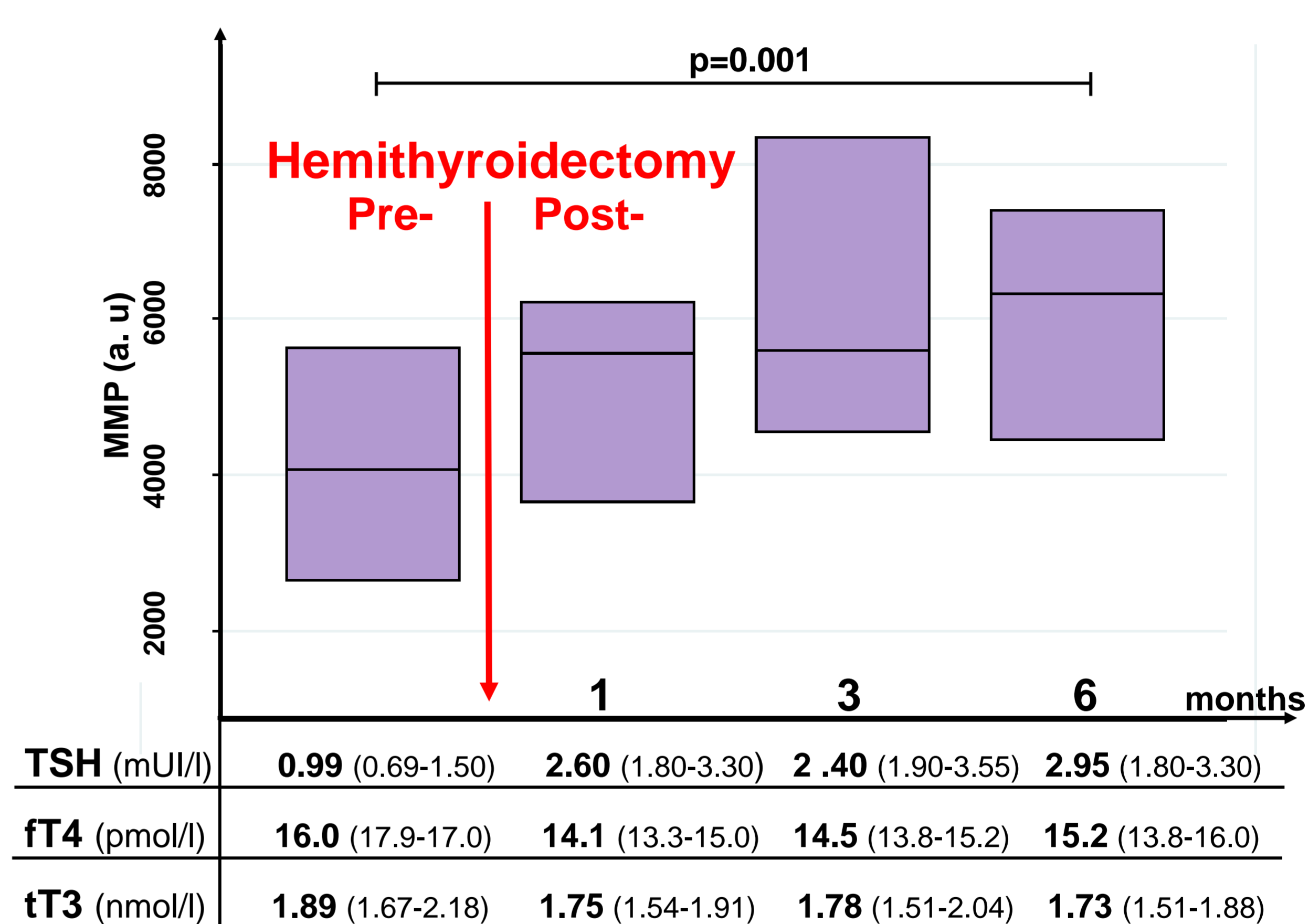


Figure 2. Median and interquartile range (IQR) presented. Wilcoxon signed-rank test was used.

Six months after hemithyroidectomy, the MMP of MNBCs was persistently increased, unchanged to values one month postoperatively.

TSH was persistently increased ($p=0.003$), fT4 and tT3 persistently decreased ($p=0.003$ and $p=0.004$, respectively) within the reference ranges, unchanged to values one month after hemithyroidectomy.

Conclusion

Although they are considered clinically and biochemically euthyroid, hemithyroidectomized patients have lowered thyroid function and hyperpolarized mitochondria.

It is unknown if these effects of hemithyroidectomy have clinical consequences.

References

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