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### Thyroid Hormone Concentrations, Disease, Physical Function and Mortality in Elderly Men

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This study of 403 men investigated the association between TSH, T4, free T4, T3, TBG and reverse T3 (rT3) and parameters of physical functioning. This study demonstrates that TSH and/or T4 levels are poor indicators of tissue thyroid levels and thus, in a large percentage of patients, cannot be used to determine whether a person is euthyroid (normal thyroid levels) at the tissue level. In fact, T4 levels had a negative correlation with tissue thyroid levels (higher T4 levels were associated with decreased peripheral conversion of T4, low T3 levels and high rT3). This study demonstrates that rT3 inversely correlates with physical performance scores and that the T3/rT3 ratio is currently the best indicator of tissue levels of thyroid.

This study showed that increased T4 and rT3 levels and decreased T3 levels are associated with hypothyroidism at the tissue level with diminished physical functioning and the presence of a catabolic state (breakdown of the body). This study adds to the mounting evidence that giving T4 preparations such as Synthroid and Levothyroxine are inadequate for restoring tissue euthyroidism and that a normal TSH cannot be relied upon as an indication of euthyroidism, as it has a very low sensitivity and specificity for hypothyroidism. This poor sensitivity and specificity is further decreased with the presence of one or more systemic illnesses, including diabetes, heart disease, hypertension, systemic inflammation, asthma, CFS, fibromyalgia, rheumatoid arthritis, lupus, insulin resistance, obesity, chronic stress and almost any other systemic illness.

Low T3 syndrome, with low T3 and high reverse T3, is almost always missed when using standard thyroid function tests, as the T3 level is often in the low normal range and reverse T3 is in the high normal range, again making the T3/rT3 ratio the most useful marker for tissue hypothyroidism and as a marker of diminished cellular functioning. The authors of this study conclude, *“Subjects with low T3 and high reverse T3 had the lowest PPS [PPS is a scoring system that takes into account normal activities of daily living and is a measure of physical and mental functioning]... Furthermore, subjects with high reverse T3 concentrations had worse physical performance scores and lower grip strength. These high rT3 levels were accompanied by high FT4 levels (within the normal range)... These changes in thyroid hormone concentrations may be explained by a decrease in peripheral thyroid hormone metabolism... Increasing rT3 levels could then represent a catabolic state, eventually proceeding an overt low T3 syndrome.”*

**This study demonstrates that TSH and T4 levels are poor measures of tissue thyroid levels, TSH and T4 levels should not be relied upon to determine the tissue thyroid levels and that the best estimate of the tissue thyroid effect is the rT3 level and the T3/rT3 ratio.**