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Replacement therapy for hypothyroidism with thyroxine alone does not ensure euthyroidism in all tissues...

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Only the combined treatment with thyroxine and triiodothyronine ensures euthyroidism in all tissues...

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Levothyroxine (T4) only replacement with products such as Synthroid and Levoxyl are the most widely accepted forms of thyroid replacement. This is based on a widely held assumption that the body will convert what it needs to the biologically active form T3. Based on this assumption, most physicians and endocrinologists believe that the normalization of TSH with a T4 preparation demonstrates adequate tissue levels of thyroid. This assumption, however, had never been directly tested until these studies were published. The first study investigated whether or not giving T4 only preparations will provide adequate T3 levels in varying tissues. Plasma TSH, T4 and T3 levels and 10 different tissue levels of T4 and T3 were measured after the infusion of 12-13 days of thyroxine. The second study compared the plasma TSH, T4 and T3 levels and 13 different tissues levels of T4 and T3 when T4 or T4/T3 preparations were utilized.

These studies demonstrate that the normalization of plasma TSH and T4 levels with T4 only preparations provide adequate tissue T3 levels to only a few tissues including the pituitary (hence the normal TSH) but almost every other tissue will be deficient. They show that it is impossible to achieve normal tissue levels of T3 by giving T4 only preparations unless supra-physiological levels of T4 are given. The authors conclude, *“The current replacement therapy of hypothyroidism should no longer be considered adequate...”*

The second study found that a combination of T4/T3 is required to normalize tissue levels of T3. The study found that the pituitary was able to maintain normal levels of T3 despite the rest of the body being hypothyroid on T4 only preparations. Under normal conditions, it was shown that the pituitary will have 7 to 60 times the concentration of T3 of other tissues of the body and when thyroid levels drop, the pituitary was shown to have 40 to 650 times the concentration of T3 of other tissues. Thus, the pituitary is unique in its ability to concentrate T3 in the presence of diminished thyroid levels that is not present in other tissues. Consequently, the pituitary levels of T3 and the subsequent level of TSH is a poor measurement of tissue hypothyroidism as almost the entire body can be severely hypothyroid despite a normal TSH level.

These studies add to the large amount of studies that demonstrate that pituitary thyroid levels are not indicative of other tissues in the body and demonstrate why the TSH level is a poor indicator of a proper thyroid dose. They also demonstrate that it is impossible to achieve normal tissue thyroid levels with T4 preparations such as Synthroid and Levoxyl. It is no surprise that the majority of patients on T4 preparations will continue to suffer from symptoms of hypothyroidism despite being told their levels are “normal”. Patients on T4 only preparations should seek out a physician who is well-versed in the medical literature and understands the physiologic limitations and inadequacy of commonly used thyroid preparations.