Action

Thyroid hormones diffuse through cell membranes and bind to thyroid hormone receptors (TRs) in target cell nuclei. TRs are present in most tissues and exist in two forms, TRα and TRβ. TRα predominates in brain, kidney, gonads, muscle, and heart tissue while TRβ is present mainly in the pituitary and liver. Both TRs can be spliced into different isoforms. The TRβ2 isoform, in particular, is expressed in the hypothalamus and pituitary and is involved in the negative feedback mechanism of the gland.

Thyroid hormone binds to TRs and induces a conformational change in the receptor, allowing TRs to bind to unique DNA sequences, called thyroid response elements (TREs), present in the promotor regions of target genes; TRs may either incite or inhibit gene transcription. T3 binds TRs with greater affinity than T4, accounting for its relative potency. Hormone deficiency causes significant disruption of gene expression because TRs interact with co-repressors, permitting the receptor to suppress transcription when thyroid hormone is not bound.

References: