?Why Am I Mad

Aziza Agneaber, 2nd year medicine
Faculty of Basic Medical Science
Libyan International Medical University

INTRODUCTION

The thyroid gland is butterfly shape consists of two lobes connected in the middle by the Isthmus located anterior to the larynx.(1) It secretes three main hormones which are :

- Thyroxine (T4).
- Triiodothryonine (T3).
- Calcitonin.

These hormones are controlled by Hypothalamus and Anterior pituitary gland.(1)

There are problems that can affect the thyroid such as hyperthyroidism which is a hypermetabolic state caused by elevated circulating level of free T3 and T4.(1)

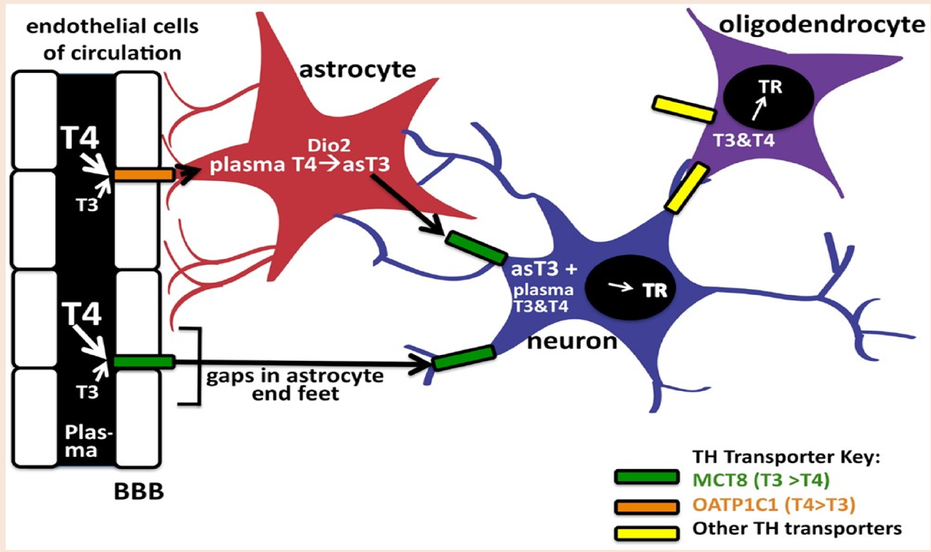


Figure1: transportation of thyroid hormones in the blood to the brain. (2)

TRANSPORTATION

1. The Hypothalamus secretes thyroid releasing hormone (TRH) which in turn stimulates the anterior pituitary gland to release thyroid stimulating hormone (TSH).(2)(3)

2. Stimulate the formation of thyroid hormone (TH) and secretion.(2)(3)

3. Free T3 and T4 bind to transporter proteins such as Thyroxin binding protein Such as Transthyretin (TTR), Thyroid hormone transmembrane (THTT).(2)(3)

4. They will enter the brain by two pathways either directly through the brain by blood brain barrier or indirectly via blood-CSF-barrier.(2)(3)

5. They will pass through the barrier at gates such as Organic anion transporting polypeptide(OATP1C1), and enter at the end feet of the astrocyte and tanycytes which contain deiodinase 2 that will covert T4 to active form T3.(2)(3)

6. The active form will pass through another transport Monocarboxylate transporter (MCT8), to the neuron and oligodendrocyte which contain TH receptors such as TRa1. (2)(3)

EFFECT ON BRAIN

Neurobiological researches have revealed the existence of metabolic, morphological and functional brain alterations associated with hyperthyroidism. Patients with hyperthyroidism had reduced glucose metabolism in the frontal, limbic and temporal lobes, and demonstrated a significantly decreased concentration of glutamate in the posterior cingulate cortex (PCC) in the hyperthyroidism group.(4)

Structural variations of some brain regions have been proven in studies to apply resting-state functional magnetic resonance imaging (rs-fMRI), and it showed bilateral hippocampal atrophy in some individuals with hyperthyroidism. (4)

analyzes showed a decrease in functional connectivity between seed-1 located in the posterior lobe of the cerebellum (PLC) and the right middle temporal gyrus (MTG) in the attention network. Meanwhile lower functional connectivity from both left PLC and right cerebellum to medial frontal gyrus (MeFG) was detected in the present study. The cerebellum has been considered to play a vital role in motor control. (4)

Studies regarding anxiety disorders have demonstrated that the cerebellum is involved in the regulation of anxiety. The cerebellum and default mode network(DMN) are both involved in causing anxiety symptoms in hyperthyroid patients. (4)

The underlying mechanism of the cerebellum dysfunction by the thyrotoxicosis is probably related to the expression of thyroid hormone receptor TRa1 and TRb1 in purkinje cells in the cerebellum. (4)

CONCLUSION

There few thyroid studies have been made when thyroid.1 .dysfunction is an important problem

theory on how hyperthyroidism work is that there's either. 2 a mutation in the thyroid receptor or an increase in .number

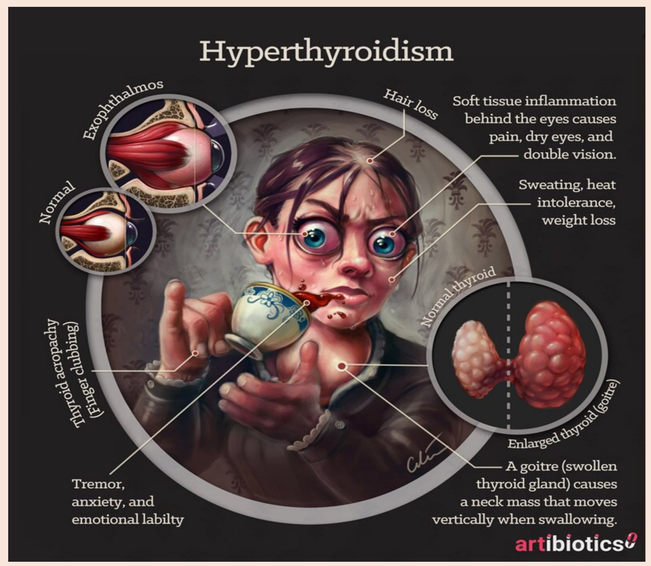
REFERENCES

Vina Kumar, MBBS, MD, FRCPath, Abul K. Abbas,.1 MBBS and Jon C. Aster, MD, PHD ,Robbins Basic .Pathology,10th Edition

Amy C. Schroeder and Martin L. Privalsky ,Thyroid .2 .hormones, T3 and T4, in the brain

Author: Juan Bernal Article title: Thyroid Hormones in. 3 .Brain Development and Function

Author Ling LiArticle title: Abnormal brain functional. 4 connectivity leads to impaired mood and cognition in .hyperthyroidism: a resting-state functional MRI study



Figure(2): Showing people with hyperthyroidism .(2)