Thyroid Australia

Pregnancy, Postpartum and Childhood

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Thyroid Conditions

Pregnancy, Postpartum and Childhood

Agenda

- Australian Statistics
- Thyroid Function and Dysfunction
- History of PPT and Autoimmunity
- Signs and Symptoms
- Pregnancy and Postpartum Concerns
- Childhood Conditions

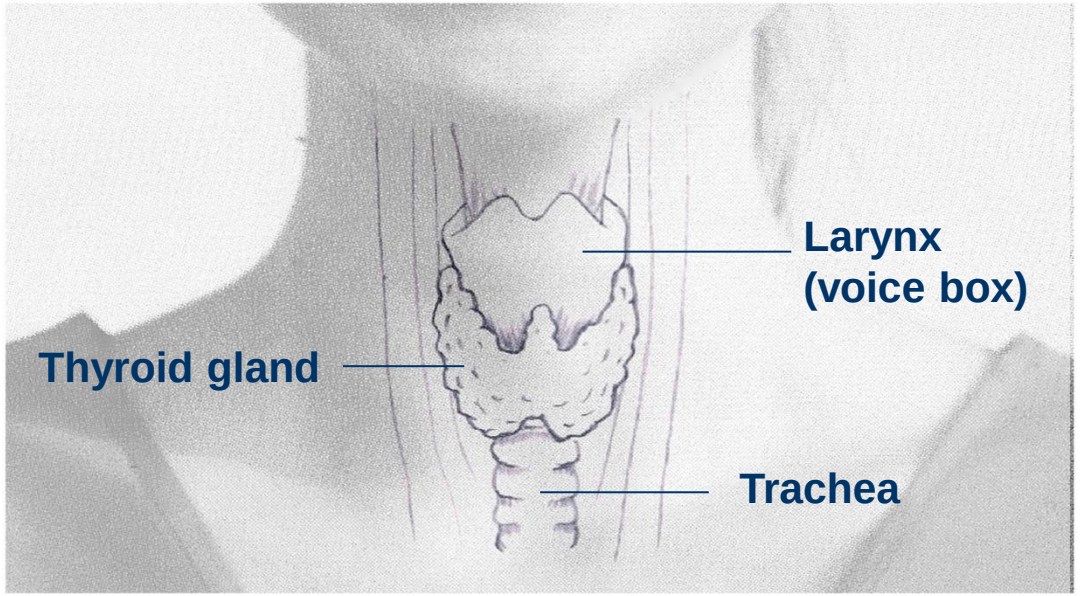
Statistics

In the general population:

- **50% of people have microscopic nodules**
- **3.5% have papillary thyroid cancer**
- **15% have enlarged thyroid glands – goitres**
- **10% have abnormal thyroid function tests**
- **6-8% have hypothyroidism**
- **2-3% have hyperthyroidism**
- **1 in 3,500 newborns are diagnosed with congenital thyroid disease**

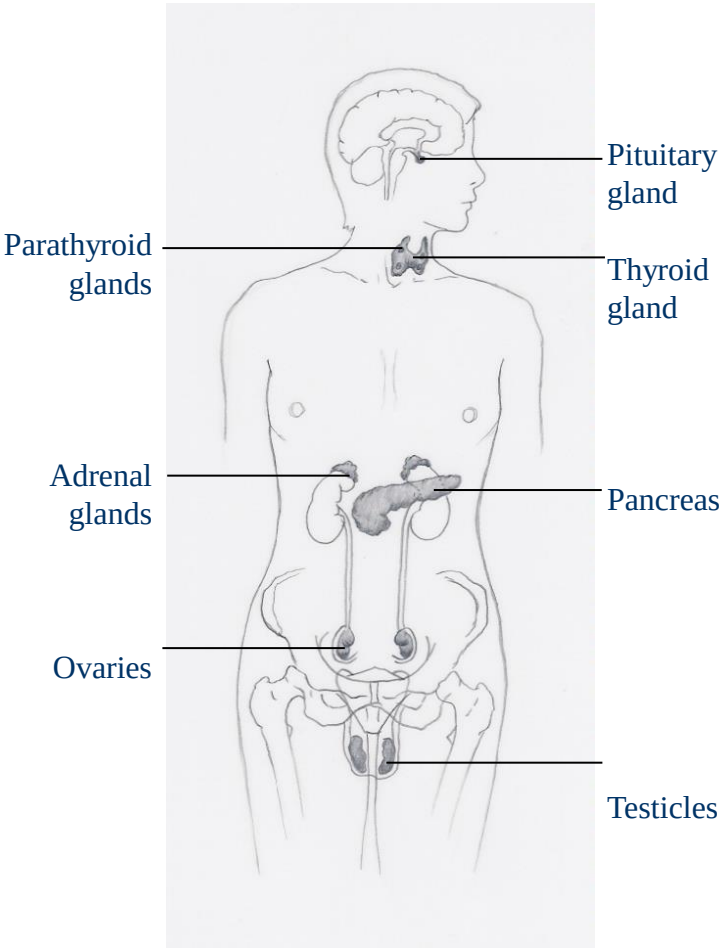
Thyroid Anatomy

The key regulator of metabolism in the body is the Thyroid gland.



The thyroid gland sits just under the Adam's apple at the front of the neck and wraps around the oesophagus

Endocrine System



Endocrine Glands

(ductless glands)

- Pituitary gland
- Thyroid gland
- Parathyroid glands
- Adrenal glands
- Pancreas
- Ovaries
- Testicles

Thyroid Hormones

- **Thyroid hormones are responsible for the speed and efficiency of our metabolism, affecting every cell, tissue and organ. Thyroid hormones are essential for life, growth, and development.**

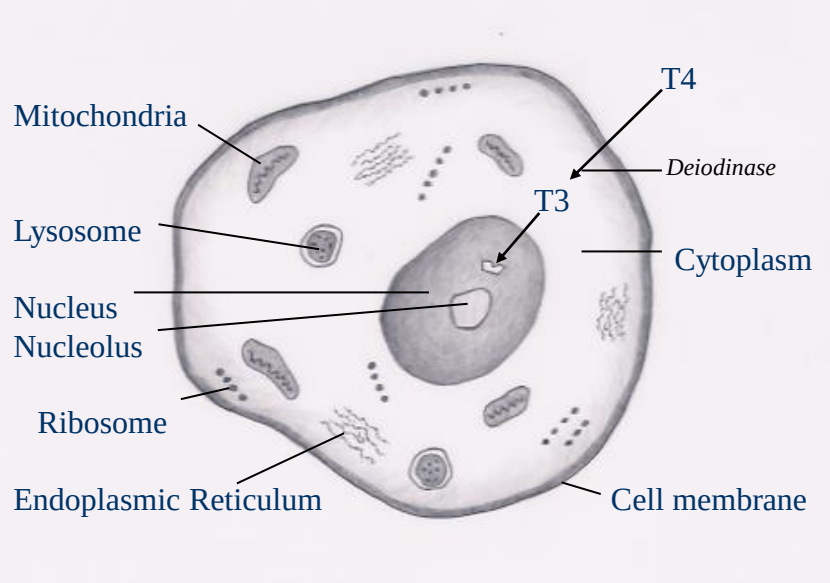
- **The two most important thyroid hormones are:**

Thyroxine (T4) – four iodine atoms: is made in greater quantities than T3, but is less active. It accounts for approx. 80-95% of hormone produced.

Triiodothyronine (T3) – three iodine atoms: is made in smaller quantities, but is far more active than T4. It accounts for approx. 5-20% of hormone produced.

Thyroid Hormones

- T4 enters the cells and has some effect, but most is converted to T3 within the target cells
- T3 is the primary active hormone stimulating cellular response



- T4 & T3 bind to receptors in cell nucleus and trigger metabolic processes, nerve development and growth
- About 80% of circulating T3 is produced outside the thyroid gland by peripheral conversion of T4 into T3. ~ 20% is directly secreted by the thyroid gland itself

Thyroid Conditions

- **Euthyroid** means ‘normal thyroid function’

- **Hypothyroidism** results when the body has too little thyroid hormone in circulation or available to the cells.

- T4 and T3 levels fall, TSH increases.

- **Hyperthyroidism** results when the body has too much thyroid hormone in circulation.

- T4 and T3 levels rise, TSH decreases.

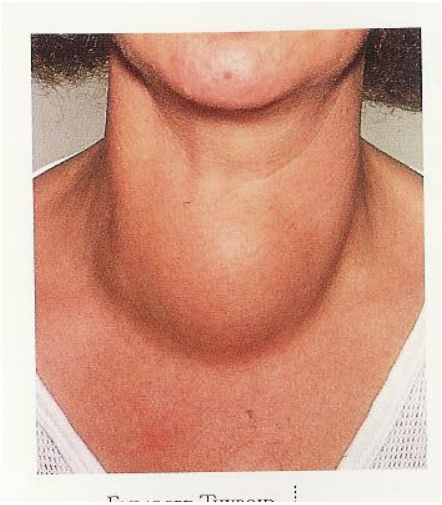
- **Affects many more women than men - 5:1**

Thyroid Dysfunction
Causes

- **Stress (internal or external)**
  - Hormonal and immune system changes
  - Viruses and other infections
  - Severe illness, emotional and physical trauma
  - Nutritional factors
  - Drug interactions / side effects/ chemicals

- **Iodine Deficiency (or excess)**
- **Autoimmunity (inherited predisposition)**

- Pituitary gland disorder
- Congenital hypothyroidism / hyperthyroidism
- Subacute viral thyroiditis
- Postpartum hypothyroidism / hyperthyroidism
- Thyroid nodules
- Poor Thyroid Hormone Utilization



Autoimmunity

In autoimmunity some part of the body is treated as foreign The immune system responds by producing antibodies and lymphocytes to attack foreign cells and substances.

- **Cause(s) of autoimmunity unknown**
  - Stress (events, illness or trauma), hormonal imbalances; viruses and other infections; toxins; chromosomal/gene abnormalities.
- **Travels in families - predisposition has genetic link**

  Hashimoto's Thyroiditis causes Hypothyroidism

  Graves' disease causes Hyperthyroidism
- **Conditions are for life!**

Pregnancy, Childbirth and Postpartum Thyroiditis (PPT)

- Thyroid Physiology
- History
- Who is at Risk?
- Disease paths
- Signs and Symptoms
- Complications
- Diagnosis and Treatment

Thyroid Physiology in Pregnancy

The essential factor guiding your physical and mental conditions during pregnancy is your metabolism

- The thyroid gland is kept especially busy in meeting the increased metabolic demands for both the mother and developing fetus. By the last few months of pregnancy a mother's metabolism will be running 15% above normal

- Pregnancy has multiple effects on maternal thyroid function. Many due to the placenta: an organ that can produce, degrade, and interconvert hormones in maternal circulation.

- The placenta also regulates the transfer of substances that are important for fetal thyroid development and function

- More oxygen and nutrients are metabolised, the heart beats faster (30-40% increased output), increasing blood flow to the thyroid and uterus

Thyroid Physiology in Pregnancy

Larger amounts of thyroid hormone is required for the growth and development of the fetus

- Adequate dietary iodine is vital: increased iodine uptake and clearance (kidneys)
- Serum Thyroxine Binding Globulin (TBG) increase 2.5 fold due to placental oestrogen secretion
- Oestrogen, chorionic gonadotropin and TSH stimulate the thyroid gland to enlarge (slightly) and work harder
- There is a slight thyroid hypersecretion during 1st trimester, and decrease during 3rd trimester

Total T4 and T3 levels increase greatly, however, free T4 and T3 concentrations remain normal or only slightly increase

Immune System Changes

Pregnancy suppresses immune function to prevent the formation of antibodies that harm the unborn baby.

- Changes in mother's immune system occur so that it doesn't reject the developing baby – "invader" who is 50% different from her.
- Immune system calms down, however mother is less resistant to common colds and viruses
- Previous autoimmune conditions and inflammatory conditions often improve during pregnancy as the immune system is less active
- New mother's immune system rebounds after childbirth. Pre-existing conditions can worsen and new conditions can be triggered

Developing Baby

From the moment of conception, a baby depends on mother for warmth, nourishment and a supply of hormones

- The thyroid hormones T4 and T3 work hand in hand with growth hormone for the baby's general development, including important organs as the lungs, heart and liver

- The most profound effects of thyroid hormone are seen in the two following areas:

  - the brain and nervous system, particularly the cerebral cortex (thinking) and the cerebellum (muscle coordination)

  - the skeletal system (influencing height, facial features and shape)

Developing Baby

- Embryo firstly absorbs nutrients and hormones directly from bloodstream. As the fetus develops: uterus grows and placenta evolves which will supply the baby with all it needs

- Fetal thyroid tissue starts as a lump near the back of the tongue at around 3 weeks. It continues to grow and then migrates downward under the jaw and relocates in the prearranged position in the front of the neck. It divide into two lobes, either side of the voice box

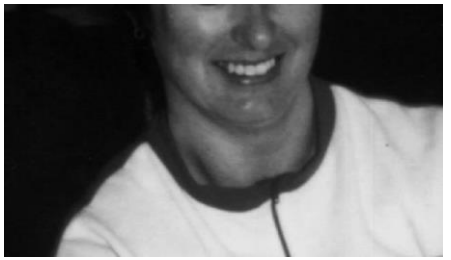
- At 6 weeks the developing thyroid gland learns to trap iodine and begins making thyroid hormones

- For the first 9 -12 weeks the fetus relies on maternal thyroid hormones for its growth. From 12 weeks onwards the baby produces its own supply and only relies on mother for around 20%

Goitre

Goitre has been associated with pregnancy since antiquity.

However, palpable thyroid enlargement does not occur unless there is co-existent iodine deficiency



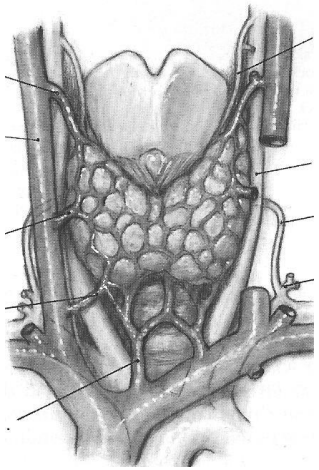
- In countries sufficient in iodine, thyroid volume only increases by 10% between 1st and 3rd trimester
- In countries with mild iodine deficiency, thyroid volume increases by 30%

- Palpable thyroid enlargement in a pregnant woman is abnormal if iodine intake is adequate. If goitre is detected, then a TFT and thyroid antibody test should be performed

Goitre – Iodine or autoimmunity?

Goitre/Nodules

- Needle biopsy and ultrasonography are fine during pregnancy to investigate any nodules
- Thyroid imaging studies with radionuclides should not be performed
- Surgery, if required, is best performed during 2nd trimester to reduce miscarriage risk
- Majority of nodules are harmless.
  (Malignant nodules are usually papillary cancer)



- Propylthiouracil (PTU) is a safer option during pregnancy and breastfeeding. Smallest dose possible to maintain normal thyroid levels
- Thyroid hormone replacement is vital if hypothyroidism detected. This is not harmful to baby, but beneficial

What is PPT?

Postpartum Thyroiditis (PPT) is an inflammation of the thyroid gland that occurs in as many as 1 in 10 women after giving birth

- The condition results in either transient or permanent hyperthyroidism or hypothyroidism and is often associated with depression (PND)
- Onset is typically within the first 12 months after giving birth
- The cause is usually autoimmune disease resulting in inflammation and changes in thyroid hormone levels

History

Postpartum Thyroiditis (PPT) & Auto-Immune Thyroid Disease (AITD)

- 1825 - Dr C H Barry - earliest written description of hyperthyroidism after childbirth
- 1835 - Dr Robert Graves described Graves' disease

- 1888 - Dr H B Donkin - earliest written description of hypothyroidism after childbirth
- 1912 - Dr Hakaru Hashimoto described the pathology of Hashimoto's thyroiditis

- 1948 - Dr H E W Robertson recognised that postpartum conditions predisposed women to thyroid disease
- PPTD described in small groups of women in 1970s, and in larger groups in 1980s & 1990s

Why Autoimmune?

Physiological Changes trigger autoimmunity

Key times of hormonal shift i.e. puberty, pregnancy and childbirth, and menopause

- Abnormalities found on particular X-chromosomes predispose to autoimmune conditions (Females = XX). Conditions, including thyroid cancer, appear to have a genetic link
- Female hormones are intimately involved with thyroid hormones - oestrogen may be a contributing factor
- Fetal male tissue/cells have been found contained within the thyroid gland of women with autoimmune thyroid conditions
- Viral, bacterial and fungal infections often pre-date development of autoimmunity

Who is at Risk?

- Personal history of goitre (enlarged thyroid)
- Personal history of Postnatal Depression (PND) or PPTD after previous pregnancies
- Women who have had more than two miscarriages (Dr Robert Smallridge)
- Family history of thyroid disease or other autoimmune diseases

Hashimoto's Thyroiditis or Graves' Disease, Thyroid Eye Disease (TED), Pernicious Anaemia, Type I Diabetes, Rheumatoid Arthritis, Addison's Disease, Coeliac Disease, Crohn's Disease, Lupus, Myasthaenia Gravis, Sjögren's Syndrome, Scleroderma, Primary Billary Cirrhosis, and Multiple Sclerosis

High Risk

Women who have a genetic predisposition to developing an autoimmune thyroid disease (AITD)

Hashimoto's Thyroiditis or Graves' Disease

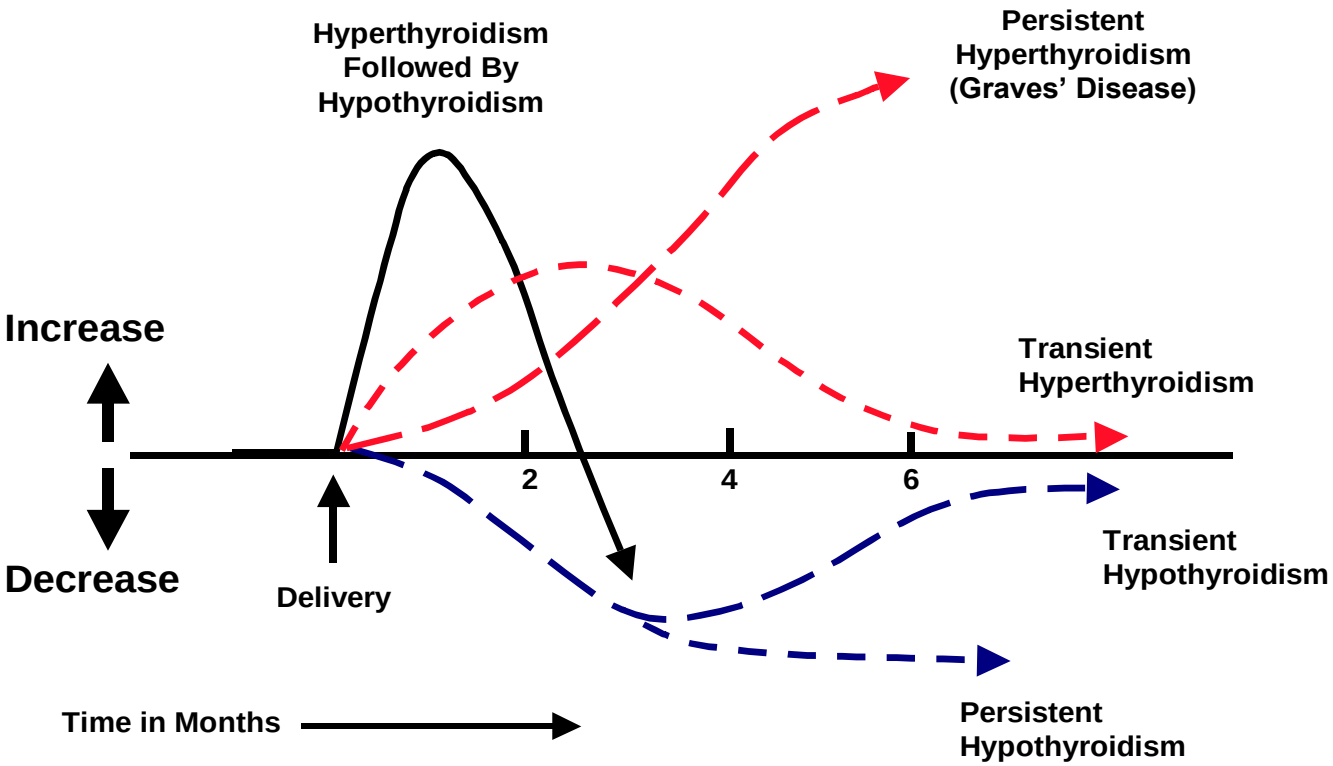
- Anti-thyroid peroxidase (Anti TPO Ab), also known as antimicrosomal antibodies
- Anti-thyroglobulin (Anti Tg Ab)
- Thyroid Stimulating Antibodies (TSA Ab)

- Changes in new mother's immune system during and after pregnancy cause levels of antibodies to rise

- **Antibodies present in ~ 5-20% of young women**
- **About half to two- thirds of these women will develop PPT**

Postpartum

Paths disease can take



Disease Paths

Several pathways for PPT:

- **Transient hyperthyroidism - 2 to 6 months duration, then full recovery**
- **Transient hypothyroidism - 3 to 12 months after delivery, followed by return to normal thyroid function**

- **Permanent/persistent (life long) hyperthyroidism or hypothyroidism**

- **Hyperthyroid phase followed by a hypothyroid phase = classic PPT**

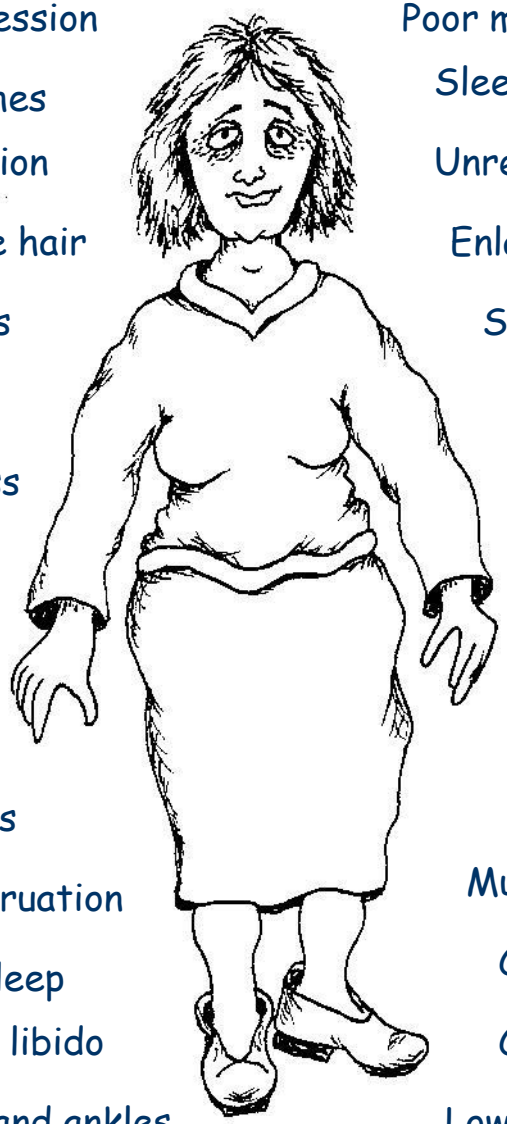
Disease Paths

What happens afterwards?

"The presence of antithyroid peroxidase antibodies (anti-TPO Ab), which is found in 10% of women at 16 weeks' gestation, is an indicator that 50% of such women will develop postpartum thyroid dysfunction. Most of these women will have symptomatic hypothyroidism, and in a significant percentage (20-30%) permanent hypothyroidism will follow during the first postpartum year. We have reported that close to 50% of women who develop transient postpartum hypothyroidism will develop permanent hypothyroidism during the next 7 years.[1]"

1. John H Lazarus et al, "Postnatal care and women's health", *The Lancet*, Vol. 35, 1 May 1999, p.1532.

Symptoms of Hypothyroidism



Depression
Headaches
Pale complexion
Dry skin and coarse hair
Hair loss
Husky voice
Breast tenderness
Slow pulse
Poor appetite
Brittle nails
Joint pain and stiffness
Irregular and heavy menstruation
Excessive sleep
Poor libido
Swollen feet and ankles

Poor memory
Sleep apnea
Unrelenting fatigue
Enlarged thyroid gland
Sore throat
Irregular heart beat
Breathlessness
Nausea
Weight gain
Cold intolerance
Increased cholesterol
Muscle cramps and weakness
Carpal tunnel syndrome
Constipation
Low blood pressure

Illustrative idea from
'Graves' Disease', E. A. Moore, 2001, pg 212

Hypothyroidism

Associated complications or conditions:

- Headaches and migraines
- Digestive disorders
- Congestive heart failure
- Severe depressive illness
- Blood sugar disorders
- Fluid retention and weight problems
- Infertility and pregnancy complications
- Other autoimmune disorders
- Polycystic Ovarian Syndrome (PCOS)
- Galactorrhoea (excessive flow of milk)
- Anemia
- CFS or FMS
- Myxoedema coma

Before Treatment After Treatment

Symptoms of Hyperthyroidism

Depression

Insomnia

Sore throat

Fatigue and exhaustion

Chest pain and breathlessness

Increased perspiration

Heat intolerance

Joint pain and stiffness

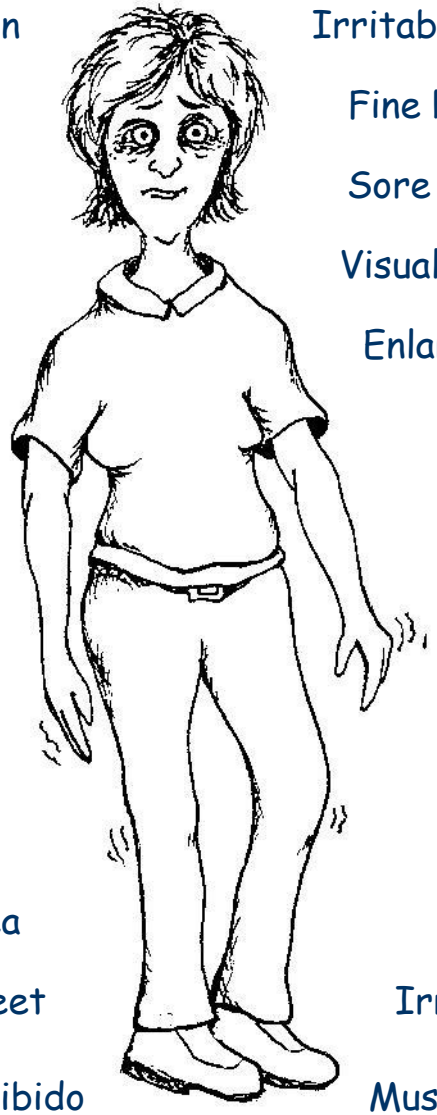
Sweaty hands

Shakiness

Diarrhea

Swollen hands and feet

Increased or decreased libido



Irritability

Fine brittle hair

Sore eyes

Visual disturbances

Enlarged thyroid gland

Nervousness

Increased appetite

High blood pressure

Palpitations

Weight loss

Infertility

Irregular and light menstruation

Muscle cramps and weakness

Illustrative idea from
'Graves' Disease', E. A. Moore, 2001, pg 212

Hyperthyroidism

Associated complications or conditions:

- Hypertension
- Headaches and migraines
- Congestive heart failure
- Digestive disorders
- CFS or FMS
- Severe depressive illness
- Other autoimmune disorders
- Infertility and pregnancy complications
- Increased bone loss
- Thyroid Eye Disease
- Swelling of legs (Pretibial myxoedema)
- Thyroid Storm

Before Graves' Graves' disease

Pregnancy and Postpartum Complications

Awareness

Why is correct diagnosis and treatment so important?

The creation of the next healthy generation depends on healthy thyroid hormone levels in today's adults, especially females!

Fertility & Pregnancy

Thyroid hormone abnormalities cause disturbances in general hormonal balance

- Changes in oestrogen, progesterone, testosterone balance
- Changes in libido - abnormal blood flow affecting tissue sensitivity
- Alterations in monthly cycle – ovulation and menstruation making conception difficult
- Abnormal fluctuations in sex hormones hinder fertility, and/or cause difficulties sustaining a pregnancy
- Increased risk of miscarriage, stillbirths, premature births is 4 fold

Complications

Concerns for Hypothyroid mother:

- Extreme exhaustion during 1st trimester
- More prone to anaemia (low iron) and excessive blood loss
- Childbirth more difficult in hypothyroid mothers due to being exhausted and weak both mentally and physically
- Slower to heal and recover
- Increased susceptibility to preeclampsia (gestational hypertension), gestational diabetes, placental abruption and other complications during pregnancy and childbirth
- Breast feeding concerns: mastitis
- Higher risk of developing Postnatal depression or PPT
  - Mood and behavioural changes more extreme if due to autoimmunity
  - Bipolar disorder is not uncommon
- Re-emergence of PPT and worsening of condition

Complications

Concerns for Hyperthyroid mother:

- Thyrotoxicosis, due to Graves' disease, tends to worsen in 1st trimester and resolves for remainder of pregnancy. Hyperthyroid symptoms will be exaggerated initially
- Morning sickness more extreme
- Inadequate weight gain or weight loss for gestational age is a concern
- Muscle weakness, racing heart and hypertension can be further exaggerated during childbirth
- Women with thyrotoxicosis (untreated) risk hypertension (preeclampsia) and thyroid storm during childbirth – life threatening
- Postnatal Depression or Postpartum Thyrotoxicosis? - Bipolar
- Re-emergence of thyrotoxicosis is common postpartum

Breastfeeding

Breast feeding complications:

- Galactorrhoea – excessive flow of breast milk due to increased prolactin levels. Usually associated with hypothyroidism
- Early cessation of breast milk production found in more severe hypo and hyper conditions
- Mastitis – inflammation of breast tissue, often associated with excessive milk flow, dry cracked nipples, leading to infection

Related Conditions

Concerns for mother:

- Morning sickness more extreme in hyperthyroidism
- Fibroids - increased risk of developing breast and ovarian fibroids/cysts

  - Iodine treatment is beneficial in these cases for the breasts and ovaries also use iodine
- Breast cancer – 46% of patients have thyroid abnormalities

  - Suspicious? However, breast cancer and thyroid conditions are common
- Ovarian cancer connection being investigated
- Polycystic Ovarian Syndrome (PCOS)
- Insulin Resistance – Metabolic Syndrome – Type 2 Diabetes

  - Both associated with poor glucose controls, excess weight and hormonal imbalance
- Recurrent infections including candida, particularly in hypothyroidism

Newborns

Concerns for baby:

- A baby relies on maternal thyroid hormones for normal growth and development, particularly important in first trimester
- Severe thyroid hormone imbalance results in abnormal fetal development, esp. brain - nervous system and skeletal development

Increased risk of neonatal abnormalities:

- Poorly treated hypothyroidism results in a higher incidence of mental and developmental abnormalities, as well as, heart, lungs, and kidney problems, hearing and speech impediments, cleft palate, and lower IQ levels (up to 15 point drop)

- Poorly treated thyrotoxicosis can result in low birth weight, fetal distress in labor, neonatal heart failure and respiratory distress

Treatment before, during and after pregnancy

Pre-pregnancy

Both hypothyroidism and hyperthyroidism need to be treated prior to conception for best possible outcomes

- **Thyroid hormone levels should be stabilized and maintained before and during pregnancy**

- Radioactive iodine therapy should be followed by at least a 4 to 5 month gap before conception – less risk to unborn child.

- **Fertility clinics** – Thyroid Function Tests should be one of the first tests given due to fertility/thyroid link
  - Thyroid abnormalities should be ruled out and treated
  - Thyroid function must be stabilized
- **TSH alone is not adequate. Antithyroid antibodies test is important**

Pregnancy Treatment

Hyperthyroidism/Graves' Disease/Nodules/Cancer

- **Antithyroid medications:** Carbimazole and PTU
  PTU is the safer option. Only small amounts cross the placenta. Minimum dose given to stabilize thyroid overactivity

- **Radioactive Iodine:** Dangerous to unborn child
  Avoid during breastfeeding

- **Surgery:** Safest during 2nd trimester – removal of part or all of gland depending on condition

- **Beta-blocker:** (propranolol) is considered safe during pregnancy
- **Cortisol:** (hydrocortisone, prednisolone) safe in low dose

Pregnancy Treatment

Hypothyroidism/Hashimoto's Thyroiditis/Nodules

- **Iodine:** (if required) - Urinary iodine test
  200 to 250 mcg per/day during pregnancy and breastfeeding

- **Thyroid hormone replacement therapy:**
  Thyroxine (T4); Tertroxin (T3); Combination therapy
  (synthetic -T4 &T3)

- **Alternative:** natural option – "Armour" ("Thyroid Extract")
  - contains both T4 and T3, varying consistencies
  - more difficult to control T4 and T3 levels (high T3 component)
  - blood levels more difficult to interpret

Treatment Approach

Thyroid hormone replacement:

- **Adults:** General rule of thumb: 2µg of T4 per 1kg of body weight, subject to:
  - **Age -** older needs less, younger need more per/kg
  - **Heart conditions -** too much can over stimulate
  - **Gender -** men need more than women
- **Pregnant** women need more (30-40% increase)
- **Newborns** need around 12.5 mcg per/kg

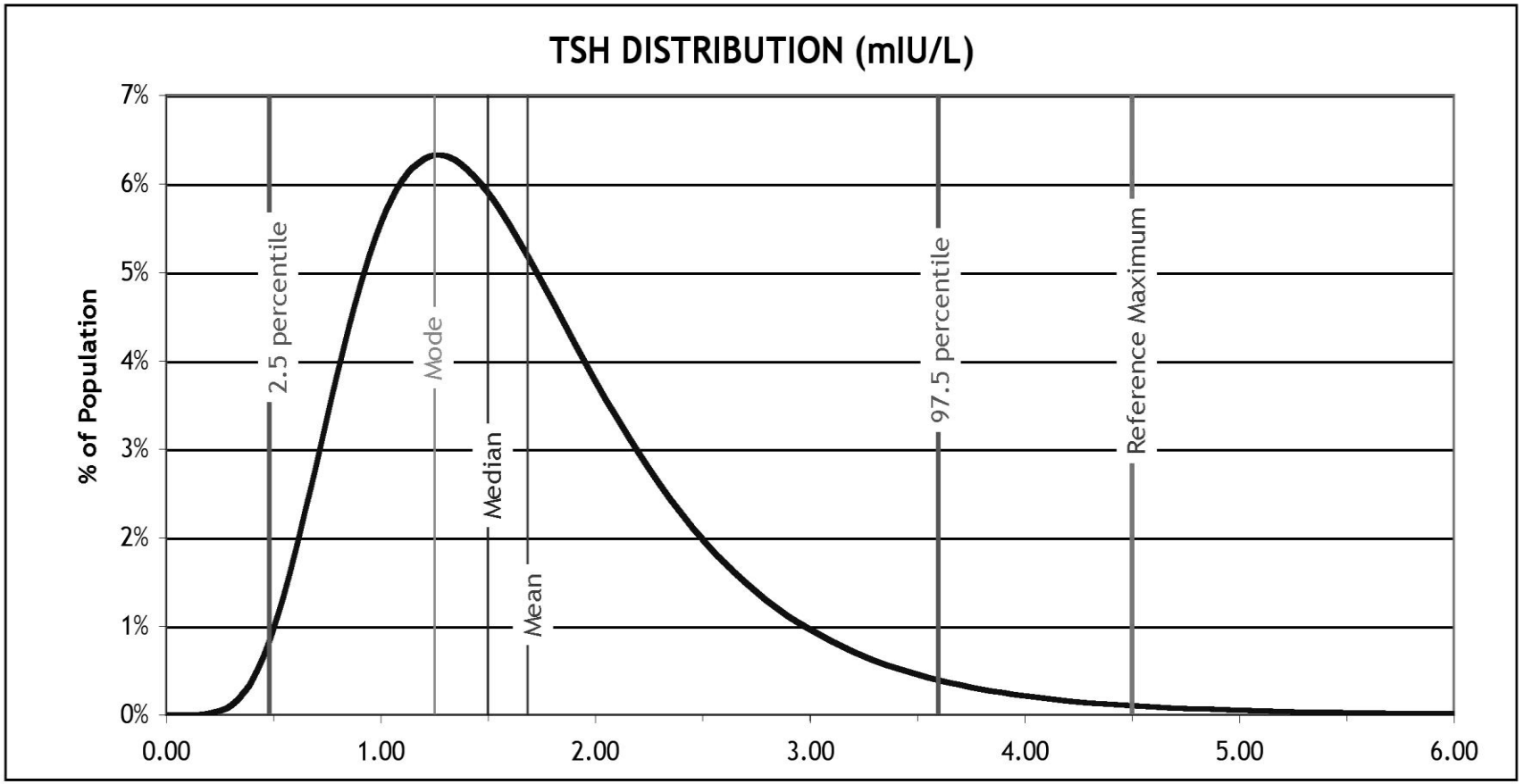
AIM: To return thyroid hormone levels to normal and render the patient as symptom free as possible

- **Not good enough to just be in normal range**

  Sir Richard Bayliss recommends T4 to top of range and TSH to bottom of range

Thyroid Function Tests
TSH Distribution Chart

Norwegian Study, 2000



Reference Range 0.2 to 4.5 mIU/L

65,000 people

Most common value was 1.25, 50% population under 1.5, 85% population under 2.35

Thyroid Function Tests

TFT	Reference Range
TSH	0.30 - 5.00 mIU/L
T4	11 - 23 pmol/L
T3	3.5 - 6.7 pmol/L

NACB guidelines 2002: TSH 0.5 – 2.5 mIU/L
(National Academy of Clinical Biochemists)

Keep photocopies of all tests and record how you feel!

Thyroid Disorders in Children

- Iodine deficiency
- Neonatal and Congenital Hypothyroidism
- Acquired Hypothyroidism
- Neonatal Hyperthyroidism/Thyrotoxicosis
- Acquired Hyperthyroidism
- Related Conditions

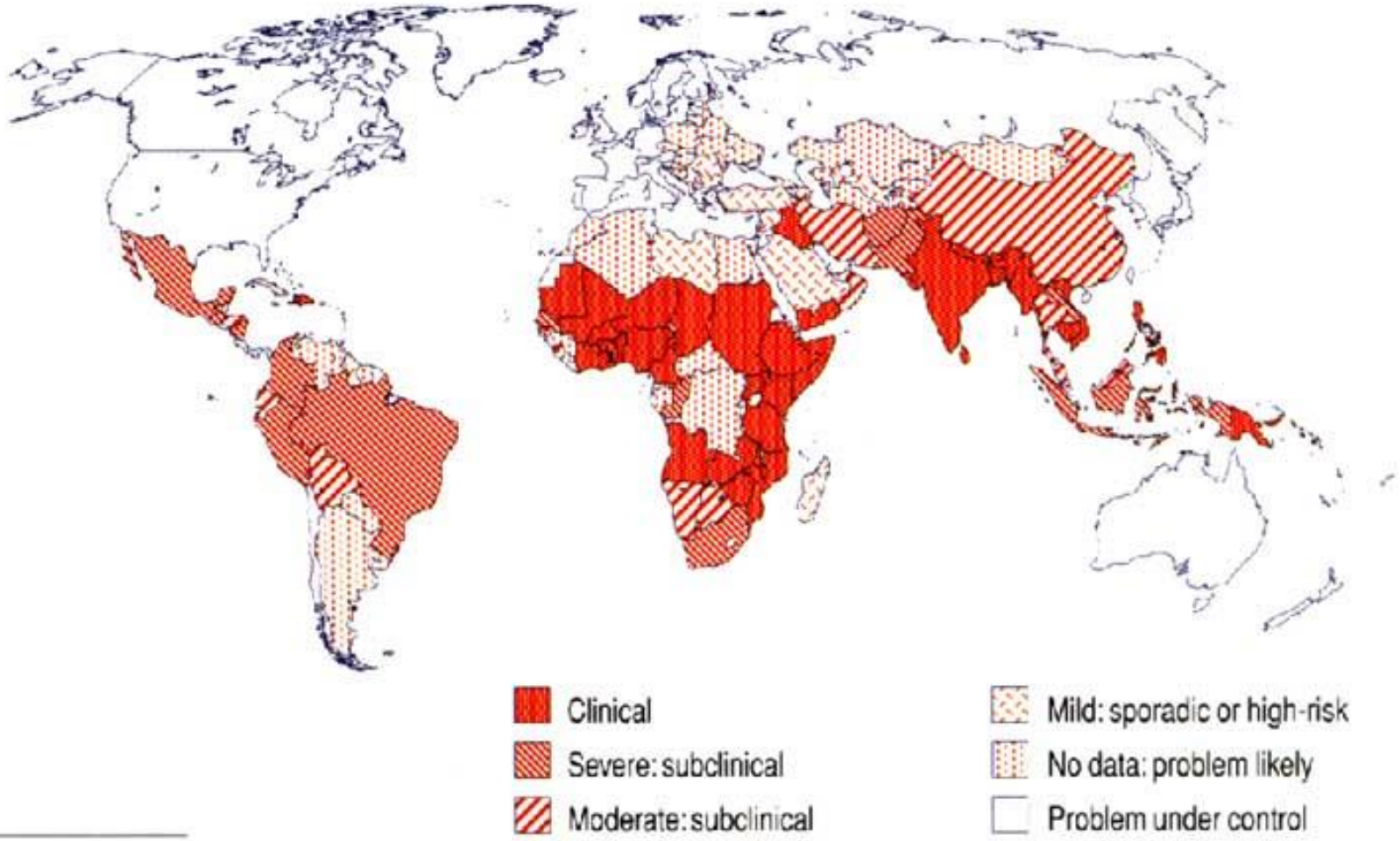
Iodine Deficiency

Iodine deficiency is now considered the most common world-wide cause of preventable intellectual impairment in children (WHO), affecting 13% of the world's population

- **The essential ingredient of thyroid hormones is iodine**
  - Soils in some areas are deficient in iodine
  - Underdeveloped nations; many parts of SE Asia, Africa, China and mountainous areas

- **Major problem for newborns and young children**
  - Thyroid hormone production is suppressed producing hypothyroid symptoms and goitres
  - **Cretinism results from severe congenital hypothyroidism**

Iodine Deficiency



Data from the World Health Organization.

Iodine Deficiency

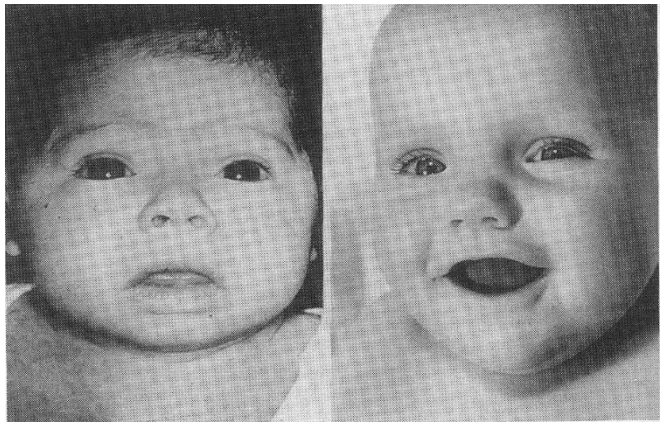
Iodine deficiency (or excess)

- Re-emergence of iodine deficiency. ~50% of pregnant women and school children in NSW, Vic and Tasmania are mildly to moderately deficient in iodine (2002).
- Iodized salt, and foods containing iodine, is safest way to maintain daily requirements
- Only 17% of Australians buy iodized salt
  - Very little needed - 150mcg per day (0.05g per year) 1 teaspoon over lifetime!
  - 200-250 mcg during pregnancy and breastfeeding
  - Australian government and food industry negotiating to fortify bread and other products with iodine
- Excess iodine can trigger thyroid disease and can aggravate autoimmunity; kelp supplements not recommended

Neonatal and Congenital Hypothyroidism

- Neonatal refers to:
  the first 28 days of life

- Congenital means:
  “present at birth”



- Hypothyroidism affects around 1 in 3,500 infants at birth. All metabolic processes ‘slow down’
- Twice as common in girls as in boys

- Main Cause: Loss of thyroid function due to failure of the thyroid gland to develop correctly - absent, agenesis, ectopic
- Other causes: iodine deficiency or excess, receptor defects (resistance), and enzyme or pituitary defects - 10% of cases

Diagnosis

Routine screening has been mandatory since 1976

- Heel prick blood sample assesses thyroid hormone levels (TSH / T4)
  - This is repeated to confirm diagnosis

- Treatment is begun immediately to avoid detrimental effects on brain development and physical growth
- Infants are given thyroxine (Oroxine) and managed by a paediatric endocrinologist.

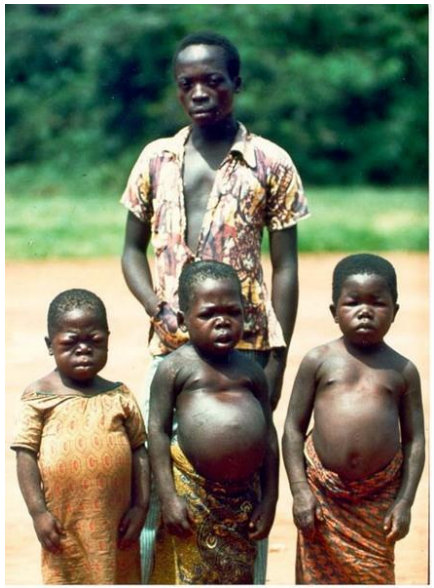
- Regular monitoring of blood levels, growth parameters, and bone age, along with clinical symptoms to ensure adequate thyroid hormone replacement

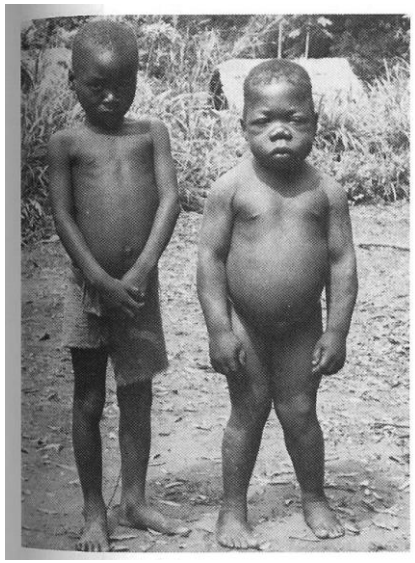
Cretinism

- If left untreated, hypothyroidism results in abnormal growth and development, and can lead to permanent brain damage

CRETINISM - is the result of severe congenital hypothyroidism

Characteristics: form of dwarfism; severely mentally impaired, swollen features, deaf and mute





Myxedematous endemic cretinism
Two girls aged 6 years and 17 years

Two 19 year old girls

Transient Hypothyroidism

Temporary hypothyroidism that corrects itself with time

- Difficult to assess whether transient or permanent
- Main cause: excessive intake of dietary iodine, or iodine antiseptics, sometimes antibodies
- Treated the same as permanent hypothyroidism, due to importance of normal growth and development
- Thyroid hormone replacement is discontinued between the ages of 3 to 5 to see whether normal thyroid function returns. Only 1–2% of newborns diagnosed with hypothyroidism at birth are transient.
- The majority of children are found to have permanent hypothyroidism

Acquired Hypothyroidism

Acquired hypothyroidism develops with time

- usually hereditary

Main cause: autoantibodies

- Hashimoto's - autoimmune thyroiditis

- Hypothyroidism can occur at any age
- Unlike congenital hypothyroidism, this is not screened for, and can be easily missed
- Diagnosis usually occurs once a child is symptomatic
- Confirmed through clinical analysis, TFT, antibodies test, and bone age test

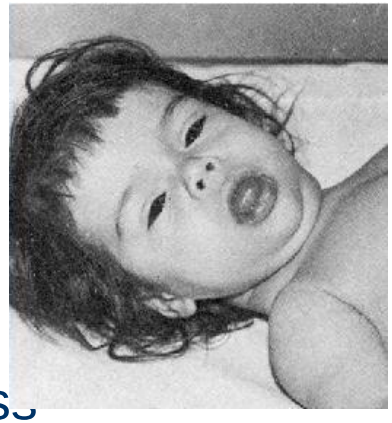
Acquired Hypothyroidism

Hypothyroidism can be insidious and the diagnosis can be easily delayed. A child may have the condition for months and even years before it is discovered

- Growth and development will slow down, as well as brain function
- Bone age testing can help determine the onset of the disorder - hand bones to check for bone maturation and calcium
- Treatment with thyroid hormone replacement will resolve most symptoms - catch up growth
- Careful observation of parents, and health providers will help determine the outcome for children with acquired hypothyroidism

Signs and symptoms Hypothyroidism

- Poor feeding
- Constipation
- Weight gain and swellling
- Puffy face
- Increased sleepiness and lethargy
- Prolonged jaundice
- Cold dry skin (mottled and /or eczema)
- Low body temperature
- Puffy face
- Breathing difficulties



- Slow, weak pulse
- Hoarse crying
- Poor muscle tone
- Slow tendon reflexes
- Enlarged tongue
- Unresponsive
- Thick coarse hair (low on forehead)
- Herniated belly button
- Goitre (swollen thyroid gland)
- Poor growth and development

Hypothyroidism causes all metabolic processes to "slow down"

Neonatal Hyperthyroidism

Transient neonatal thyrotoxicosis affects around 3 in 100,000 infants at birth. All metabolic processes 'speed up'

- Hyperthyroidism occurs in 1 out of every 70 babies born to hyperthyroid mothers - Graves' disease
- Main cause: thyroid stimulating antibodies from mother with Graves' disease, cross the placenta and enter the infants bloodstream
- Hyperthyroidism is transient as the antibodies only remain in the bloodstream for around 3-4 months
- In the majority of newborns the hyperthyroidism is mild and doesn't require treatment

Severe Neonatal Thyrotoxicosis

In severe cases, TSA's are very high, and 1 in 4 of affected babies die

- Immediate treatment is required involving antithyroid medication
- Condition may be masked temporarily if mother is on antithyroid medication

Carbimazole is not recommended during pregnancy or while breast feeding

Propylthiouracil (PTU) is the preferred drug, but at lowest maintenance dose

RAI or surgery is generally not necessary for the baby. Only exception is when thyroid cancer poses a greater risk.

Acquired Hyperthyroidism

Main cause: autoimmunity - Graves' disease

- Less common than hypothyroidism
- Can develop at any age, but more common around puberty or key times of hormonal change
- Diagnosed through assessment of clinical symptoms, TFT results and antibody test
- Treatment is with antithyroid medications, RAI or surgery, depending upon the severity of the condition

Signs and symptoms of Hyperthyroidism

- Extremely fast pulse - above the normal range of 160 -180 b/pm.
- Tachypnoea – fast breathing rate
- Diarrhoea
- Ravenous appetite but failure to thrive
- Irritability and restlessness
- Flushed moist skin
- Fever and sweating
- Low birth weight

- Premature births
- Long, thin body shape
- Malformed cranial bones (occasionally)
- Heart complications
- Rapid fingernail growth
- Prominent eyes - rare
- Goitre (swollen neck) - rare
- Growth and mental retardation - bone development is sometimes affected

Hyperthyroidism causes all metabolic processes to "speed up"

Related Conditions

- A thyroid nodule is rare in a child, but is more likely to be malignant
- Ear abnormalities and deafness - mainly associated with hypothyroidism. Thyroid hormone levels affect maturation of inner ear structures associated with hearing
- Stillbirths and respiratory distress disorders - prevalence studies directly correlate with iodine levels from country to country. Colder climates are also a contributing factor
- 7% of babies/children with diabetes later develop thyroid conditions
- Down's Syndrome - hypothyroidism in around 50%
- Turner's Syndrome - chromosomal defect resulting in dwarfism and abnormal sexual development
- Higher risk of developing other autoimmune conditions later in life

Tests

TFT - correct interpretation of blood results, along with clinical assessment is vital. Results may appear normal, borderline or change with time

- Thyroid antibody test
- Bone age test

- Hearing test (8-9 months of age)
- Urinary iodine
- Other - eg: organ function tests

Clinical Analysis

- Investigation into family history
- Clinical assessment of signs and symptoms
- Anyone, at any age can develop a thyroid condition
- Observant parents and health care providers play an important role in determining the outcome for children with thyroid conditions
- If diagnosed and treated early and appropriately, infants will grow and develop normally and live a long healthy life

Conclusion

Healthy thyroid function is vital for the health and wellbeing of every generation

- **Diagnosis should involve:**
  - laboratory tests (including thyroid antibodies)
  - family history
  - clinical presentation

- **Treatment should involve;**
  - an integrative approach (conventional/complementary medicines)
  - regular and thorough blood testing
  - careful monitoring of signs and symptoms

- **Thyroid conditions are treatable and have a good prognosis**

Enjoy taking your life back!