Thyroid Dysfunction & Related Conditions

Thyroid Seminar

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2004

Agenda

- Australian Statistics
- Thyroid and Metabolism
- Thyroid Dysfunction
- Signs and Symptoms
- Health Concerns
- Holistic Approach

Statistics

- **It is estimated that around 1 in 14 Australians suffer with a thyroid condition** – conservative estimate

- **Most common thyroid condition is hypothyroidism:**

- About 8% of women have this condition, with close to 20% being afflicted after the age of 60.

- Approximately, 1.5% of men suffer with hypothyroidism.

- **Second most common thyroid condition is hyperthyroidism:**

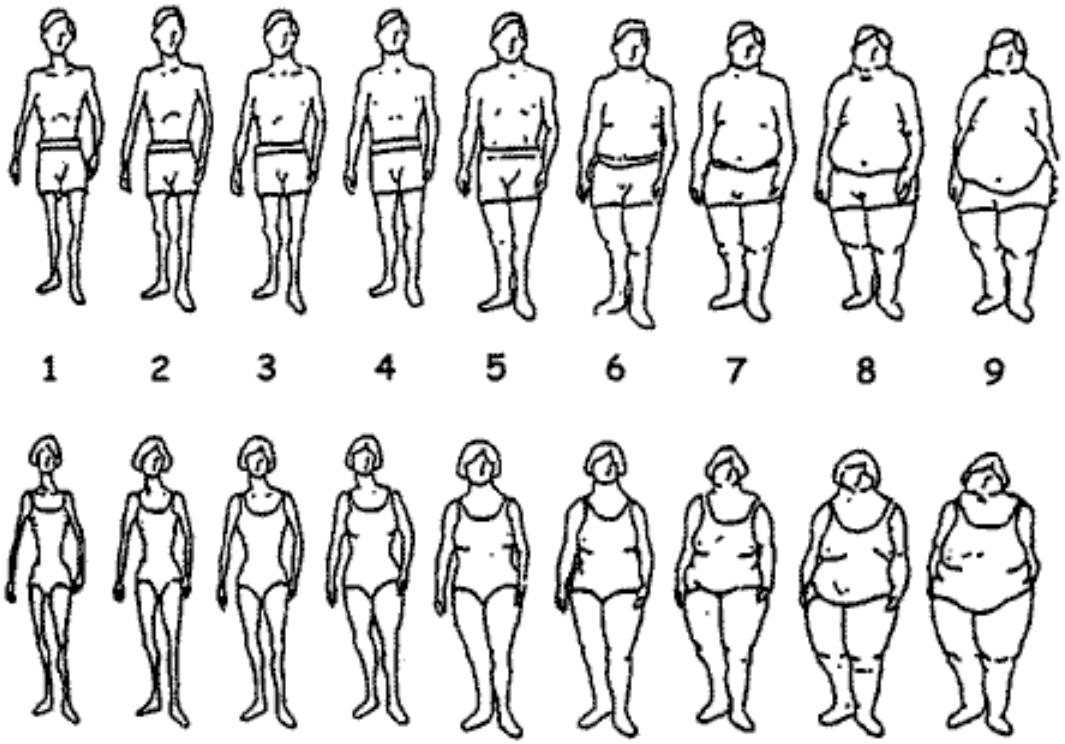
- Approximately 2% of women and 0.25% of men suffer with this condition.

- Other thyroid conditions, which are less common, include thyroid cancer, thyroid nodules and congenital thyroid disease.

Assumptions

- Thyroid conditions are easy to diagnose and easy to treat
- Iodine will cure all thyroid problems
- Thyroid conditions are not that serious
- A tablet a day will keep a thyroid condition at bay
- Weight problems have nothing to do with thyroid conditions

Metabolism



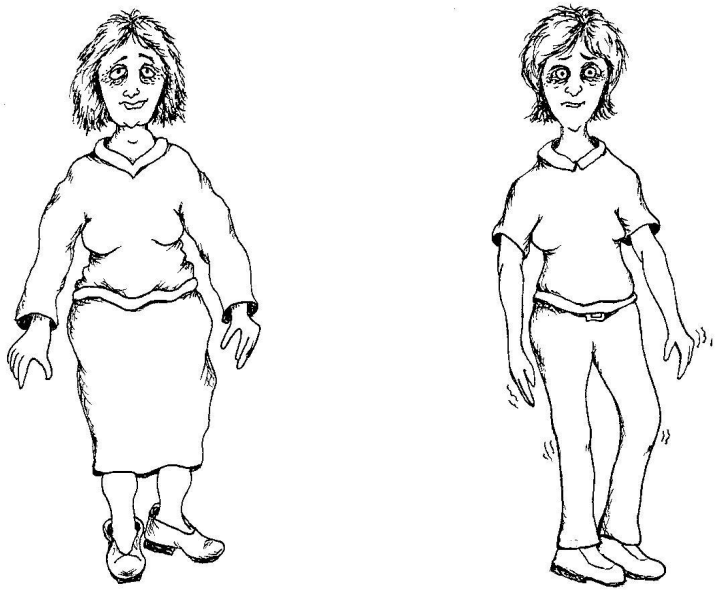
Metabolism is the chemical activities by which cells convert nutrients into energy and living tissue.

Metabolism

- It involves all the chemical reactions that foods/nutrients undergo in the construction and building up of body chemicals and tissues, including, blood, enzymes, and hormones.

- During metabolism, energy is released from the carbohydrates, proteins, fats and other nutrients we eat. The metabolic process generates heat, carbon dioxide, water and waste products.

Metabolism



Metabolism affects your body temperature, body weight, energy levels, muscle strength, psychological health, fertility, and much more.

Metabolism

- **Our metabolic set point is determined by our genes**

- **Not everyone has the same metabolic rate and efficiency**

- **Metabolic rate is the amount of energy required by the body to maintain a stable state in a given unit of time - Basal metabolic rate (BMR)**

- **Our metabolic rate does change according to the body's needs.**

- Exercise, illness with elevated body temperature, acute stress, hormonal activity, and digestion can increase the metabolic rate

- Severe illness, malnutrition/starvation, hypothermia, inactivity, weight loss and aging can decrease metabolic rate

Metabolic Disorder

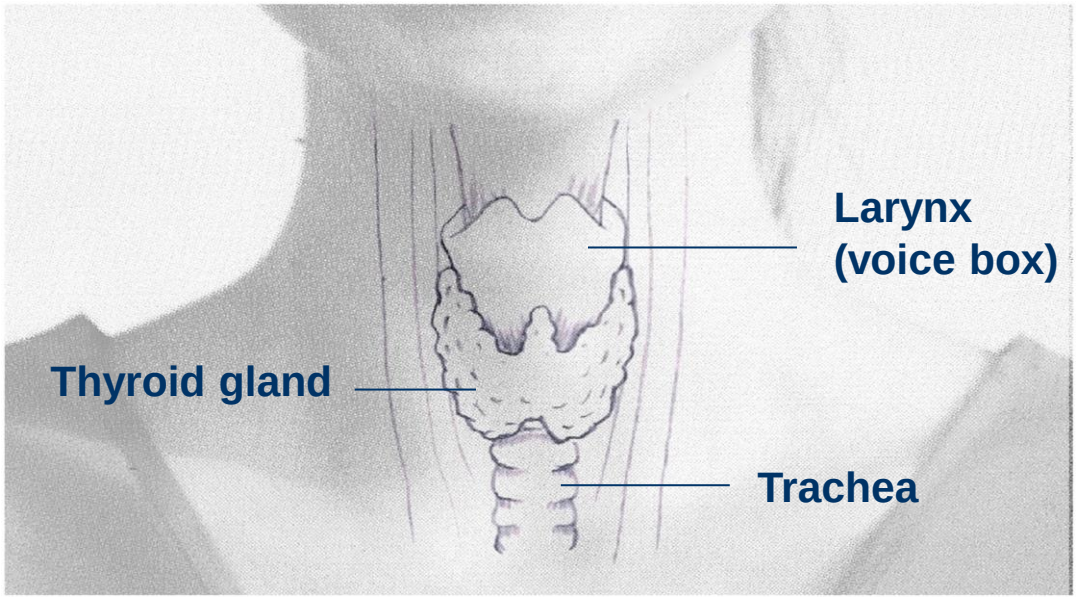
- What happens when our metabolic rate is disrupted, resulting in a loss of the metabolic control of homeostasis in the body?

- What happens to the various organ systems within the body?

- What signs and symptoms will appear?

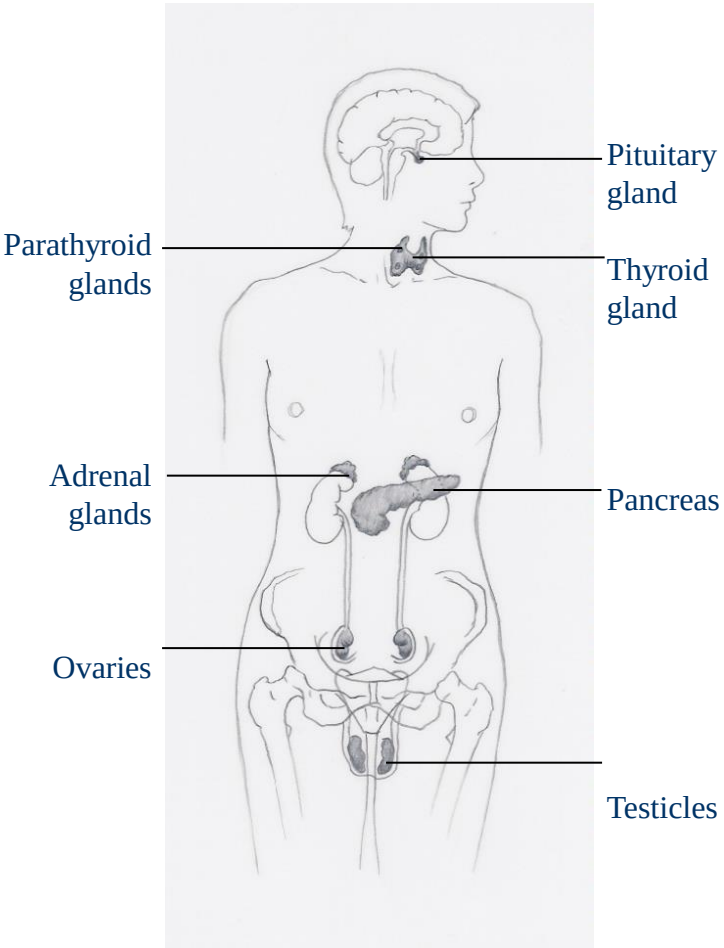
- The key regulator of metabolism in the body is the Thyroid gland.

Thyroid Anatomy



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

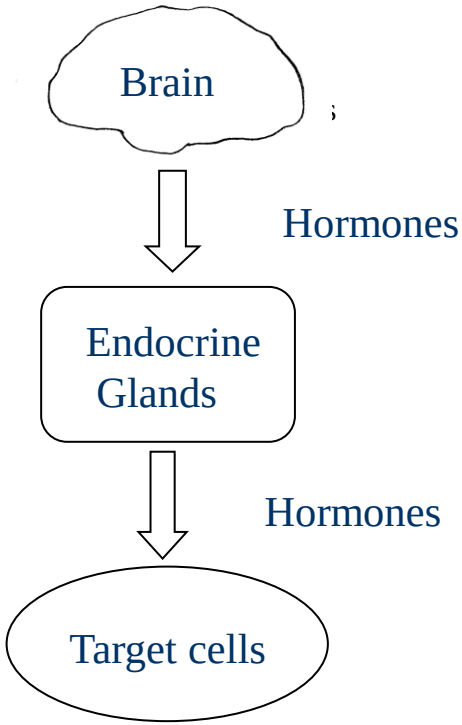
(ductless glands)

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

Hormones

- **Hormones affect every part of the body. They regulate body processes, such as:**

- growth and development
- reproduction
- fluid and mineral balance
- cardiac function and blood pressure
- the use of oxygen and food to produce heat, energy and living tissue



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.**

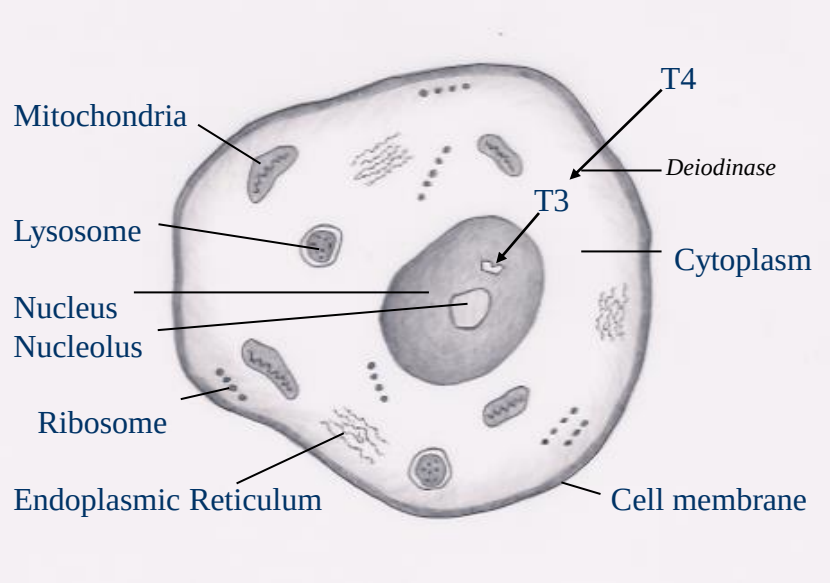
- **The two most important thyroid hormones are:**

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 Hormone Action

- 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

Thyroid Hormone Action

Low T3 syndrome

- **Low T3 syndrome is caused by decreased conversion of T4 to T3, and inhibition of T4 transport into the liver**

  - Often seen in non-thyroidal illness

  - The production and metabolism of thyroid hormones is dependent upon two trace elements, namely iodine and selenium. Deiodinase enzymes are selenoproteins

  - Conversion of T4 to T3 is also dependent on the secretion of T3 to activate D1 deiodinase in peripheral tissues

- **For biological action, both T4 and T3 have to cross the plasma membrane of target cells. Transport and cellular uptake is vital**

  - Cellular uptake inhibited by: reduced ATP production, starvation, caloric deprivation, non-thyroidal illness, increased bilirubin, low cortisol, low glucose, high fructose, renal disease, and stress

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**

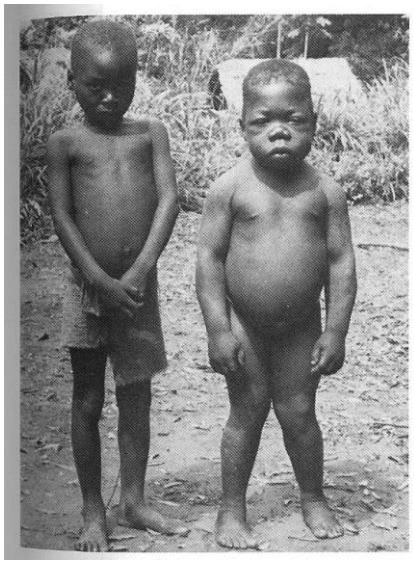
Thyroid Dysfunction
Causes

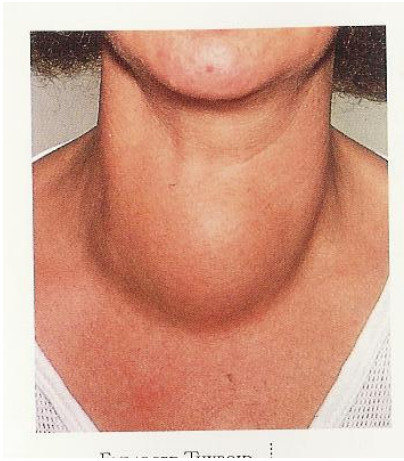
- **Iodine deficiency (or excess)**

- **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
  - Toxins/ Chemicals

- **Autoimmunity (inherited predisposition)**

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





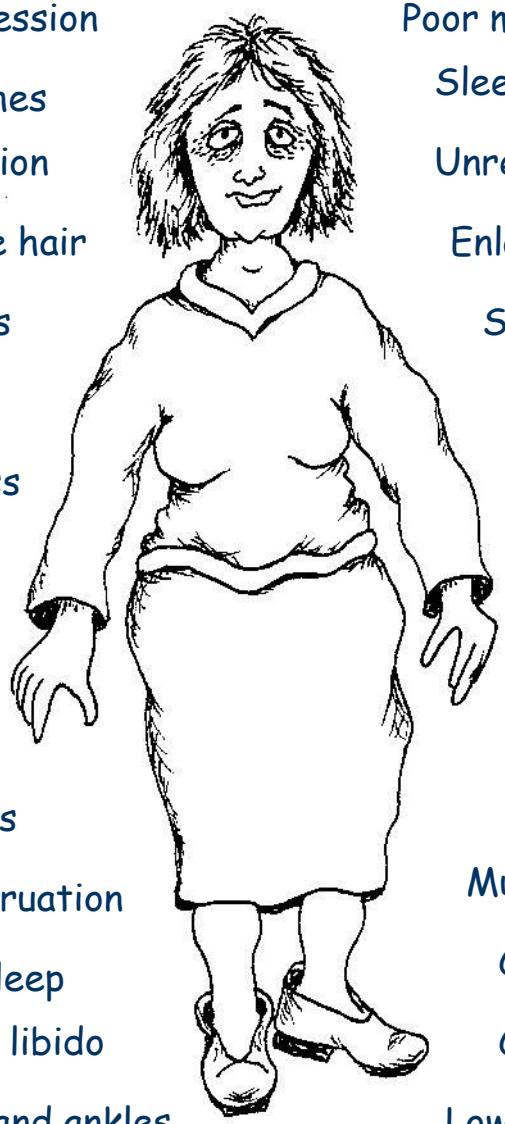
Autoimmunity

- **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 – genetic and environmental**
  - Stress (events, illness or trauma), hormonal imbalances, viruses, infectious agents, oxidative stress, and environmental toxins.
- **Travels in families - predisposition has genetic link**
- **Hashimoto's Thyroiditis causes Hypothyroidism**
- **Graves' disease causes Hyperthyroidism**
- **Conditions are for life!**
  - Can be treated and managed

Thyroid Dysfunction

Poor oxygen and nutrient transport
Abnormal protein synthesis
Immune system dysfunction
Poor cellular detoxification
Poor elimination of wastes
Alterations in brain chemistry
Abnormal nervous system function
Elevated ESR, indicating inflammatory response
Abnormal fluid and mineral balance
Abnormal calcium metabolism, contributing to kidney stones and gallstones
Poor glucose-insulin regulation
Abnormal bowel function (IBS)
Heart function irregularities
Abnormal blood pressure
Elevated cholesterol levels
Elevated muscle enzymes (indicating muscle damage)
Poor muscle/bone growth and repair
Elevated liver enzymes, indicating liver damage
Abnormal adrenal gland function
Imbalanced sex hormones
Tissue hypoxia (oxygen deficiency)
Cyst, fibroid and tumour growth

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:

- Anemia
- Headaches and migraines
- Digestive disorders
- CFS or FMS
- Congestive heart failure
- Severe depressive illness
- Blood sugar disorders
- Fluid retention and weight problems
- Infertility and pregnancy complications
- Other autoimmune disorders
- PCOS
- 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

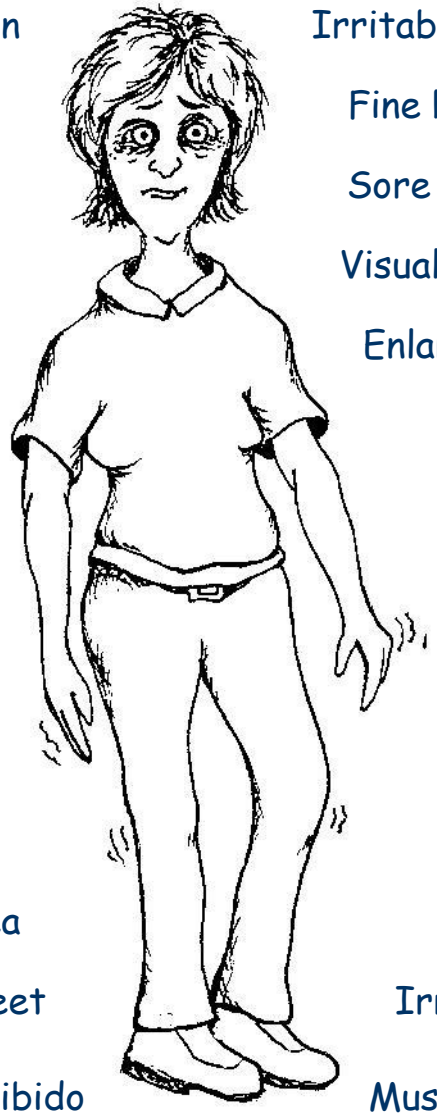
Sweaty hands

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

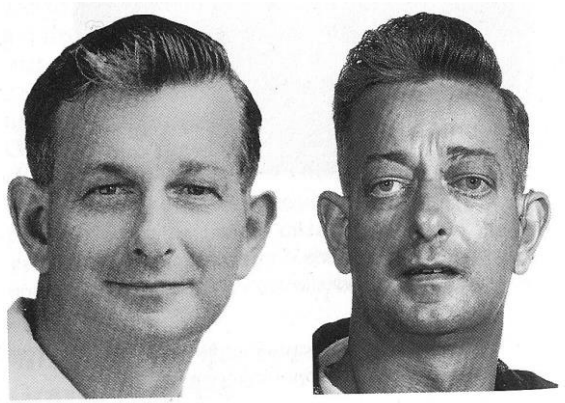
Muscle cramps and weakness

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

Hyperthyroidism

Associated complications or conditions:

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



Health Concerns

Anemia

- Iron and B12 deficiency (Pernicious anemia)
- Reduction of hemoglobin and/or red blood cells production
- Malabsorption (stomach and bowel function)
- Excess blood loss
- Less oxygen available to all body tissues
- Carbon dioxide accumulation
- Lower rate of chemical and metabolic processes
- Slower brain function
- Pernicious anemia – associated autoimmune disorder

Presentation: tiredness, pale skin, breathlessness, dizziness, poor appetite, weight loss, weakness, numbness and tingling, poor memory and coordination, mood and mental changes

Health Concerns

Depression

- The brain is the most metabolically active organ in the body requiring large amounts of energy
- Brain function slows down or speeds up
- Oxygen and nutrient transport to brain is affected
- Alterations occur in brain chemistry, including neurotransmitters - affecting mood and behaviour
- Sympathetic nervous system relies on adequate levels of thyroid hormone
- Appetite controls are increased or decreased
- Every organ system in the body is affected

Presentation: depressed mood, emotionally volatile, anxiety, panic attacks, insomnia, poor memory and concentration, poor cognitive skills, compromised intellectual ability, generalized brain fog, and more serious forms of mental illness

Health Concerns

CFS and FMS

- Alterations occur in biochemical pathways and chemical processes related to the endocrine, nervous and immune systems
- Multiple health problems occur simultaneously due to a poorly functioning body
- Hypometabolic at cellular level
- Low energy production and cold body temperature
- Increased infections - mycoplasmas, viruses, bacteria, fungal
- Signs and symptoms almost identical to Hypothyroidism

Presentation: Extreme unrelenting fatigue, brain fog, cold body, aches and pains, inflammation and fluid retention, constant struggle with infections – bacterial, viral and fungal. Occasionally, low T3 syndrome

Health Concerns

Bones and muscle

- Abnormal oxygen and nutrient transport to muscles, bones and connective tissues
- Altered metabolism affects growth and repair, fluid and mineral balance, and nerve impulses
- Increased inflammation (ESR) and fluid
- Muscle and connective tissue damage (longer term)
- Loss of mineral content in bones (bone loss)
- Increased pain sensitivity
- Increased infections risk

Presentation: Stiff and painful muscles and joints, swelling, inflammation, burning, cramping, chilblains, Osteoporosis, Arthritis, Carpal Tunnel Syndrome, Rheumatoid Arthritis

Health Concerns

Digestion

- Abnormal speed of digestive processes
- Abnormal metabolism of carbohydrates, proteins and fats
- Incomplete breakdown of food particles
- Poor absorption of nutrients
- Poor elimination of waste products
- Inflammation and mucus build up
- Excess fluid retention – salt and water
- IBS and inflammatory bowel conditions
- Coeliac disease, Crohn's disease (autoimmune)
- Food allergies and intolerances

Presentation: indigestion, nausea, stomach pains, infections, bloating, flatulence, constipation/diarrhea, nutritional deficiencies, skin rashes, inflammation and ulcers, bowel blockages

Health Concerns

Blood Sugar

- Alterations in hormonal balance
- Abnormal speed in carbohydrate breakdown and processing
- Changes in appetite centers in the brain
- Alterations in pancreatic response to carbohydrates
- Improper lipid processing with excess fatty acids
- Hypo: Elevated blood lipids and cholesterol interfere with insulin receptors and cells become less sensitive to insulin's effects
- Hyper: Carbohydrates are metabolized too quickly. Pancreas becomes more reactive to glucose (yoyo effect)
- Associated Autoimmune Diabetes (Type 1)

Presentation: changes in appetite and weight, fluid retention, frequent urination, fatigue, dizziness, tingling, headaches, irritability, visual disturbances, resulting from Hypoglycemia, Insulin resistance, and Diabetes

Health Concerns

Weight

- Changes in hormonal and electrolyte balance
- Accumulation of water and salt (fluid retention-oedema)
- Increased inflammation (ESR) and mucus
- Alterations in the metabolism of carbohydrate, protein and fat
- Hypo – less energy requirements and more fat storage
- Hyper – more energy requirements and muscle wastage
- Changes in peripheral tissue circulation
- Poor exercise tolerance, (fatigue and muscle weakness)
- Study: TSH correlated with Body Mass Index (BMI)

Presentation: fluid retention, weight gain/loss, swollen joints, circulatory problems, CTS, poor muscle strength, poor blood sugar controls, body aches and pains, muscle and bone loss

Health Concerns

Heart Function

- Adapting to different metabolic rate
- Changes in heart rhythm and blood pressure
- More inflammation and fluid retention
- Constriction of blood vessels
- Higher cholesterol and triglycerides - Hypothyroidism
- Hypertension or hypotension
- Poor oxygenation
- Damage to arteries (longer term)
- Blockages in arteries (longer term)

Presentation: tightness or chest pain, breathlessness on exertion, numbness or pressure in hands, arms, feet and legs, cramps, dizziness, headaches, irregular heart rhythm, palpitations.

Health Concerns

Fertility, pregnancy, postpartum and menopause

- Disturbances in hormonal balance
- Abnormal fluctuations in sex hormones
- Changes in libido
- Abnormal blood flow affecting tissue sensitivity
- Alterations in monthly cycle
- Immune system changes
- Increased risk of developing fibroids and cysts
- Recurrent infections, including candida
- Alterations in brain chemistry, affecting mood and behaviour

Presentation: abnormal monthly cycle, severe PMS, iron deficiency, heavy/light periods, no periods, gynecological problems, recurrent infections, infertility, increased miscarriages/stillbirths, Postpartum depression, early menopause, PCOS

Health Concerns

Autoimmune Conditions

- **People with one autoimmune disorder have a higher rate of developing another autoimmune condition**

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

- Coeliac Disease – 3% of patients with AIT disease have been diagnosed with extreme gluten sensitivity (CD). Around 43% of those with AIT disease show signs of gluten sensitivity. Gluten-free diet improved the disease and allowed reduction of thyroxine dosage

Treatment protocol

Integrative approach is best

- Conventional and Complementary
- Thyroid condition must be addressed first if moderate to severe.
- Treatments to restore thyroid hormone levels to normal, where patient is as ‘symptom free’ as possible
- Treatments for other diagnosed health problems
- Medications if required
- Healthy diet
- Regular exercise
- Nutritional supplementation if required
- Adequate sleep
- Plenty of water

Conventional

- **Hyperthyroidism/Graves' disease/Nodules/Cancer**
- Antithyroid medications (Carbimazole and PTU)
- Radioactive Iodine
- Surgery
- Beta-blocker (propranolol)
- Cortisol (hydrocortisone,prednisolone)

- **Hypothyroidism/Hashimoto's/Nodules**
- Iodine (if needed)
- Thyroid hormone replacement therapy – Thyroxine (T4); Tertroxin
- Alternative – Combination therapy (synthetic -T4 &T3)
- 'Natural' – Armour, Thyroid extract (contains both T4 and T3)

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

Thyroid Function Tests
TSH Distribution Chart

Norwegian Study, 2000

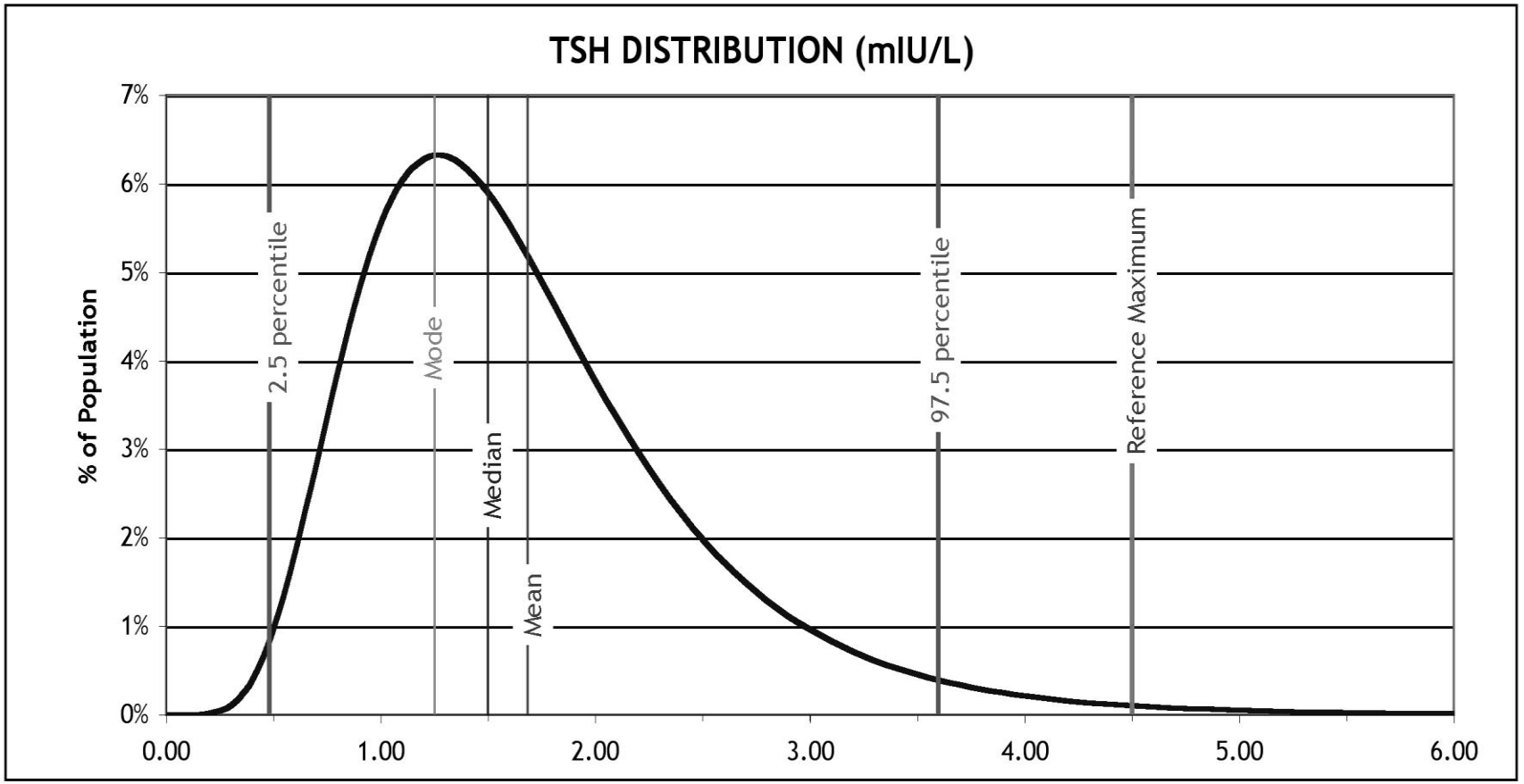


Figure 12.1

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

Keep photocopies of all tests and record how you feel!

Treatment Options

Graves' Disease - Hyperthyroidism

- **Herbal medicines - antithyroid properties**
  - Bugleweed (Lycopus), Lemon balm (Melissa), Motherwort (Leonurus), Lemonweed (Lithospermum), Thyme (Creeping thyme)

- **Nutritional supplements**
  - Carnitine, fulvic acid, quercetin, lipoic acid, copper, boron, silicon, calcium, magnesium, selenium, B-complex vitamins, multivitamin/mineral
  - Avoid iodine and cadmium (smoking and green leafy vegetables)

- **Medications/ Hormones**
  - Oestrogen and Lithium hinder thyroid hormone production; celery-seed extract can reduce or increase thyroid hormone levels
- **Goitrogens**
  - Eat more foods with an antithyroid effect; soy, brassica vegetables

Treatment Options

Hashimoto's Thyroiditis - Hypothyroidism

- **Iodine supplementation** (if required)

  - Iodine can aggravate autoimmunity in Hashimoto's

  - 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). Long term effects?

  - 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

  - Iodized salt, and foods containing iodine, is safest way to maintain daily requirements

Treatment Options

Hashimoto's Thyroiditis - Hypothyroidism

- **Goitrogens**
  - Antithyroid substances e.g. thioglucosides/isothiocynates
  - Brassica vegetables, millet, cassava, almonds, walnuts, strawberries. Cooking reduces goitrogenic effect.
  - Soy reduces T4 to T3 conversion, inhibits iodine uptake and can cause hypothyroid symptoms and goitre (in 50%).
  - Goitrogenic effect strongest in tofu, soybeans and milk; fermented soy products much safer – miso/tempeh). Counteract effect by giving iodine.

- **Nutritional supplementation**
  - Multivitamin/mineral - selenium, B-group vitamins, iron, zinc, copper, calcium, magnesium, manganese, EFAs, chromium, vitamins A , C and E, digestive enzymes, tyrosine, ginseng, withania and astragalus

Treatment Interactions

- **Some medications that may interfere with Oroxine include the following:**
  - Anticoagulants (blood thinners): e.g. Warfarin
  - Antidepressants: e.g. Lithium, Zoloft
  - Medicines for diabetes: i.e. Insulin
  - Amiodarone (heart drug)
  - Beta blockers
  - Cholesterol lowering drugs containing cholestyramine
  - Corticosteriods: e.g. Prednisolone
  - Oral contraceptives
  - HRT containing Oestrogen
  - Epileptic drugs: e.g. Phenytoin
  - Rifampicin (antituberculosis agent)
  - Iron supplements
  - Calcium supplements
  - Antacids containing aluminium hydroxide and calcium carbonate

Dietary Recommendations

Healthy Nutrition comprising:

• **Carbohydrates**	Energy
• **Protein**	Build and repair body tissues; enzymes, hormones
• **Essential Fatty Acids**	Healthy brain, nervous and immune system; skin; anti-inflammatory
• **Vitamins/Minerals**	Normal critical bodily functions
• **Fibre**	Healthy digestion and glycemic control
• **Water**	Essential for cellular function and detoxification

Dietary Recommendations

Healthy Choices:

- **Carbohydrates -** wholegrain breads and pasta (if tolerated), rice, fruit and vegetables; low GI carbohydrates
- **Protein -** lean meats, fish, nuts, seeds, beans, eggs, dairy, whole soy
- **Essential Fatty Acids -** mono/poly unsaturated fats (omega 3 and 6), vegetable oils, olive, flaxseed, primrose, canola
- **Vitamins/Minerals -** whole foods, supplements
- **Fibre** - wholegrain foods and vegetables
- **Water -** tap, spring, purified; 8 to 10 glasses per/day

8

Dietary Recommendations

A Low Glycemic Diet

- improve body's sensitivity to insulin
- maintain steady blood sugar levels
- control cholesterol levels and lower blood lipids
- maintain healthy weight (aids in weight loss)
- reduce stored fat levels
- control appetite
- sustain energy levels
- increase exercise endurance and tolerance
- lower risks of developing insulin resistance
- lower risks of developing Type 2 Diabetes
- lower risks of developing heart disease

Dietary Recommendations

Carbohydrates – sugars and starches

- **Traditionally divided into two groups – simple and complex**

Simple – sugar, sweets, cakes, soft drinks
Complex – wholegrain, rice, bread, potato, pasta and vegetables and fruit

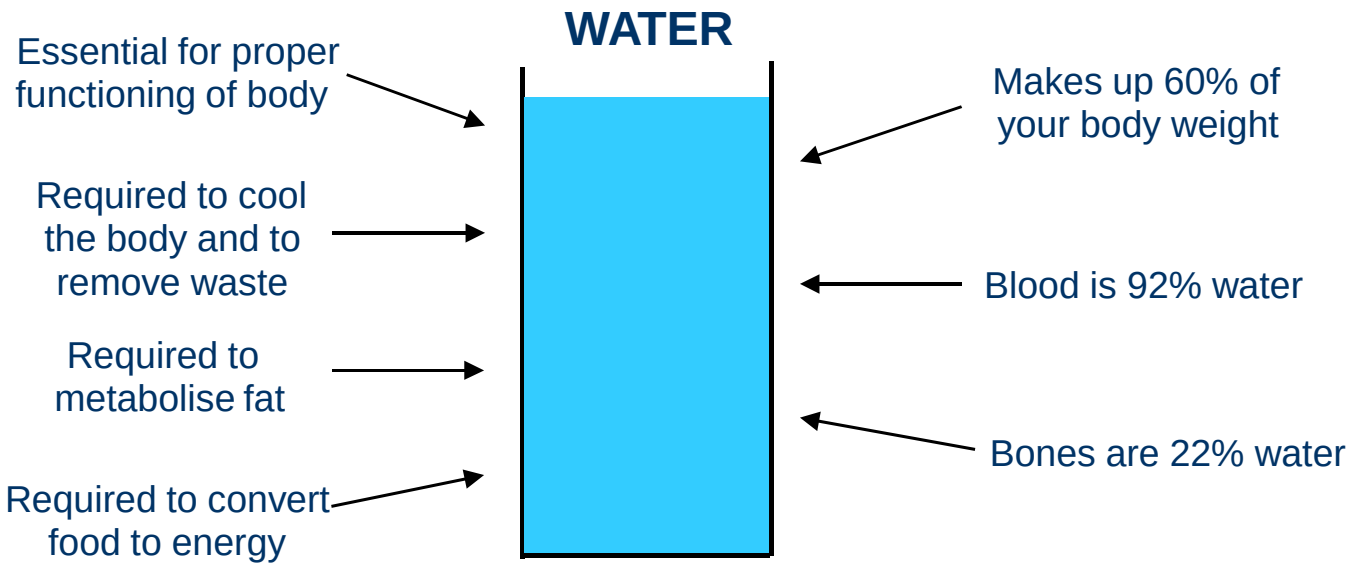
- **Glycemic Index (GI)** is the current classification of carbohydrates, rating foods containing carbohydrates from 0 to 100 according to their effects on blood sugar levels and insulin response

- High GI foods are digested rapidly and raise blood sugar quickly after eating – above 70/100; burn quickly (excess stored)

- Low GI foods are broken down slowly and keep blood sugar levels more stable for longer – below 55/100; burn slowly (less stored)

Dietary Recommendations

YourHealth
LEADERS IN INTEGRATIVE MEDICINE
www.yourhealthcom.au



Keep your body well hydrated!

Exercise Recommendations

- **Diet and exercise together is the most effective approach for maintaining a healthy body and weight**
- Regular moderate-intensity exercise increases metabolism, circulation, oxygenation of tissues, strengthens blood vessels, lungs and heart, improves organ function and detoxification processes, develops strength and stamina, builds lean muscle mass, causes the body to burn more calories and fat, reduces stress and blood pressure, lowers cholesterol and insulin levels, and is vitally important in the prevention of disease.
- Include some resistance or strength training a few times a week, to build more muscle mass and burn more calories and fat
- Aim for 30 to 45 minutes of moderate exercise every day. Start off slow and gradually increase duration and intensity.

Conclusion

Thyroid conditions can cause serious health problems, therefore they need to be taken seriously!

- **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!