

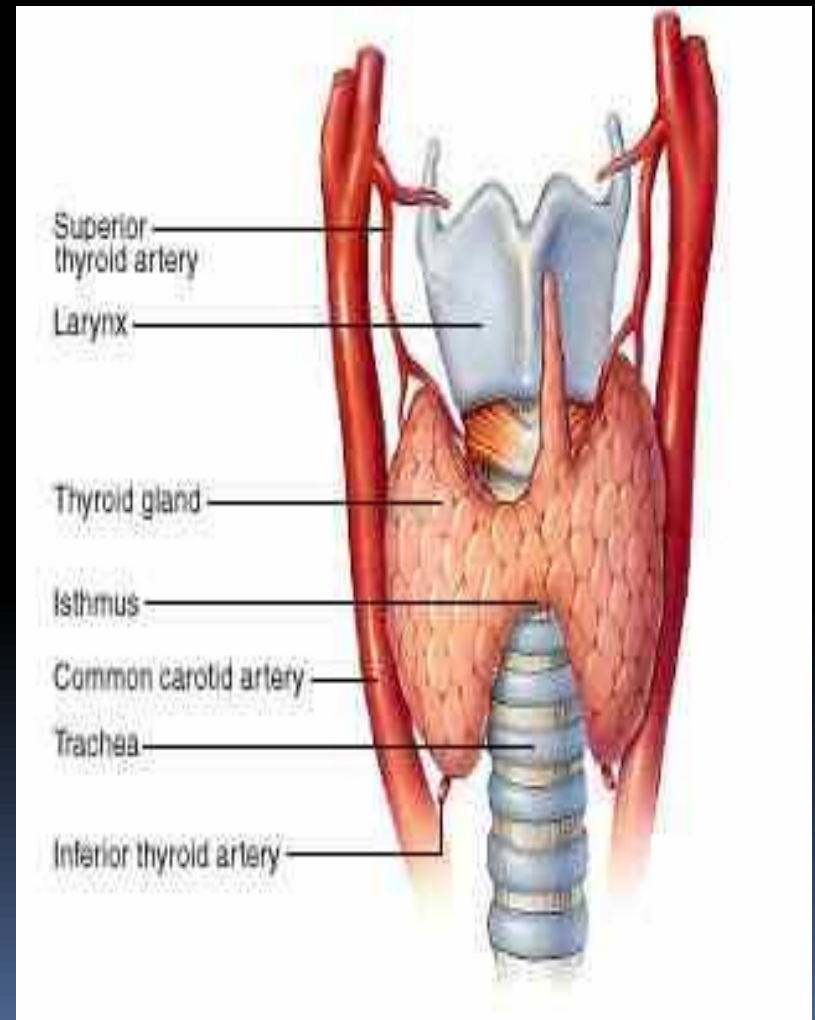
Thyroid gland

In center of the neck

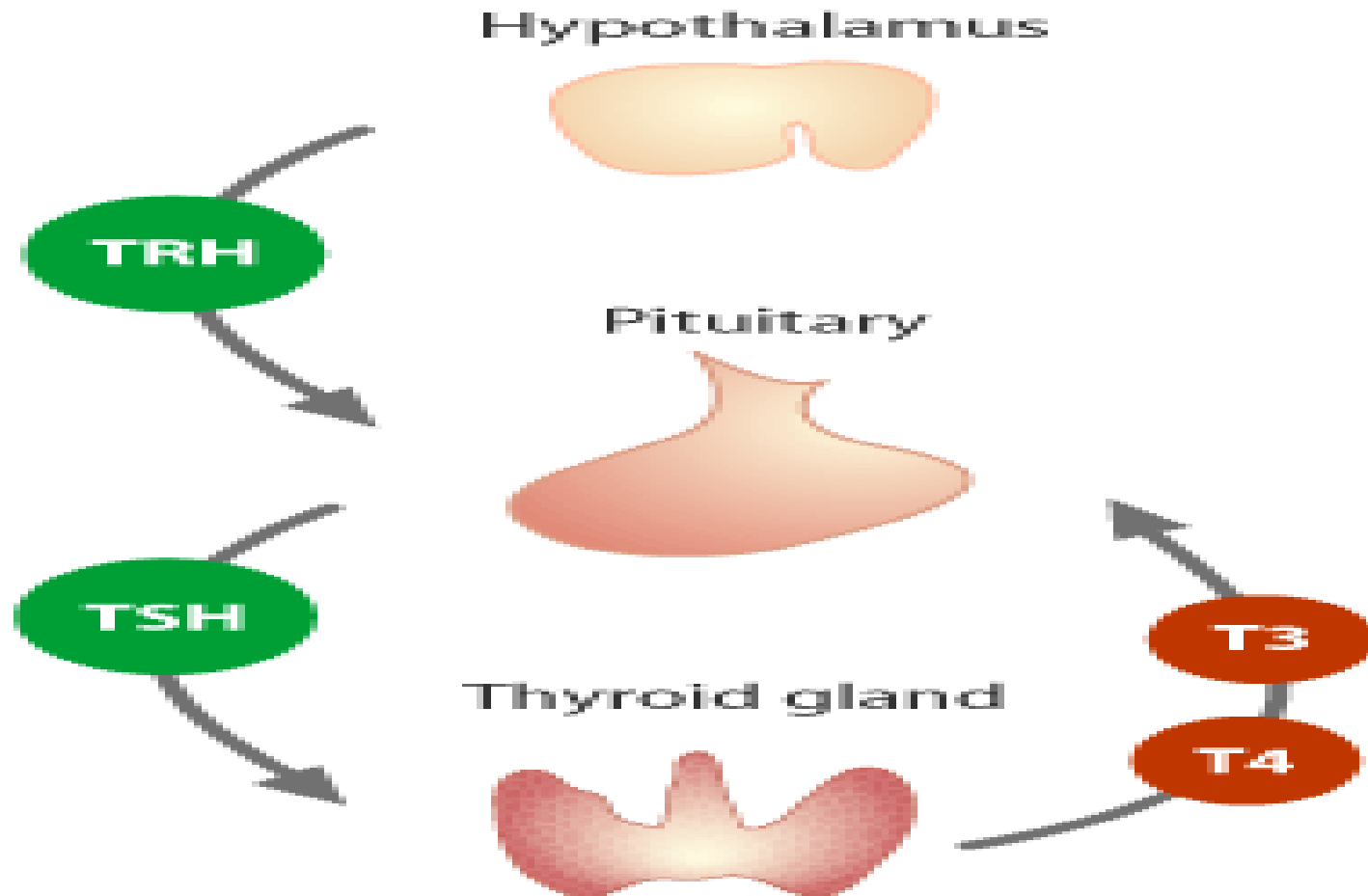
2 Main lobes,

1 intermediate lobe,

Highly vascular



Pituitary & Thyroid gland



Thyroid disorders

- Hypothyroidism



T₃

T₄

TSH

- Hyperthyroidism



T₃

T₄

TSH

- Euthyroid Nodule



N-T₃

N - T₄

N-TSH

HYPOTHYROIDISM



- lethargy and tiredness
- feeling cold (even on warm days)
- difficulty concentrating
- unusual weight gain

HYPOTHYROIDISM



- **depression**
- **puffiness of the face**
- **hair loss**
- **dry skin**
- **constipation**

Hypothyroidism in Newborn

- **Poor physical development**
- **Poor mental development**
- **Not passing stool**
- **Large tongue**
- **Rough skin**
- **Umbilical hernia**



Congenital Hypothyroidism



Hypothyroidism in children

- **Growth Retardation / Short stature**
- **Weight gain**
- **Puffiness of face**



Delayed / Early sexual development

Poor performance in school

Hyperthyroidism Symptoms

Table 1. Neurobehavioral and Psychiatric Changes Associated With Hyperthyroidism in Young Adults as Compared With Older Adults

Young adults exhibit:

- Anxiety
- Emotional lability
- Insomnia
- Lack of concentration
- Restlessness
- Tremulousness

Older adults exhibit:

- Apathy
- Lethargy
- Pseudodementia
- Depressed mood

Source: Reference 2.



Hypothyroidism in pregnancy

(Target TSH 0.5 – 3.0)

- **If uncontrolled**
- Increased risk for Abortion,
- premature delivery
- High blood pressure
- Increased risk of PET
(Pre-eclamptic toxemia)
- Fetal loss
- Low IQ / Mental sub normality in baby



Hypothyroidism in females

- **Delayed menses** (Oligomenorrhoea)
- **Excess menstrual bleeding** (Menorrhagia)
- **Infertility**
- **Polycystic ovaries, High Prolactin**
- **Excess hair fall,**

How long hypothyroidism lasts?

- **Majority of the cases, life long**
- **In some cases it may recover**
 - 1) Mild hypothyroidism (TSH Less than 10)
 - 2) Some cases of Pregnancy with mild hypothyroidism
 - 3) Critically ill patient with mild hypothyroidism
 - 4) Drug induced hypothyroidism



Thyroid tests (1):

Thyroid Hormone tests

- **T₃ & T₄** : Thyroid hormones, simple tests, generally advised when 1st time investigated
- **TSH**: Pituitary hormone, Inversely related to T₃ & T₄, More sensitive, Routinely used
- **Free T₃, Free T₄** : Free from binding proteins, Required sometimes

Thyroid Antibody tests

- **TMA** (Thyroid Microsomal Antibody) or **Anti TPO Ab** (Thyroid Peroxidase Ab) : Marker of auto immune disease, Predicts permanent thyroid disease
- **Thyroglobulin test** : Used in post operative thyroid cancer cases for annual monitoring

Hypothyroidism: Not a troubling disease


- No long term complications related to Heart, kidneys, eyes or brain
- Take correct thyroxine dosage & live normal life
- If taken in correct dosage, thyroxine has no side effects

Thyroxine tablets

- a) Daily morning, after brushing teeth, empty stomach
- b) Break fast after $\frac{1}{2}$ hour or more gap
- c) No diet restriction (including cabbage)
- d) In case if you forget, after 4-5 hours fast or next day double the dosage
- e) Be regular in treatment, No self dosage change

Thyroxine medicine benefits

 Fatiguability, tiredness, dullness,
sleepiness, leg cramps,


 Increased alertness, sharpness, feel active,

 Dryness of skin & hair fall


Thyroxine Treatment:

Specific benefits in females


-  Menstrual irregularity, heavy menses

-  Chances of pregnancy for those who are keen to conceive

-  chances of abortion, still birth,



Thyroxine treatment: Other benefits

- a. Mild- Moderate weight loss
 - b. Memory improves,
 - c. Thinking process gets faster
 - d. Skin & hair texture improves
- 

Thyroxine tablets:

12.5, 25, 50, 75, 100, 125, 150 mcg



Thyroid tests: Ultrasound

- In goiter / Thyroid nodule cases

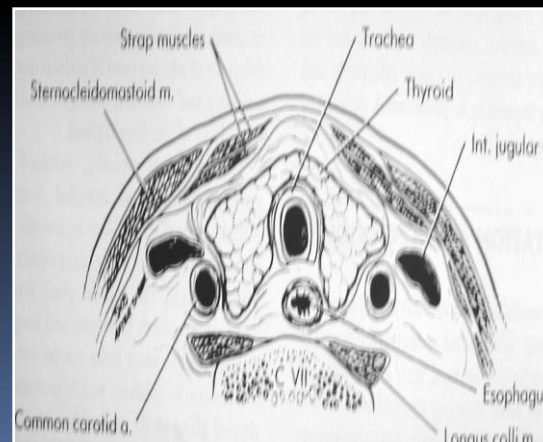
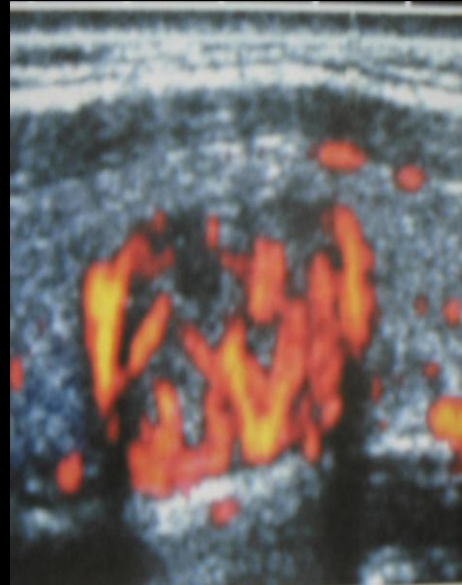
- Cystic / Solid

- Single / Multiple nodules

- With/Without calcification

- Surrounding structures :
Pressed / Invaded

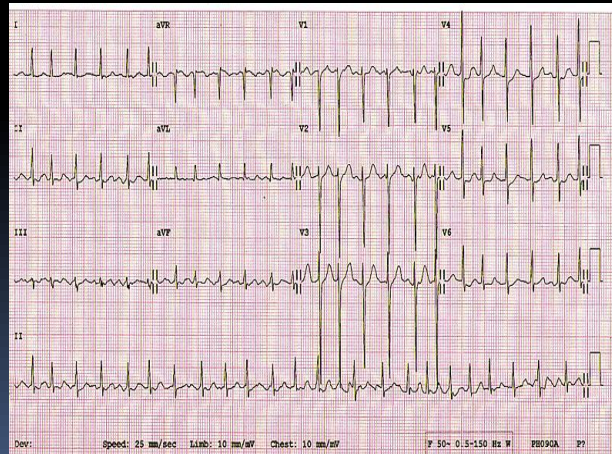
- Simple / Cancerous



Hyperthyroidism (Graves' disease)



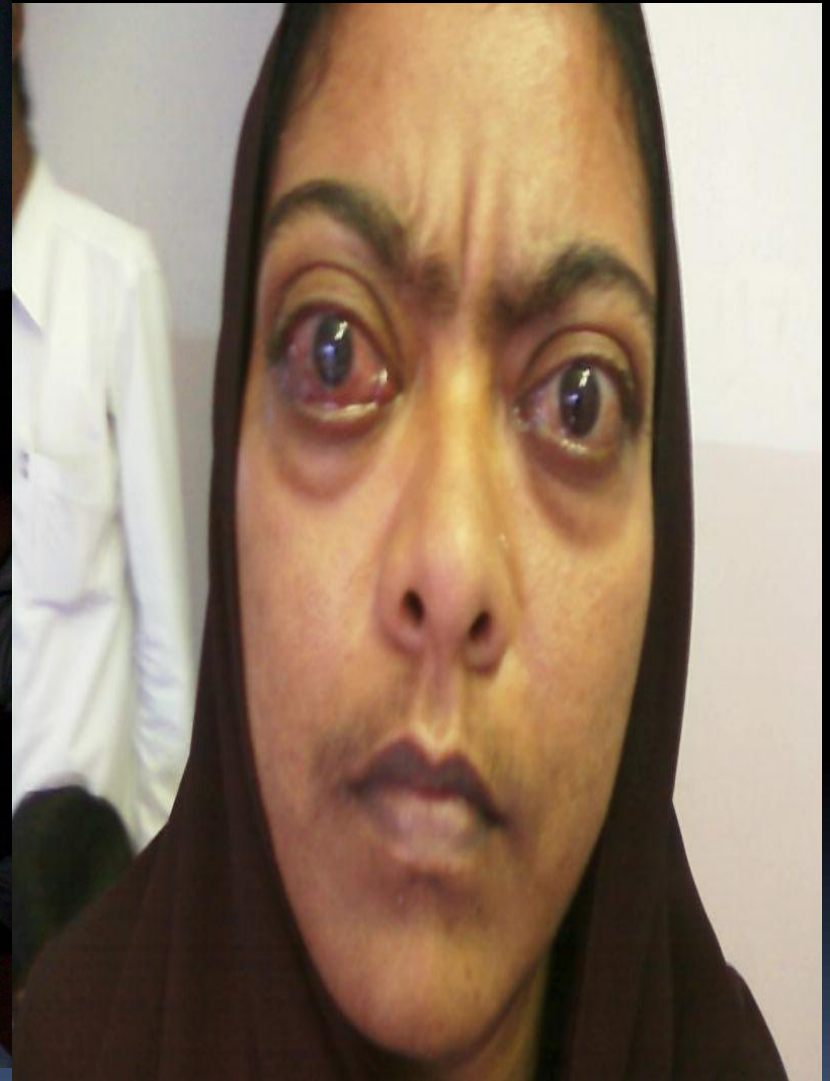
- **T3, T4, TSH**
- **Wt loss**
- **Hand tremors (shaking)**
- **Palpitation**
- **Sweating**
- **Heat intolerance**
- **Diarrhea**
- **Eye protrusion**
- **Double vision**
- **Eye Redness**



Symptoms of hypothyroidism

- lethargy and tiredness
- feeling cold (even on warm days)
- difficulty concentrating
- unusual weight gain
- depression
- puffiness of the face
- hair loss
- dry skin
- constipation





Hyperthyroidism: Treatment

- **Anti thyroid drugs**


 - Carbimazole** : Neomercazole /Anti thyrox /Thyrocab)

- **Propylthiouracil : PTU**

- First line treatment for all patients
- Safe during pregnancy
- Duration of treatment: Generally 2-3 yrs
- 40-50 % chances of permanent cure
- **Side effects** : Not common (itching, ▼ blood cell count, very rare



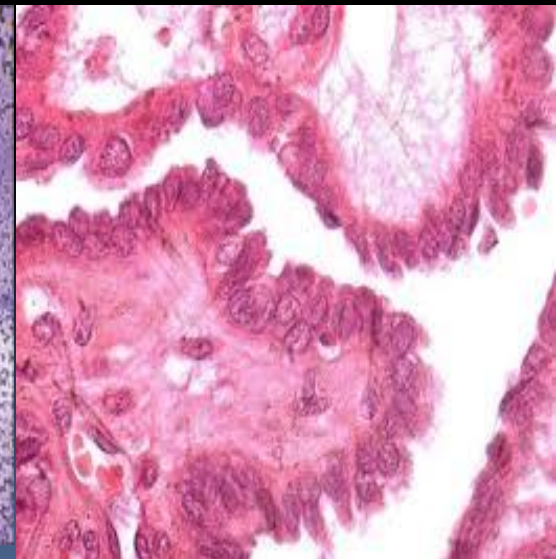
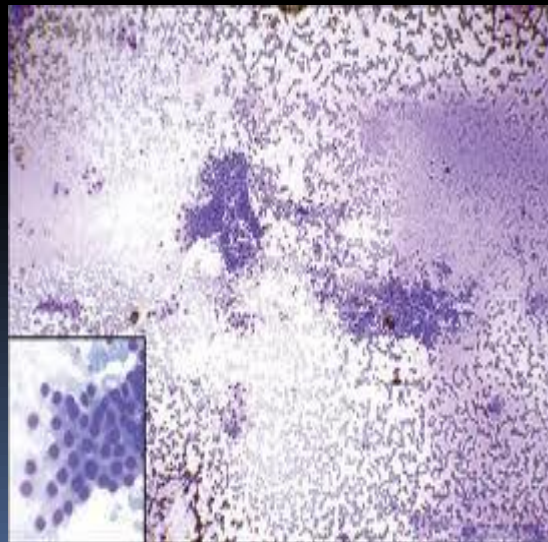
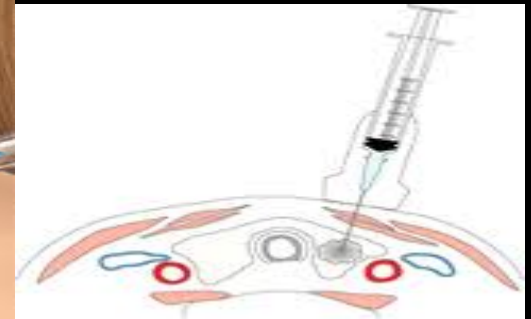
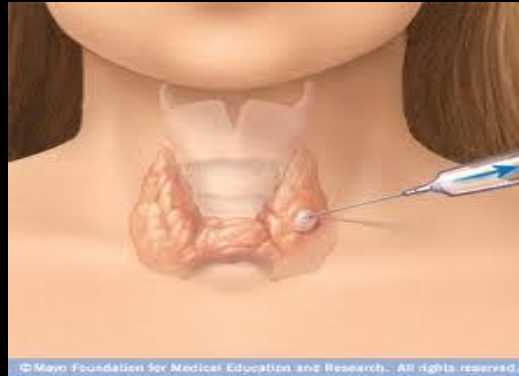
Radio Iodine Therapy:

- Not controlled with anti thyroid drugs
 - Hyperthyroidism with cardiac problem
 - Safe, Only side effect Hypothyroidism
 - 10 – 15 mCi , Capsule / Liquid
- 



Fine Needle Aspiration Cytology (FNAC)

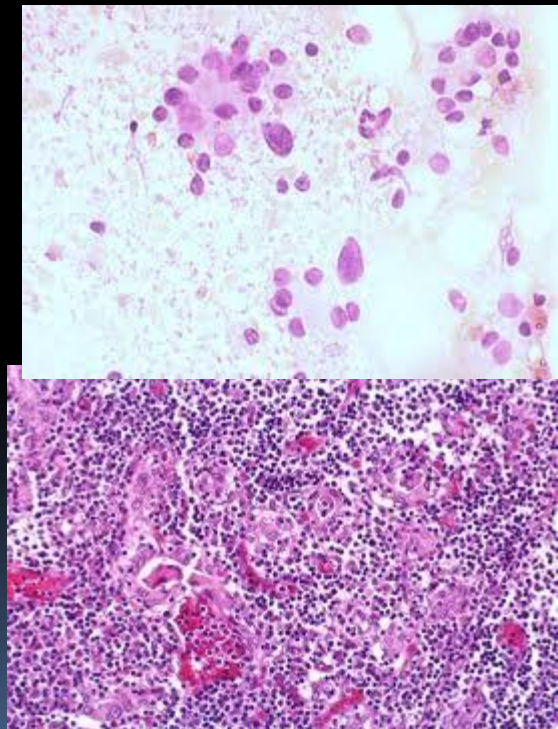
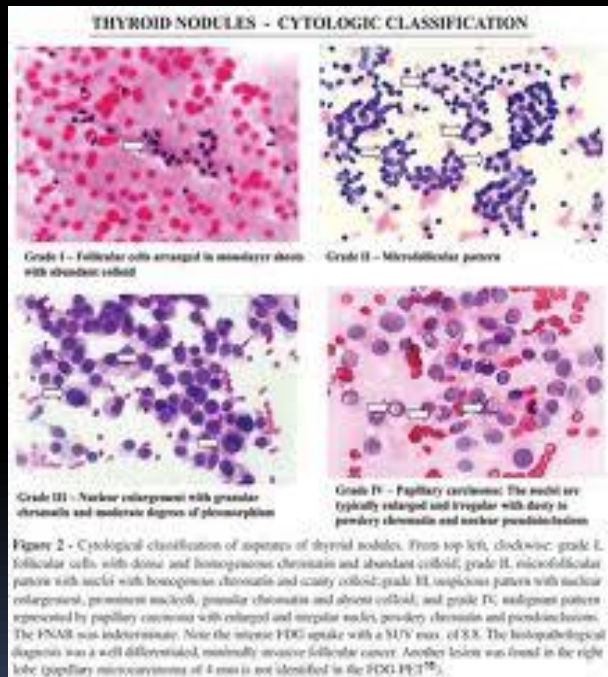
- Colloid goiter
- Simple Cyst
- Thyroiditis (Autoimmune)
- Papillary thyroid cancer
- Colloid nodule
- Follicular thyroid cancer



FNAC Thyroid :

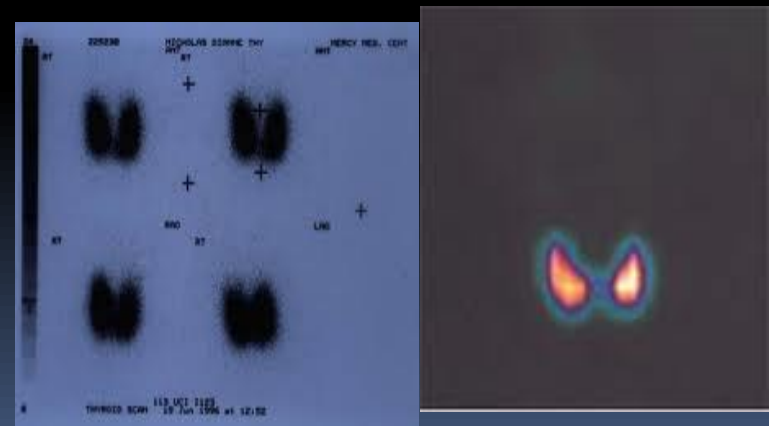
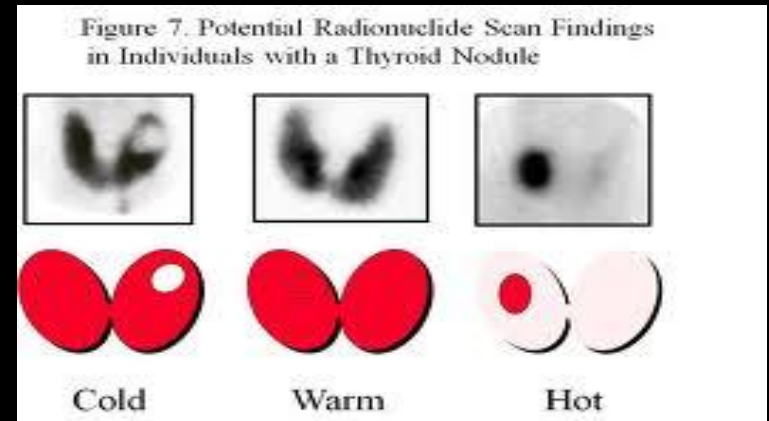
Various thyroid disorders

Autoimmune Thyroiditis

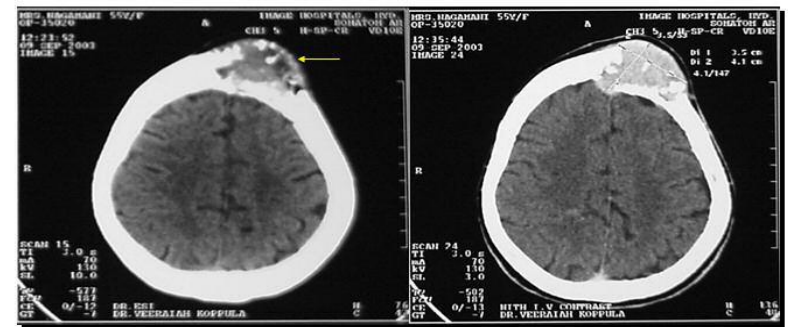
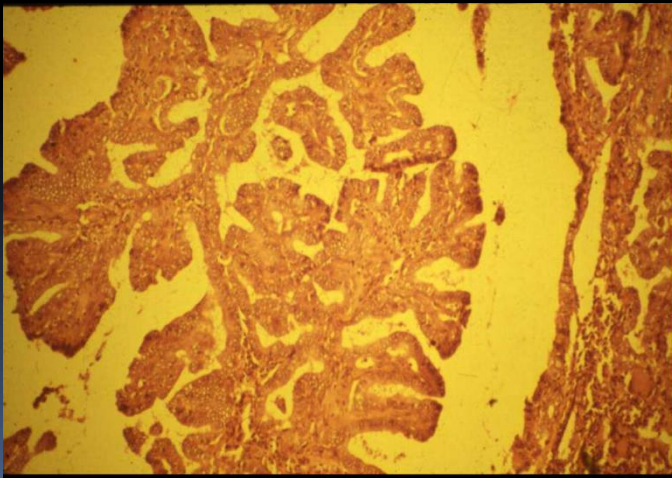
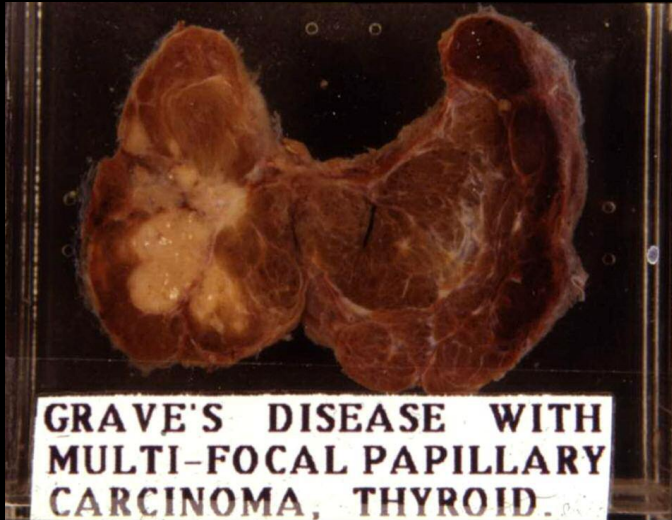


Radio Isotope Thyroid Scan 99 TcM

- **Thyroid Nodule**
- Cold / Warm / Hot
- **Hyperthyroidism**
- Silent Thyroiditis
- Graves' disease
- Toxic MNG
(multinodular goiter)



Thyroid cancer



Thyroid

Myths & Facts

-
- **A lady with thyroid cannot conceive:** On the contrary, hypothyroidism is the commonest treatable cause for female infertility. Chances of pregnancy increase several fold once hypothyroidism is corrected. Lady must continue thyroxine even during pregnancy. Thyroxine requirement often increases during pregnancy.
- **A lady with hypothyroidism gives birth to hypothyroid baby:** It generally does not happen. Baby can have increased risk of thyroid disorder in future life due to genetic factors. But vertical transmission directly from mother to baby does not occur.
- **Thyroid patient with obesity cannot lose weight:** Thyroid contributes only a few kgs weight for obese hypothyroid person. Once hypothyroidism is corrected, it does not contribute to obesity. And hence hypothyroidism should not be blamed as an excuse for not losing weight.

Thyroid

Myths & Facts (2)

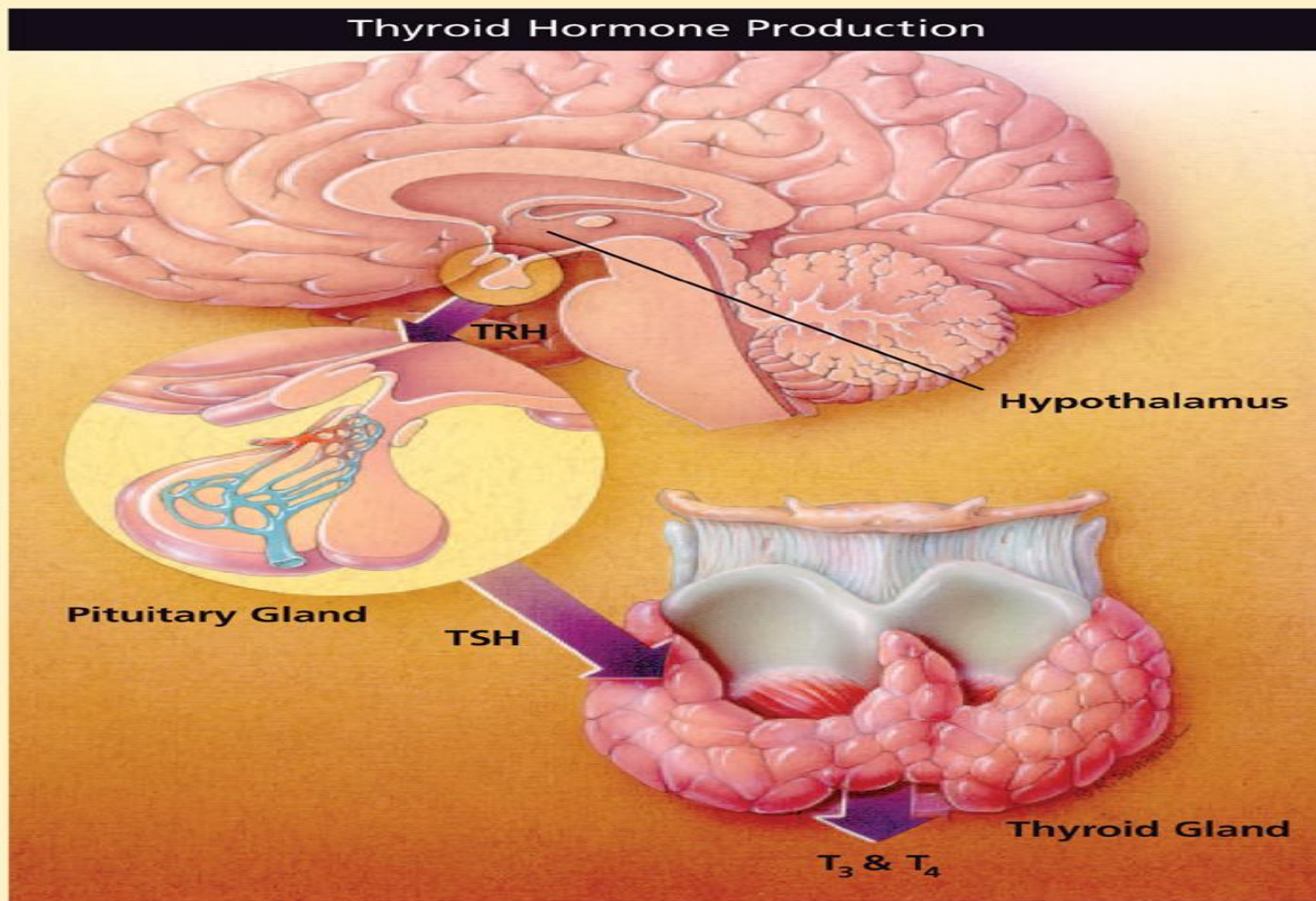
- **Once you get thyroid, it is for ever:** It is not always true. Some of the hypothyroidism cases are sometimes reversible like borderline (sub clinical) hypothyroid cases, hypothyroidism during critical illness and drugs related hypothyroidism
- **Thyroxine has lot of side effects:** Right dose of thyroxine is virtually side effects free. Over dosage of thyroxine can cause hyperthyroidism like features e.g. palpitation, increased sweating, weight loss and irritability. Rapidly corrected hypothyroidism can some times precipitate angina in elderly people and increased cranial / brain pressure in children.
- **Thyroid medicines are risky during pregnancy:** Thyroid medicines are absolutely safe during pregnancy. In hypothyroid lady thyroxine has several beneficial effects for mother as well as baby like reducing risk of abortion and other pregnancy related complication while it improves IQ (intelligence) in baby if mother takes right dose of thyroxine.

Thyroid

Myths & Facts (3)

- **Thyroid surgery can cure any thyroid disorder, including hypothyroidism:** Surgery is usually not required in hypothyroidism cases. There is no surgical cure for primary hypothyroidism cases.
- **Thyroid cancer is not curable, just like other cancers:** By & large thyroid cancers have benign course in future life. Unlike other cancers, timely detected and treated patient with common thyroid cancers (papillary & follicular) lives absolutely normal like.
- **Children with thyroid deficiency cannot live normal adult life:** With right dosage of thyroxine and regular treatment, children get normal height, pubertal development and normal future adult life.
- **Radio iodine treatment for hyperthyroidism can cause radiation side effects:** The quantity given during radio iodine therapy for hyperthyroidism is in very small (5-15 mCi) unlike 350-400 mCi given for various cancers. Twenty years follow up data have have proved safety of radio iodine therapy.

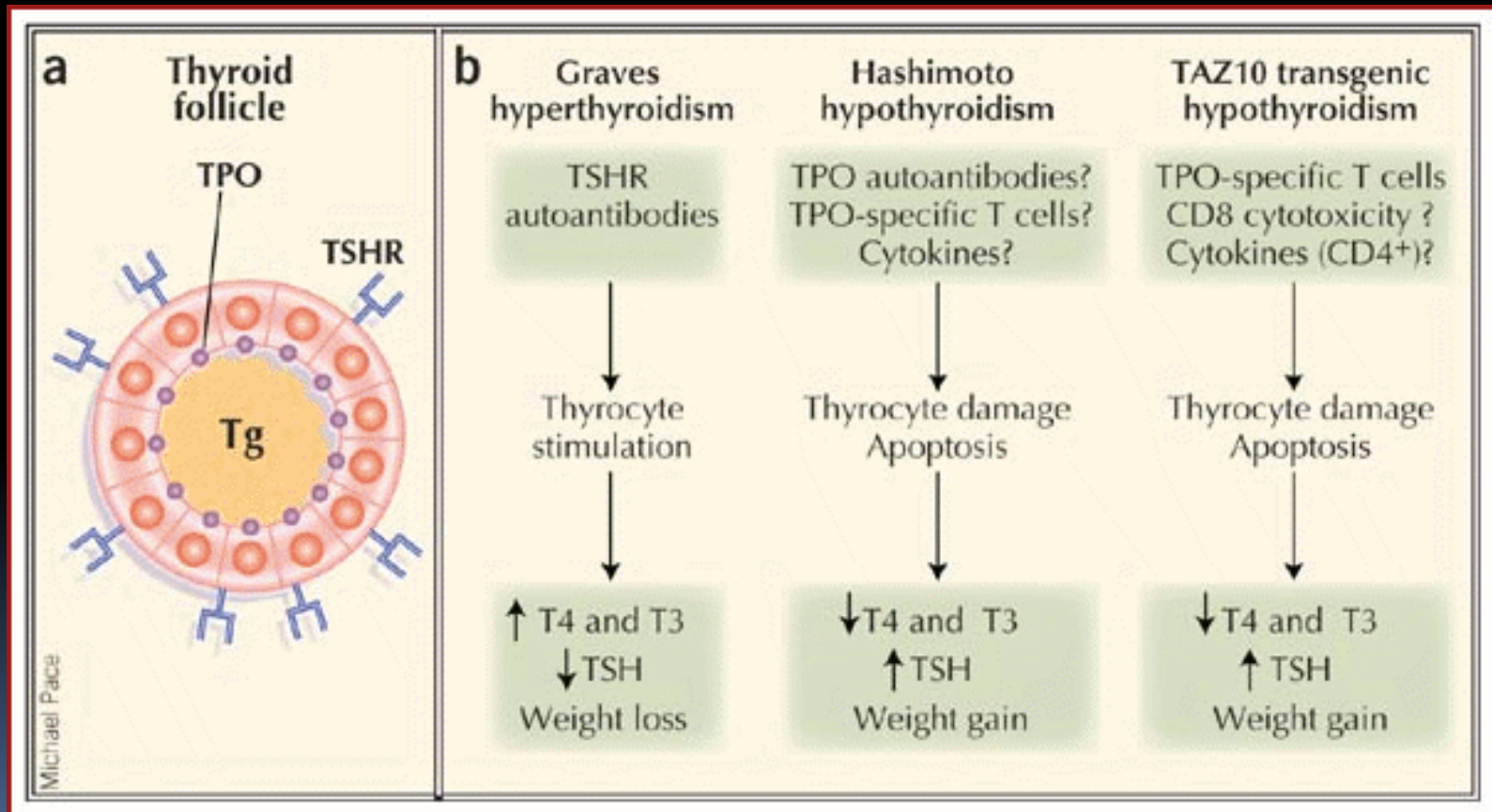
Thyroid & Pituitary



An elegant system. The thyroid regulates its hormone output with the aid of the hypothalamus

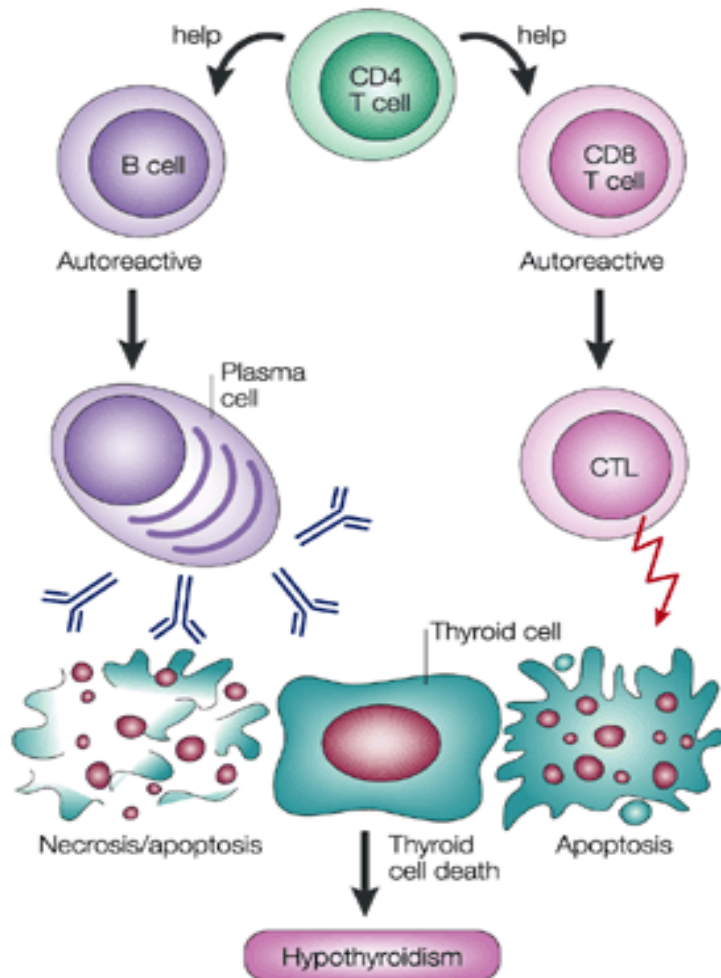
Thyroid follicle

Basic unit of thyroid gland

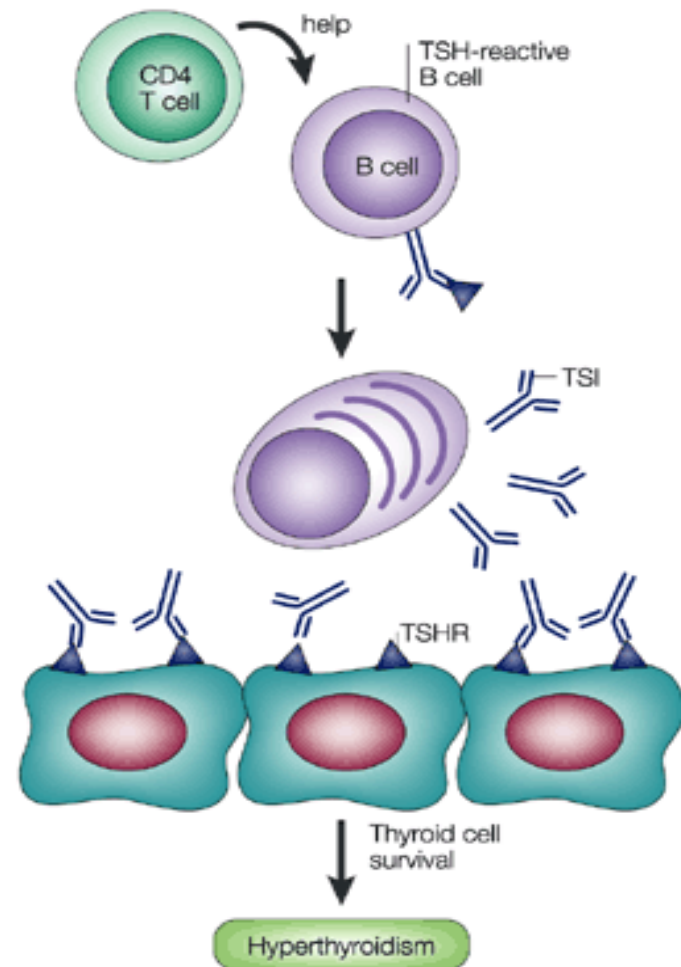


Auto immunity

a Hashimoto's thyroiditis



b Graves' disease



HYPOTHYROIDISM

thyroidism

DRY, COARSE HAIR

LOSS OF
EYEBROW HAIR

PUFFY FACE

ENLARGED THYROID
(GOITER)

SLOW HEARTBEAT

ARTHRITIS

COLD
INTOLERANCE

DEPRESSION

DRY SKIN

FATIGUE

FORGETFULNESS

HEAVY
MENSTRUAL
PERIODS

INFERTILITY

MUSCLE ACHES

WEIGHT GAIN

CONSTIPATION

BRITTLE NAILS

HYPERTHYROIDISM

thyroidism

HAIR LOSS

BULGING EYES

SWEATING

ENLARGED THYROID
(GOITER)

RAPID HEARTBEAT

DIFFICULTY
SLEEPING

HEAT
INTOLERANCE

INFERTILITY

IRRITABILITY

MUSCLE
WEAKNESS

NERVOUSNESS

SCANT
MENSTRUAL
PERIODS

WEIGHT LOSS

FREQUENT
BOWEL
MOVEMENTS

WARM, MOIST
PALMS

TREMOR
OF FINGERS

SOFT NAILS

This diagram is to be used for informational purposes only. Please consult your physician for proper diagnosis and treatment.

Congenital Hypothyroidism



Response to hypothyroidism treatment



Nov 2007



Jan 2008

Hypothyroidism, Response to treatment

Facial puffiness, Luster less skin, Depressed, Dull, Weak, Lethargic, Dry & rough skin

Before treatment



2 months after treatment



Congenital Central Hypothyroidism due to TSH- β gene Mutation

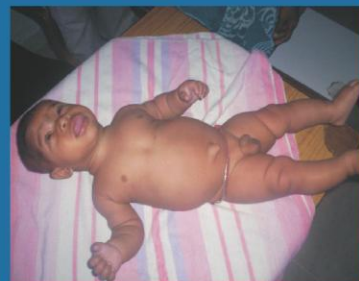
Muthukrishnan J, Harikumar KVS, Verma A, Modi KD, Dept of Endocrinology, Medwin Hospital, Hyderabad

Clinical Data

- 15mth old, male child
- Developmental delay
- Constipation
- No h/o prolonged jaundice, hypoglycemia,
- 2nd deg Consanguinity
- No similar Family history
- Elder sib 4yrs,male, normal

Examination

- Length 64cm (<5%ile)
- Wt 9kg (10%ile)
- HC 46cm
- P1G1, Testes b/l <4ml,
- SPL 3cm
- AFontanelle open,
- Posterior F closed
- Protruding tongue, umbilical hernia,
- Dry skin, hoarse weak cry,
- No goiter



Investigation

- TSH 0.07mIU/l (0.3-4.2)
- Total T4 1.16mcg/dl (5-12)
- Total T3 0.24 ng/dl (0.16-0.32)
- Rpt TSH 0.06 mIU/l
- S.Cortisol 18.8mcg/dl
- Hb 13.4g/dl
- TRH stimulation test – Not done

Diagnosis:

Congenital Central Hypothyroidism
? Isolated TSH Deficiency
Rx
Levothyroxine 100mcg/d

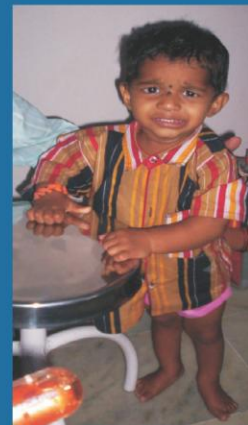


MRI – Normal Pituitary



Bone Age <3mths

Treatment and Follow up



Ht 83 cm,Wt 12kg
TT4 1.24 ng/dl (0.8 – 1.8)

Age 1yr 3m

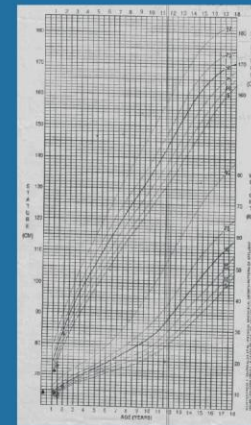


Length 64cm, Wt 9kg

Age 1yr 5m



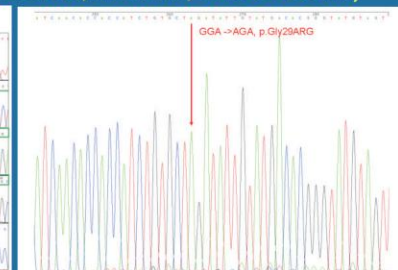
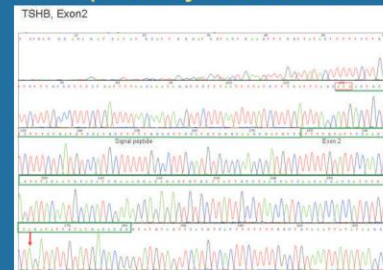
Length 71cm, Wt 10kg



19cm gain in 10mths

Genetic Analysis

(Courtesy – Prof Annette Grüeters, H Krude, Univ of Berlin)



Discussion

- Congenital Central Hypothyroidism

Rule out:

Other pituitary hormone deficiency

Structural Hypothalamo-pituitary lesion

- TRH testing ?

Mehta A et al, JCEM, 2003

Isolated TSH deficiency

TSH beta gene mutation - 5 types known

Homozygous missense mutation due to single base substitution G? A at codon 85

(Earlier reported from Japan)

Hayashizaki Y et al, EMBO J, 1989

