

Short Stature and Tall Stature

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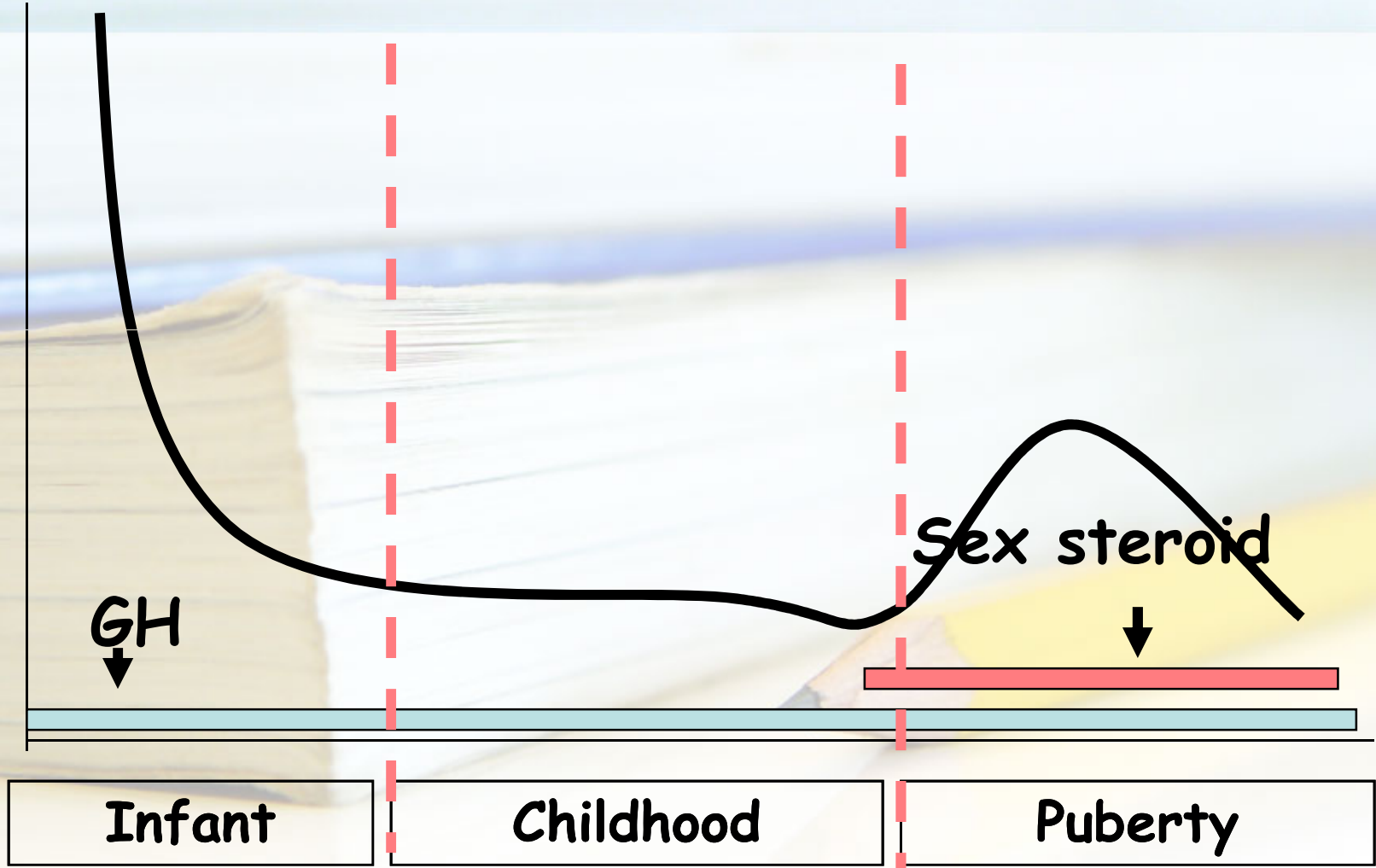
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Growth

- Normal growth
 - Infant
 - Childhood
 - Puberty
- Growth : change in size & maturation
- Stature : size

Growth Velocity Curve

Cm/tahun



GH

Sex steroid

Infant

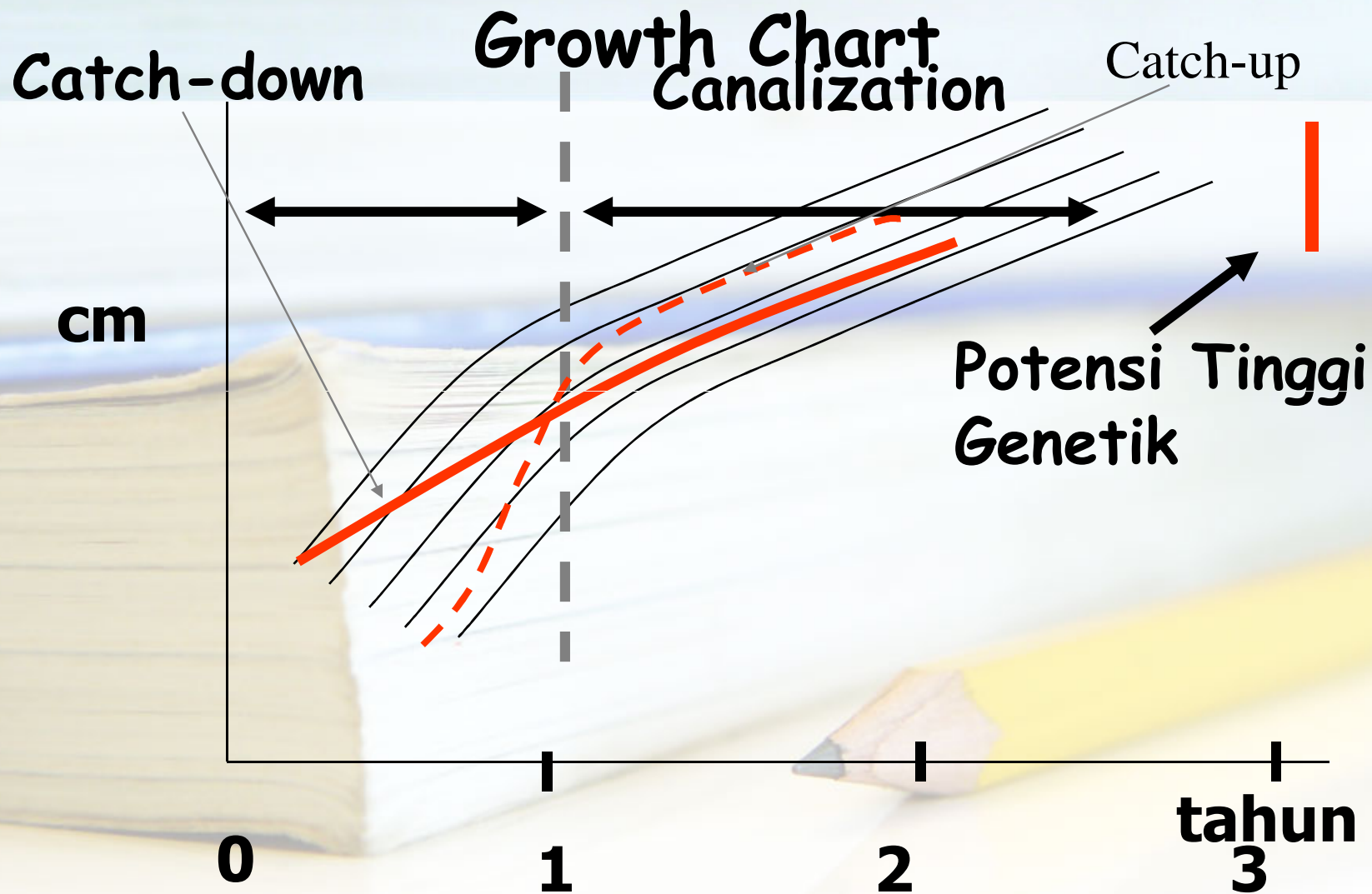
Childhood

Puberty

Growth rate by age

1-6 mo	: 18 - 22 cm/yr
6-12 mo	: 14 - 18 cm/yr
1 yr	: 11 cm/yr
2 yr	: 8 cm/yr
3 yr	: 7 cm/yr
4 - puberty	: 5 - 6 cm/yr

INFANT PERIOD



Evaluation of growth

- Anthropometry
 - Standing & sitting : proportional
 - Arm span
- Bone age :
 - GP, TW, RUT
 - Normal, delayed, advanced
 - prediction of final height

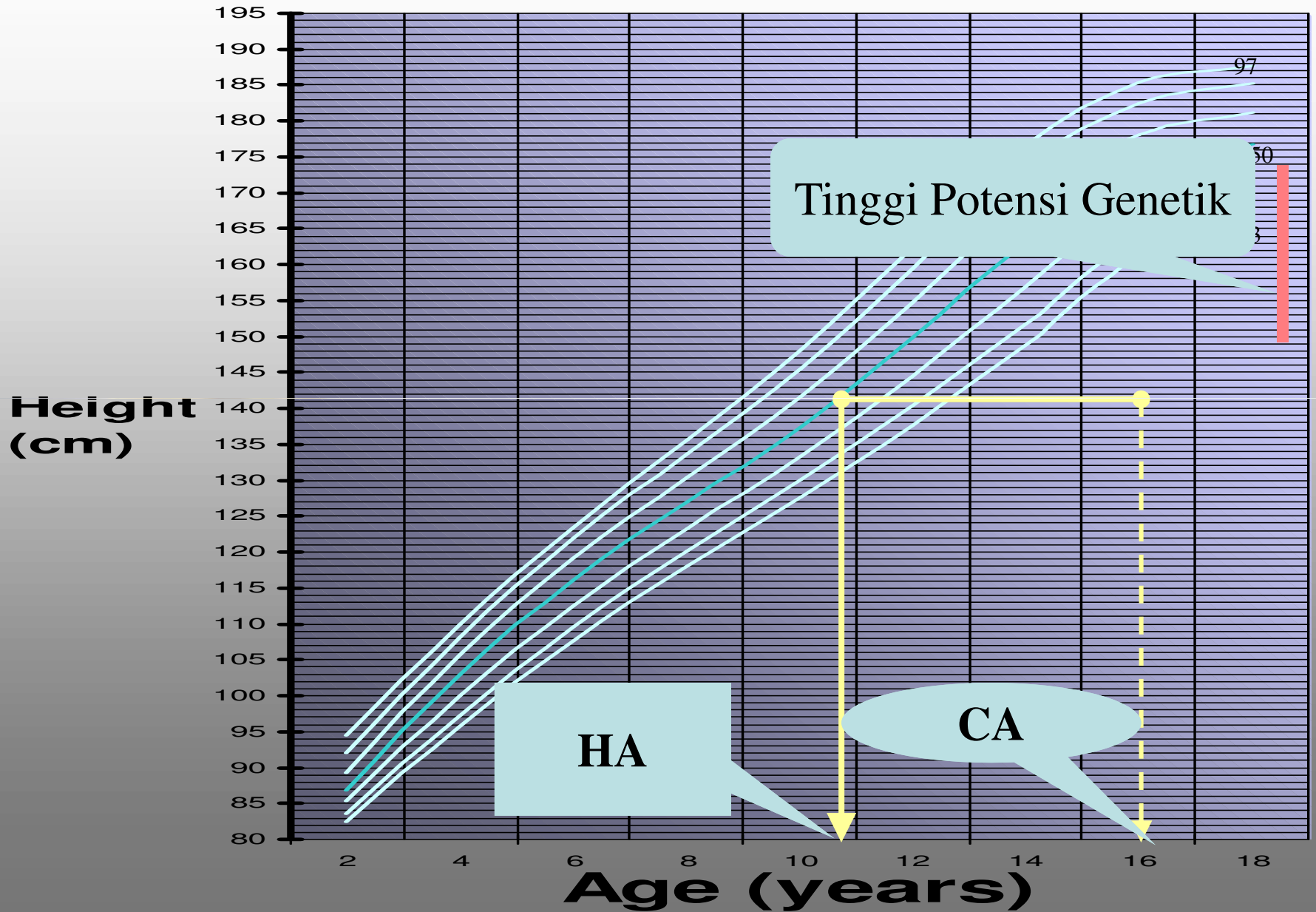
Growth chart

- Growth curve
 - NCHS, Jumadias, Husaini
- Plotting growth
 - Normal, short, tall
- Interpretation of plot
- Potential genetic height

Growth Chart



Growth Chart



Bone age

- Greulich & Pyle
 - Comparison of left wrist
 - Prediction of FH after 6 years
 - Table Bayley & Pinneau
- Tanner Whitehouse II
 - Maturation of ossification center
 - More reliable : scoring system
 - complicated

Usia tulang

- Tangan kiri cara
 - Atlas Greulich - Pyle
 - Tanner-Whitehouse II
 - RWT
- Pusat-pusat osifikasi
- Prediksi tinggi akhir



Short stature

- Height < 2SD
- Sex, age and race
- Pattern of growth more important rather than absolute position on growth curve

Short stature

- Variants of normal
- Prenatal onset
- Post natal onset

Variants of normal (normal growth velocity)

- Familial short stature
 - Parents height genetically short
 - normal bone age
 - short adult
- Constitutional delay of growth & puberty
 - Delayed puberty in the family
 - Normal growth velocity
 - normal adult height

Prenatal onset

- Primary growth deficiency
 - Malformation
 - syndromes
- Secondary growth deficiency
 - Low maternal socioeconomic
 - Undernutrition
 - Maternal disorder or disease

Post natal onset

- Nutritional
- Deprivation syndrome
- Cardiac defect
- Respiratory insufficiency
- Renal dysfunction
- Hormonal
- Chronic infection, chronic disease

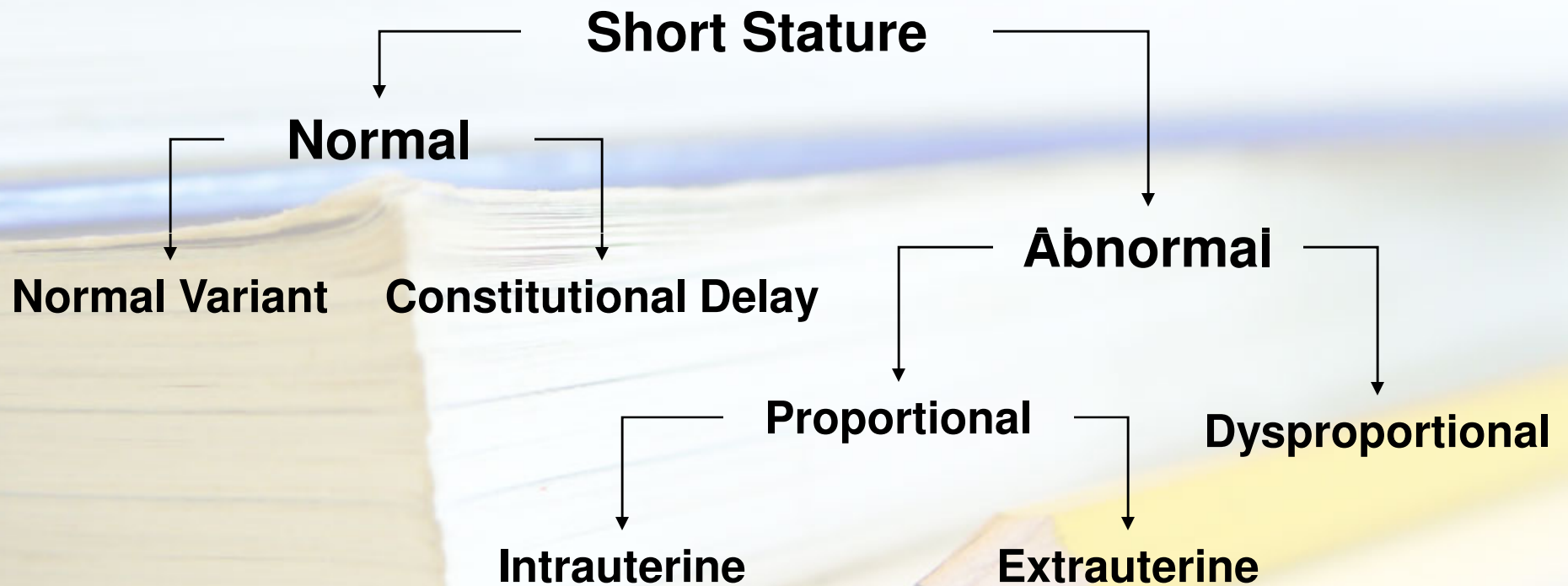
Etiology

- Primary disturbances of growth
 - Skeletal dysplasias
 - Chromosomal abnormalities
 - Metabolic causes
 - IUGR
 - Syndromes
 - Genetic

Etiology

- Secondary growth disturbances
 - Undernutrition
 - Disorder of the bowel, kidney, heart, lung
 - Psychosocial deprivation
 - Chronic infection, drugs
 - Endocrine disorder
 - Idiopathic growth delay

Diagnostic Approach to Short Stature



Endocrinological causes

- Normal variant : CDGP
- GH Deficiency
- Hypothyroid
- Precocious Puberty
- Cushing's syndrome
- Pseudohypoparathyroidism

Treatment

- Depend on the etiology
 - Nutrition
 - Organic disease
 - CHD, IDDM
 - Hormonal
 - GH, Thyroid, Sex hormone
 - Mechanical
 - Bone lengthening : achondroplasia

GH deficiency

- Short stature
- Chubby
- Abdominal adiposity
- Micropenis
- Single central incisor
- Frontal bossing
- Proportional

GH Deficiency

- Low growth velocity : < 25%
- Retarded bone age
- GH level < 10 ng/dl
 - Screening tests : sleep & exercise
 - Stimulation test
 - 2 tests : ITT & Arginine,
- Low IGF-1

Causes of GH Deficiency

- Congenital
 - Idiopathic
 - Genetic
 - Associated anatomic defect : SOD, midline defect
- Acquired
 - Trauma
 - Neoplasma
 - Cranial irradiation
 - etc

Treatment

- Varies: GH 14 - 21 IU/m²/day
- 6 times/week
- Monitoring:
 - Height, velocity
 - Side effect
- Terminate :
 - No response < 2 cm
 - Epiphyseal plate closure

CDGP

- Family history
- Growth velocity normal
- Bone age retarded
- Puberty : late
- Adult height : normal
- Treatment : No Need

Congenital hypothyroidism

- Large posterior fontanelle
- Respiratory difficulty
- Hypothermia
- Feeding difficulty
- Lethargy
- Delay in passing meconium
- Abdominal distention
- Vomiting
- Prolonged jaundiced
- Oedema

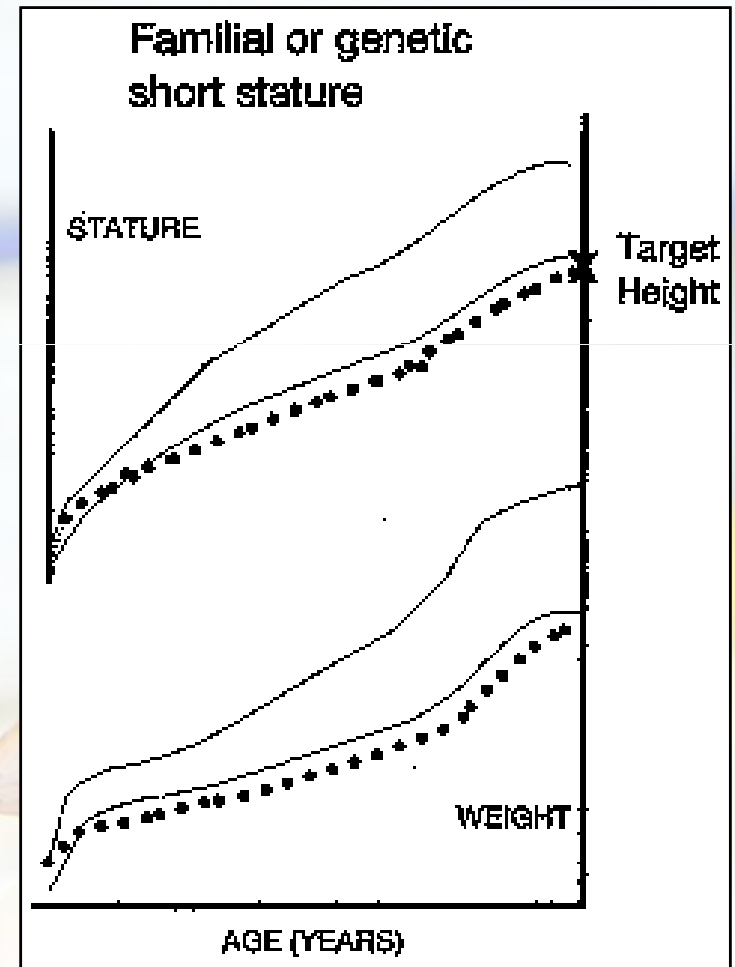
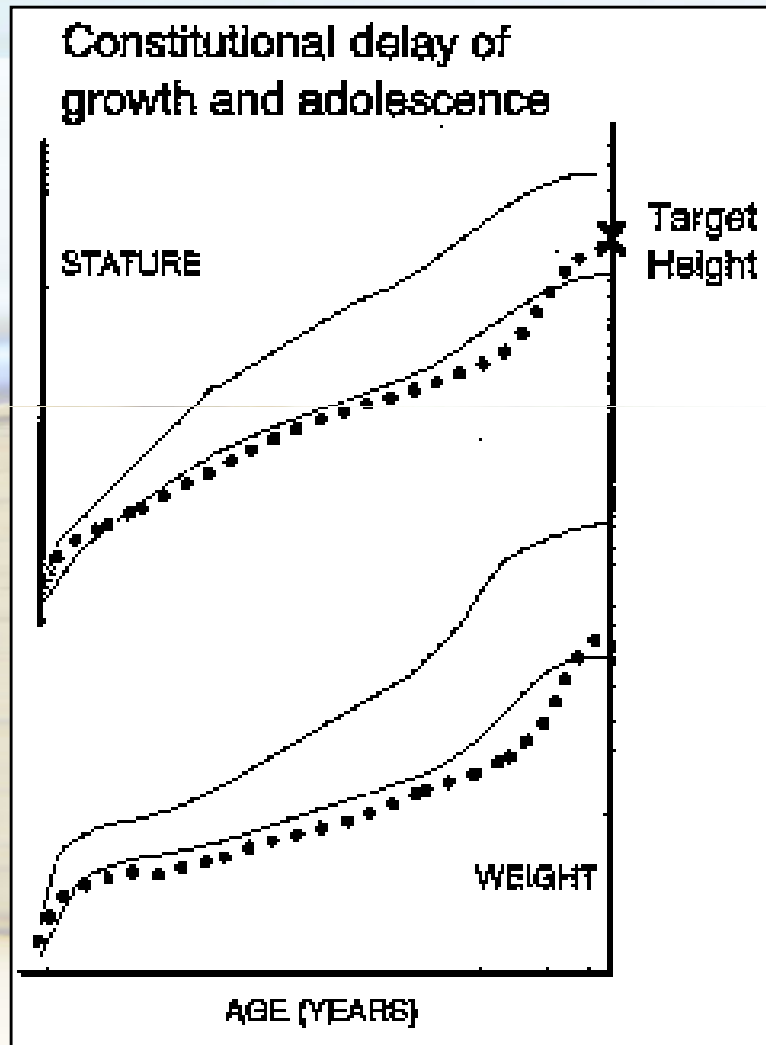
Cushing's Syndrome

- Corticosteroid excess
- Growth retardation due to
 - Interfering protein anabolism
 - Impairing somatomedin production
- Hypertension
- Obesity predominant : trunk and neck, moon face
- Disturbances of glucose metabolism
- Purple striae, hirsutism, osteoporosis, hypogonadism
- Muscular weakness

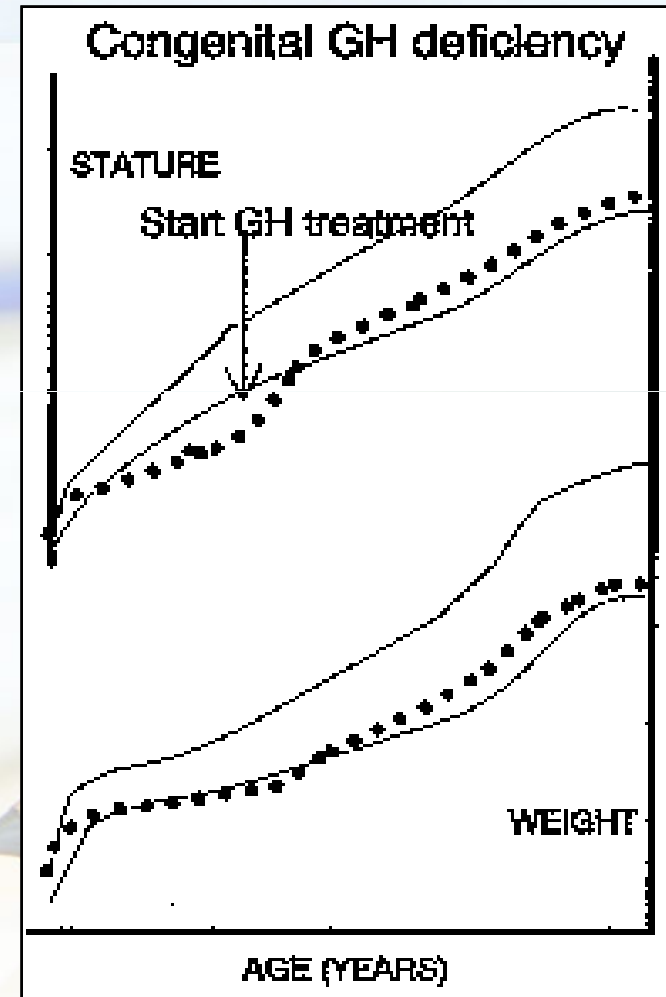
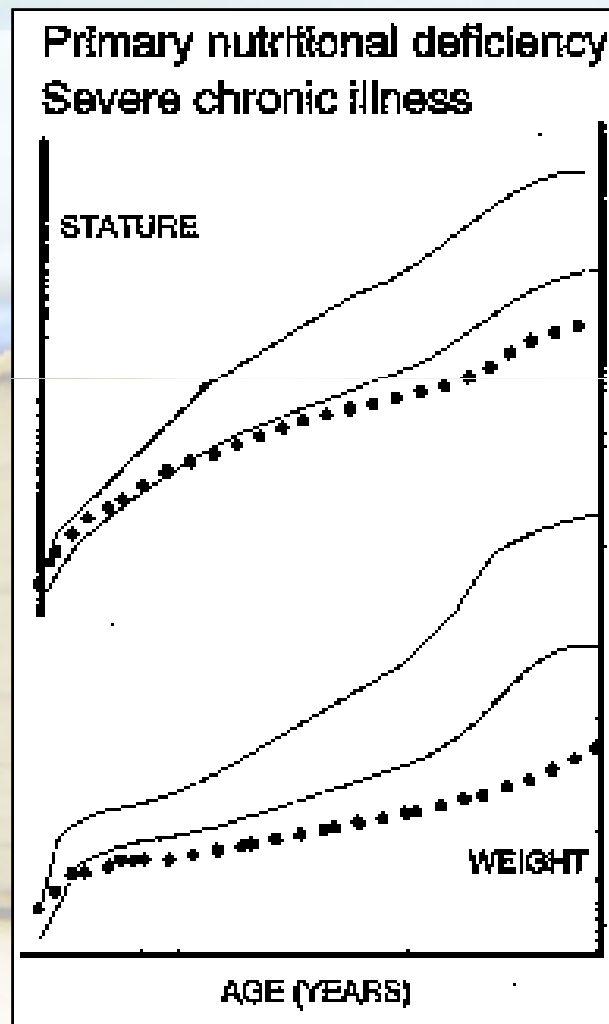
Pseudohypoparathyroidism

- Short stature
- Mental retardation
- Albright's osteodystrophy
- Round facies
- Ectopic calcification

Pola pertumbuhan linier



Pola pertumbuhan



Conclusion

- Short stature
 - Etiology : varies; endocrinology
 - Treatable, depend on the etiology
 - Psychosocial problem
- Growth monitoring : important
- Anthropometric measurement
 - Clue to diagnosis

Etiology

- Primary disturbances of growth
 - Skeletal dysplasias
 - Chromosomal abnormalities
 - Metabolic causes
 - IUGR
 - Syndromes
 - Genetic

Tall Stature

- Height > 2 SD
- Age, sex and race

Etiology

- Genetic
 - Familial tall stature
 - Familial rapid maturation
- Hormonal
 - GH excess
 - Hyperthyroid
 - Androgen/estrogen excess
- Syndromes
 - Weaver, Sotos, Marfan, Klinefelter
- Metabolic disorders

Diagnostic approaches

- Height, velocity
- Dysmorphism
- Family history

Treatment

- To treat or not to treat
 - Family or patient request
 - Contra indication
- Psychosocial problem
- Female > male
- Ethynil estradiol 100 ug/day
- Testosterone 200 - 250 mg every 2 - 3 week

Conclusion

- Short stature & tall stature
 - Treatable, depend on the etiology
 - Psychosocial problem
- Growth monitoring : important
- Anthropometric measurement
 - Clue to diagnosis

A photograph of a stack of books on a desk with a yellow pencil lying on top of them. The text 'Thank You' is overlaid in a purple, stylized font.

Thank You