

GROWTH AND DEVELOPMENT IN CHILDREN

Objectives

- Define growth and development.
- Identify the importance of growth and development.
- *Outline the principles of growth and development.
- *List factors affecting growth and development.
- Outline the types of growth and development.
- Identify the stages of development.

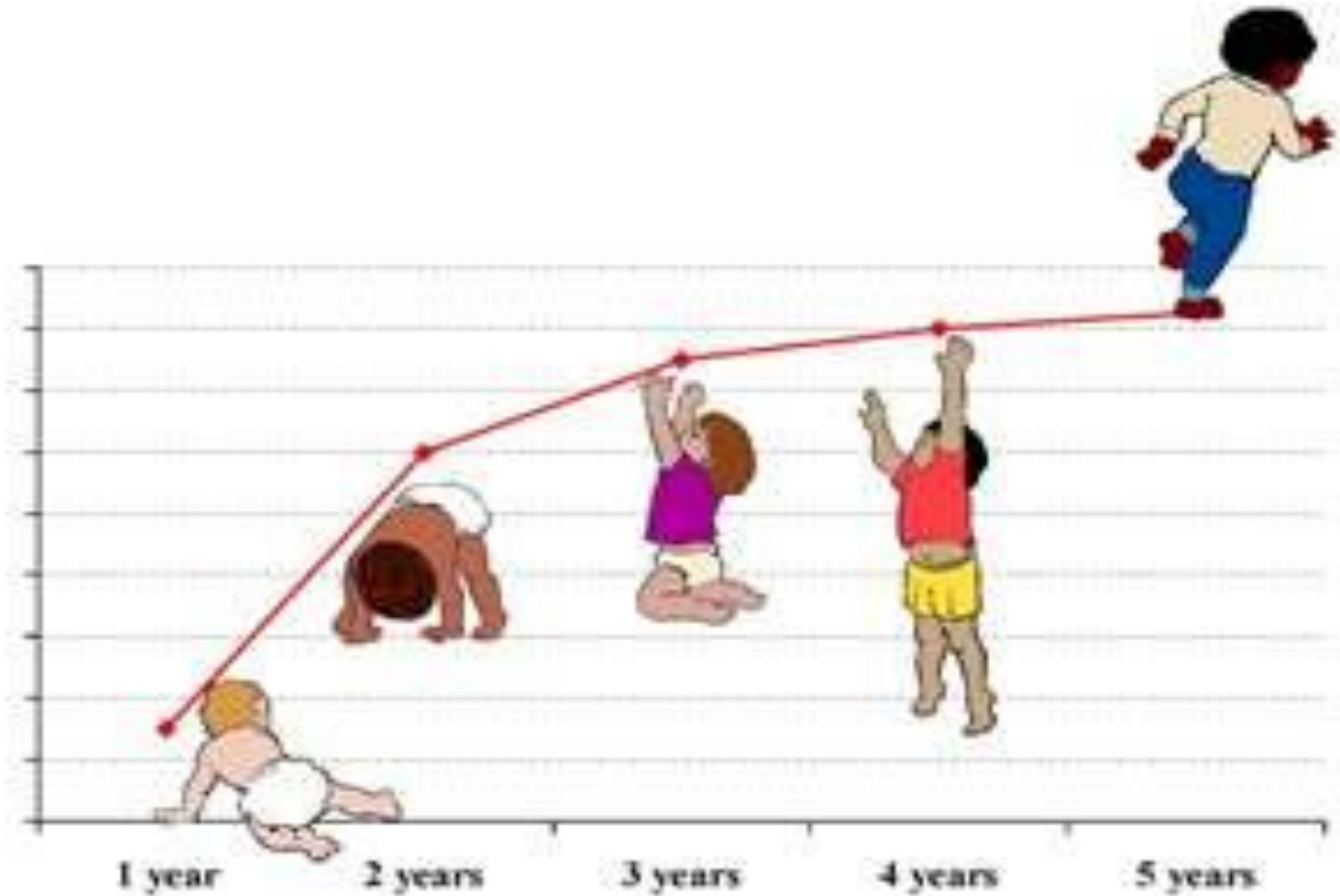
Growth

Growth refers to an increase in **physical size** of the whole body or any of its parts.

It is a **quantitative change** in the child's body.

It can be measured in Kg, pounds, meters, inches, etc

Child Growth (Image: WHO)



Changes in bodily proportions with age.

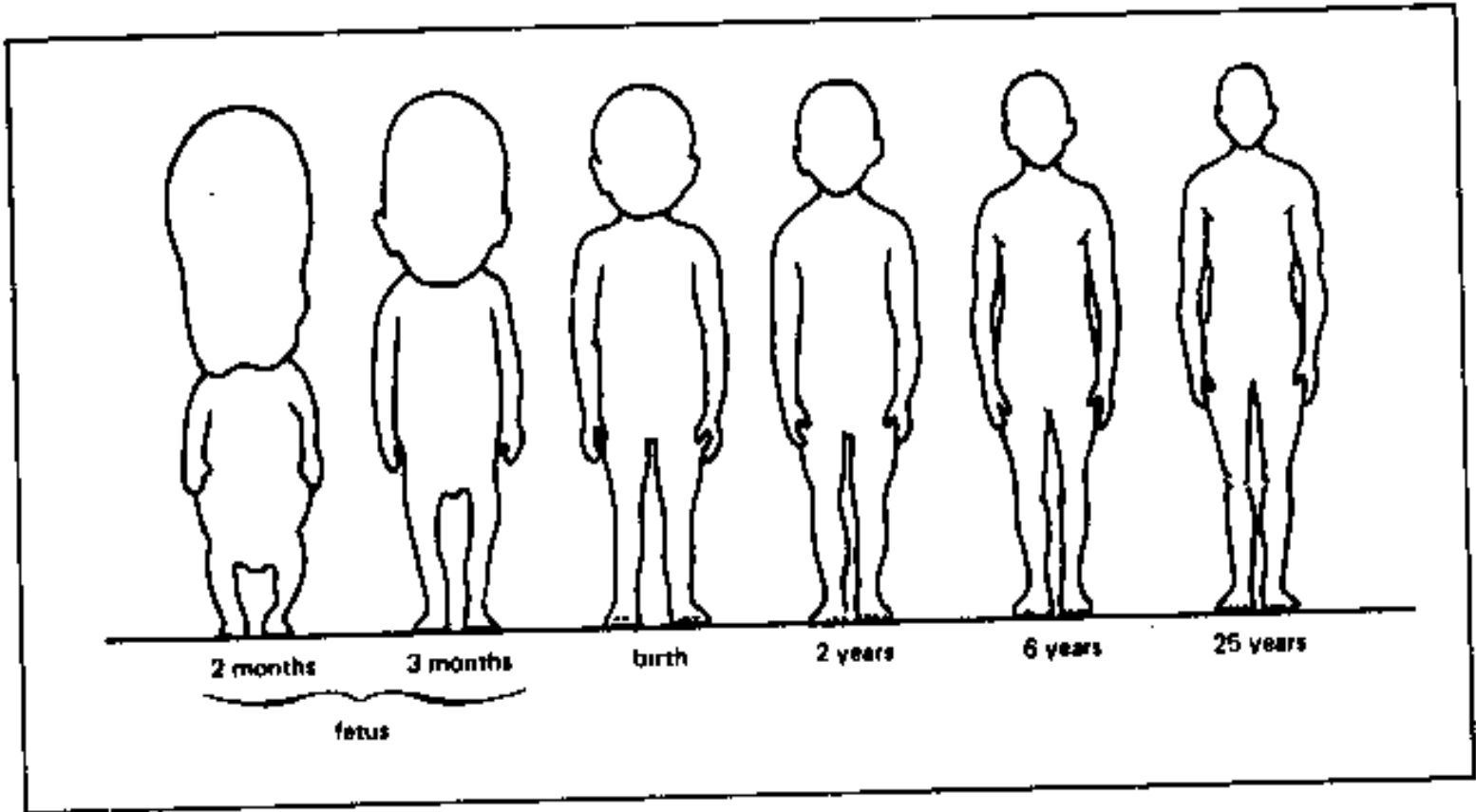


Figure 9. Changes in bodily proportions with age

Development

- Development refers to a progressive increase in **skill and capacity of function**.
- It is a **qualitative change** in the child's functioning.
- It can be measured through **observation**.

Importance of Growth and development

- Knowing what to expect of a particular child at any given age helps identify problems when they arise.
- Helps in understanding how illnesses affect growth and development.
- Helping in formulating the plan of care.
- Helping in parents' education in order to achieve optimal growth & development at each stage.

Factors affecting growth and development:

- Hereditary
- Environmental factors

Stages of Growth and Development

- Neonate

- Birth to 1 month

- Infancy

- 1 month to 1 year

- Early Childhood

- Toddler

- 1-3 years

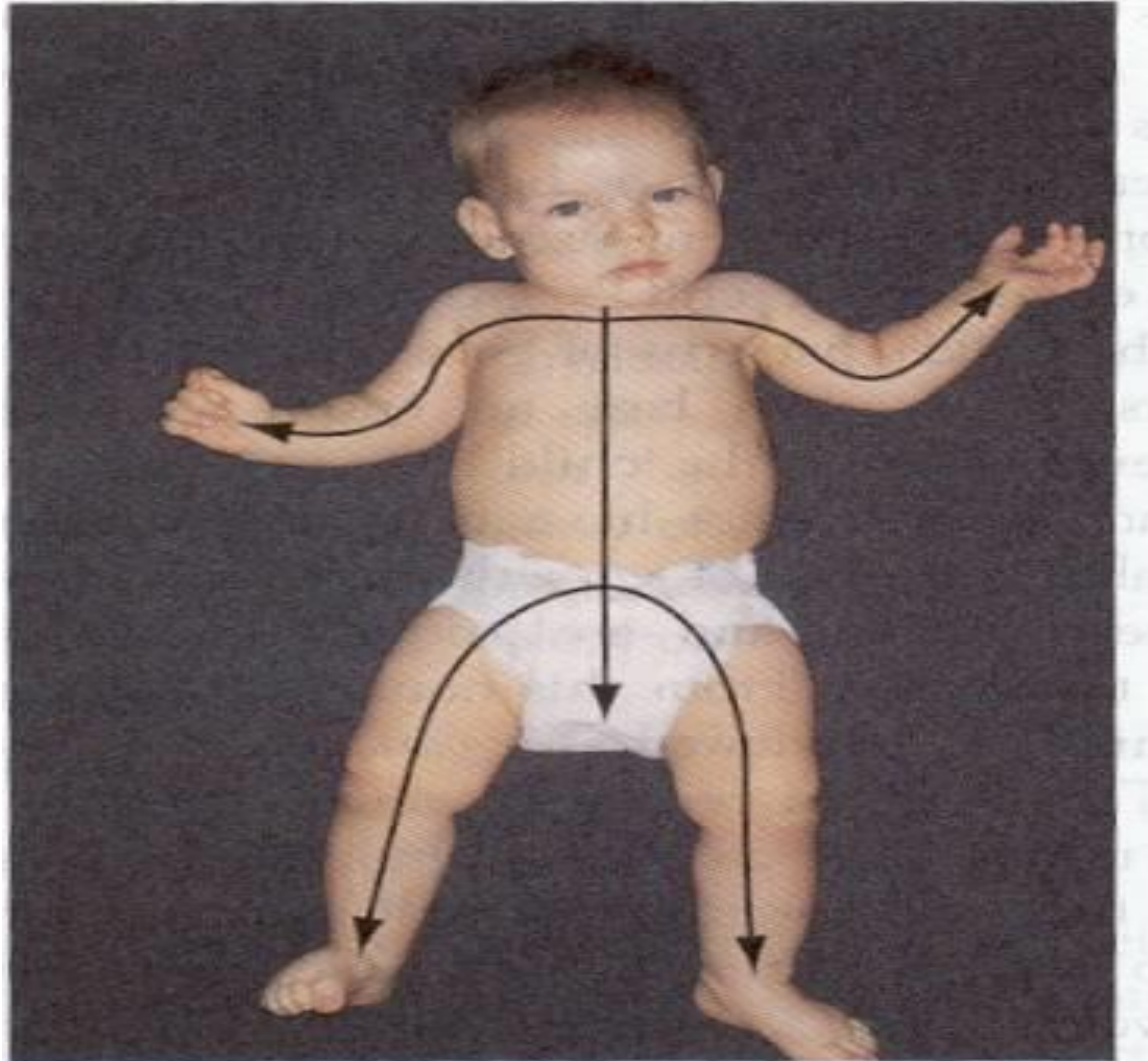
- Preschool

- 3-6 years

Cont..

- Middle Childhood
 - School age
 - 6 to 12 years
- Late Childhood
 - Adolescent
 - 13 years to approximately 18 years

Growth Pattern



Growth Patterns

- The child's pattern of growth is in a head-to-toe direction, or **cephalocaudal**, and in an inward to outward pattern called **proximodistal**.

Gross Motor Skills

- The acquisition of gross motor skill precedes the development of fine motor skills.
- Both processes occur in a cephalocaudal fashion
 - Head control preceding arm and hand control
 - Followed by leg and foot control.

Normal newborn

Physical growth

- Weight = 2.5 - 4 kg
- Wt loss 5% -10% by 3-4 days after birth
- Wt gain by 10th days for term babies and by 14 days for preterms
- Gain $\frac{3}{4}$ kg by the end of the 1st month

LENGTH

- Boys average Lt = 50 cm
- Girls average Lt = 49 cm
- Normal range for both (47.5- 53.75 cm)

Head circumference

33-37 cm

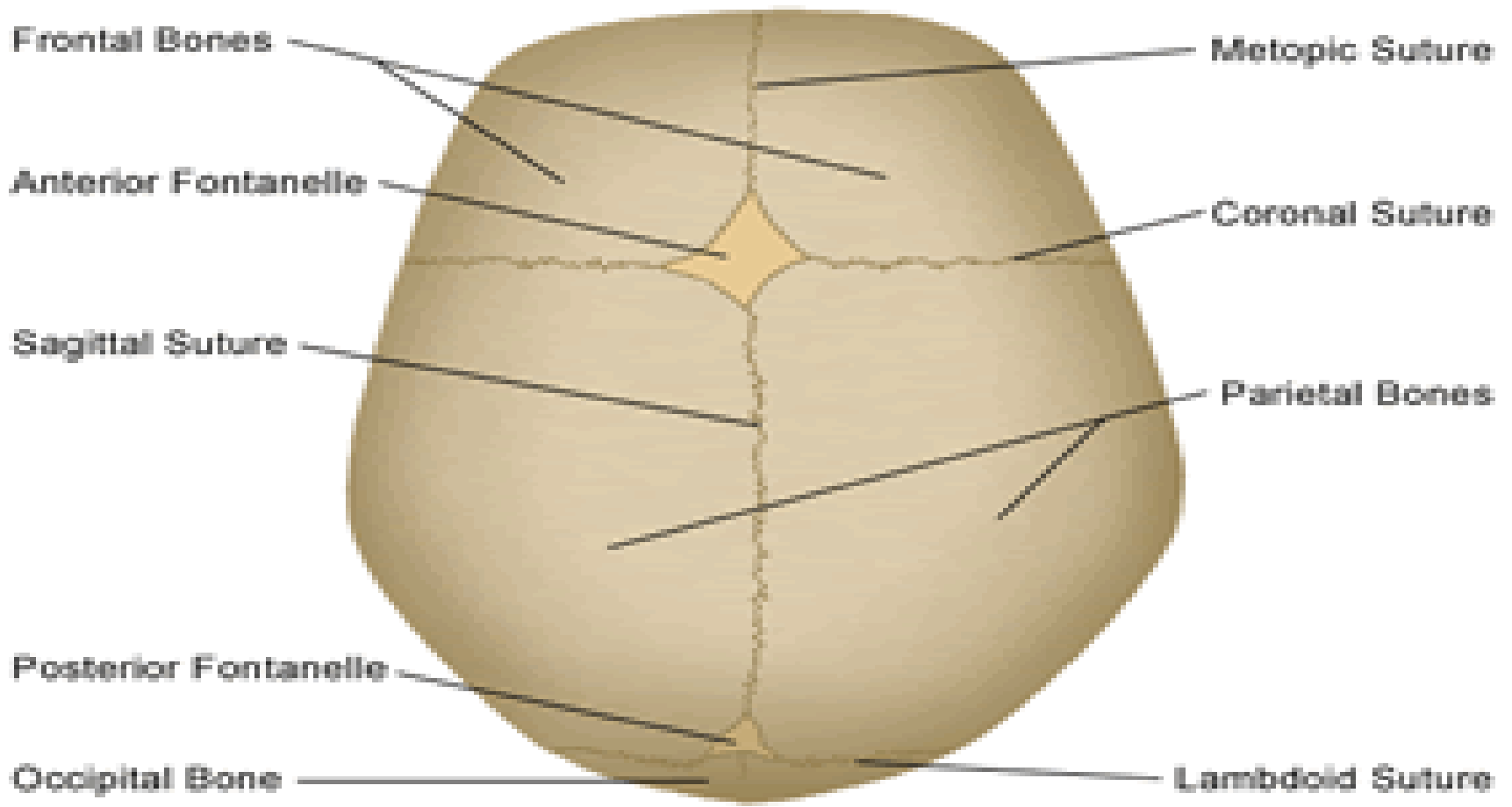
Head is $\frac{1}{4}$ total body length

Skull has 2 fontanelles (anterior & posterior)

Cont .. Head circumference

- It increases about **2 cm /month** during the **1st 3 months**,
- Then, **1 cm/month** during the next **3 months** and lastly **0.5cm/month** in the last **6 months**.
- Posterior fontanel closes by 6-8 w of age.
- Anterior fontanel closes by 12-18 months of age.

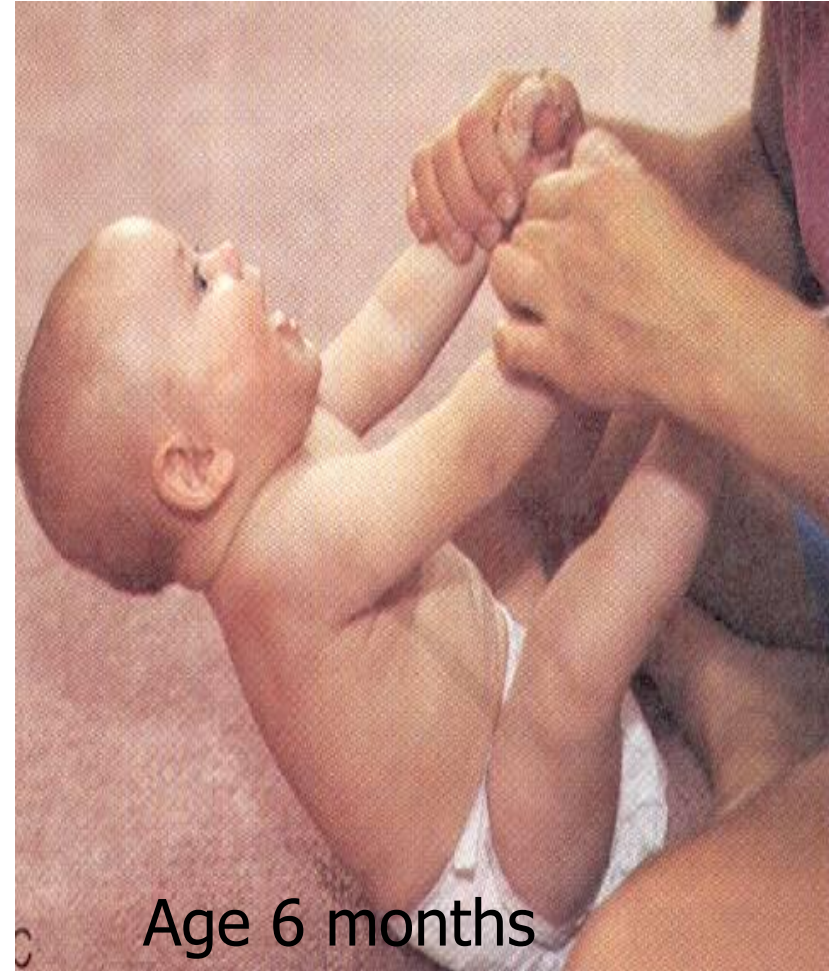
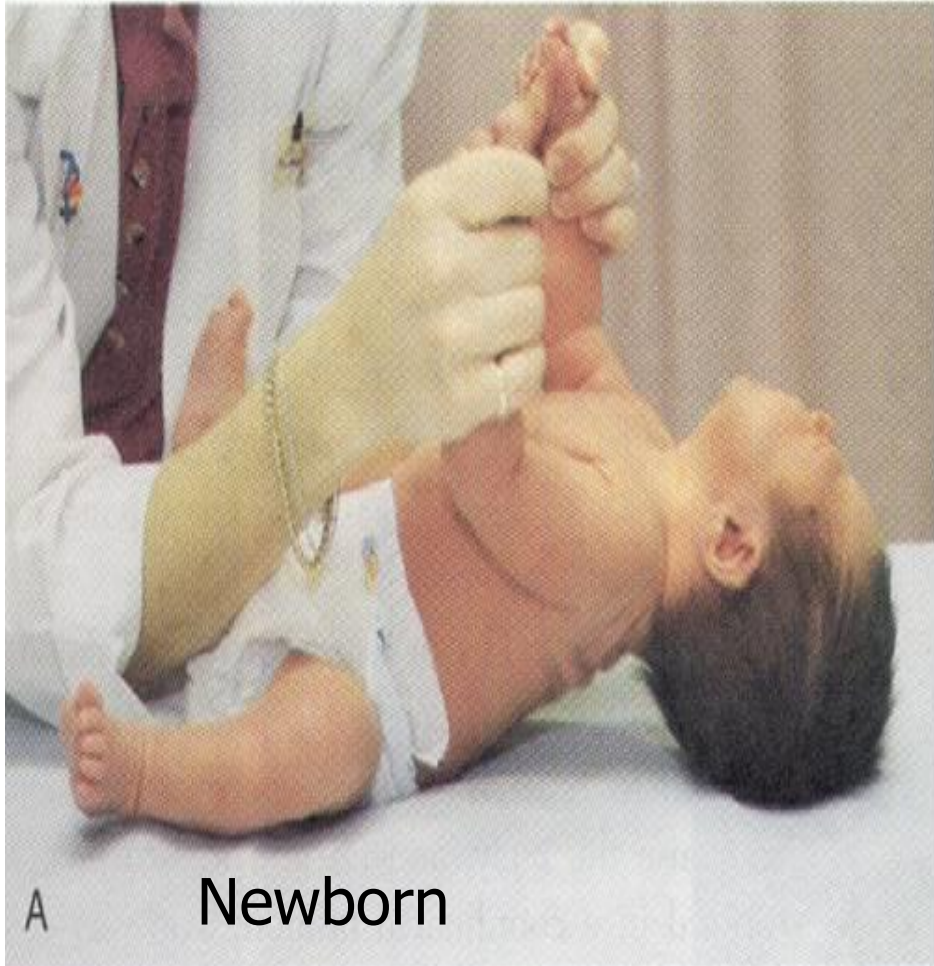
Normal Skull of the Newborn



Gross Motor Development

- Newborn: barely able to lift head
- 6 months: easily lifts head, chest and upper abdomen and can bear weight on arms

Head Control



Neonatal reflexes

Are primitive responses present in the normal newborn and occur as responses to specific stimuli and depend on level of the baby's wakefulness.

They disappear at different times up to the age of 4 months, and persistence may denote developmental delay.

Absence may be due to a brain or localized limb abnormality.

Neonatal reflexes cont..

- Rooting
- Sucking
- Swallowing
- Palmar and plantar grasp
- Tonic-neck
- Startle/ moro reflex
- Stepping /walking

One month-Reflexes

Tonic neck reflex



Grasp reflex



Step reflex



Crawl reflex



Infancy

- It is the period which starts at the **end of the first month** up to the end of the **first year of age**.
- Infant's growth and development during this period are rapid.

Growth

Weight : the infant gains :

- Birth to 4 months $\rightarrow \frac{3}{4}$ kg /month
- 5 to 8 months $\rightarrow \frac{1}{2}$ kg / month
- 9 to 12 months $\rightarrow \frac{1}{4}$ kg /month

The infant will double his birth wt by **6** months and triple it by **12** months of age.

Infant weight calculation

Infants from 3 to 12 months

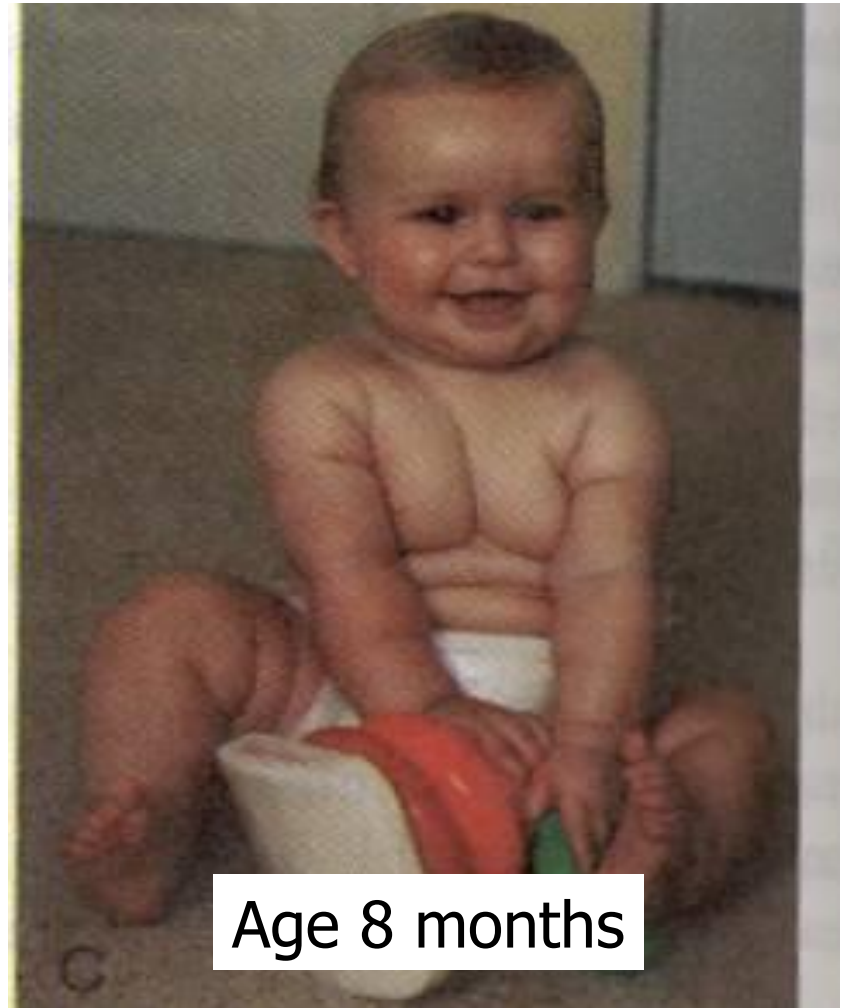
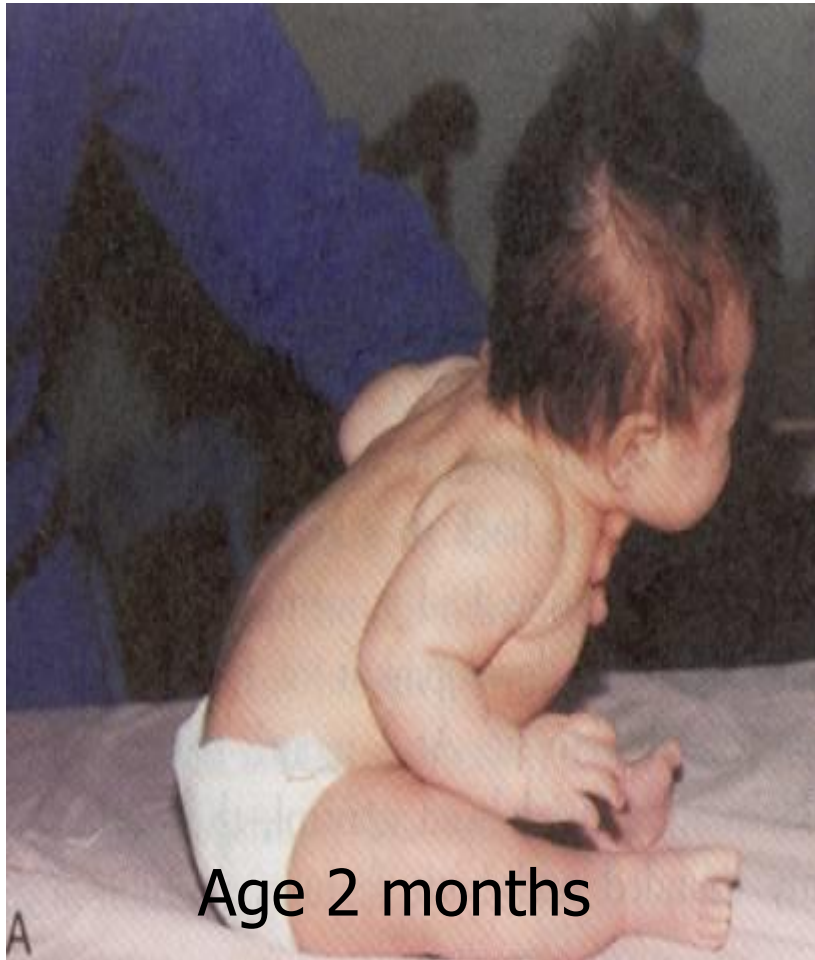
$$\text{Weight} = \frac{\text{Age in months} + 9}{2}$$

$$\begin{aligned} \text{Wt of 7 months old infant} &= 7+9 = \\ &16/2 = 8 \text{ kg} \end{aligned}$$

Sitting up

- 2 months old: needs assistance
- 6 months old: can sit alone in the tripod position
- 8 months old: can sit without support and engage in play

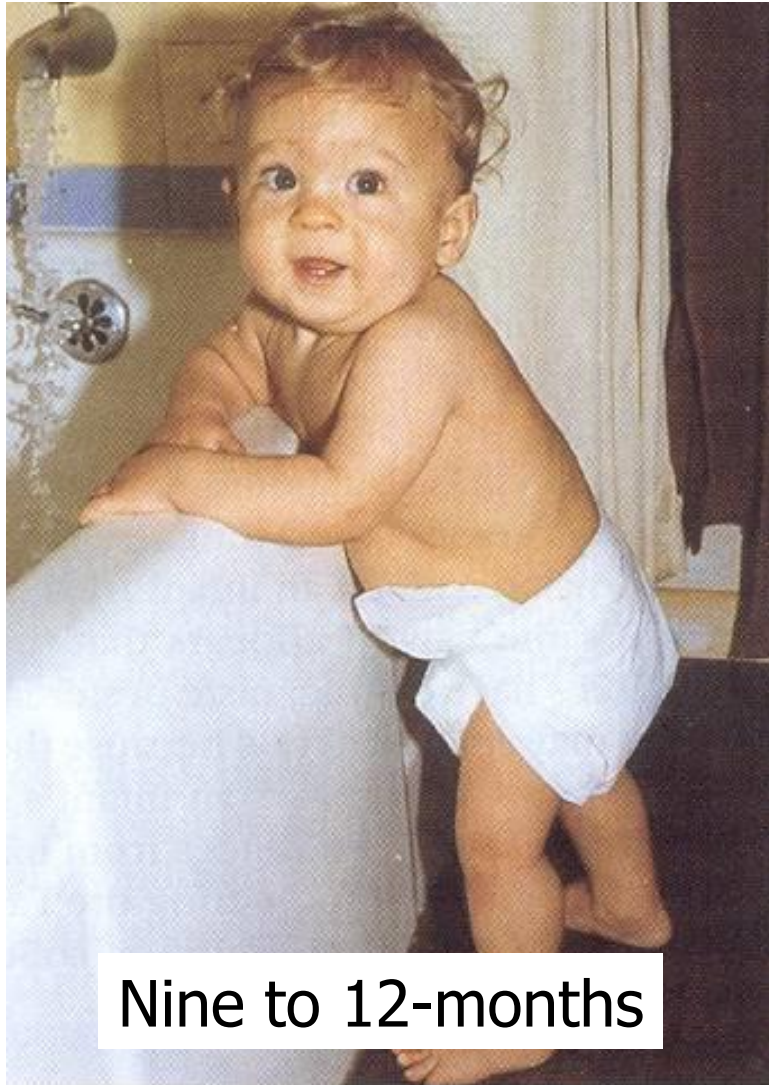
Sitting Up



Ambulation

- 9 month old: crawl
- 1 year: stand independently from a crawl position
- 13 month old: walk and toddle quickly
- 15 month old: can run

Ambulation



Nine to 12-months



13 month old

F

Fine Motor - Infant

- Newborn has very little control. Objects will be involuntarily grasped and dropped without notice.
- 6 month old: **palmar grasp** – uses entire hand to pick up an object
- 9 month old: **pincer grasp** – can grasp small objects using thumb and forefinger

Speech Milestones

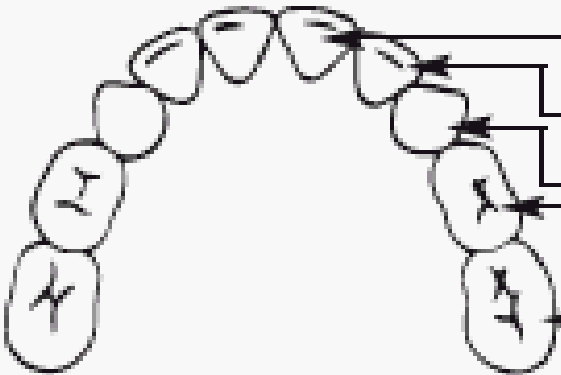
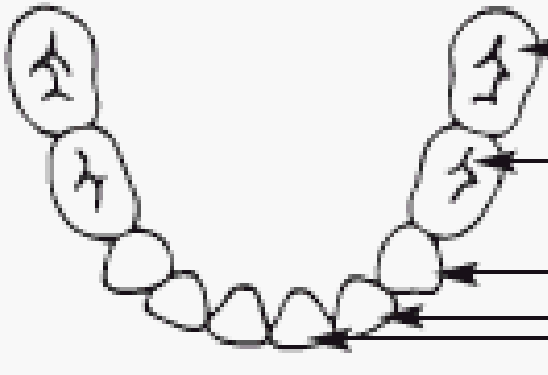
- 1-2 months: coos
- 2-6 months: laughs and squeals
- 8-9 months babbles: mama/dada as sounds
- 10-12 months: “mama/dada specific
- 18-20 months: 20 to 30 words – 50% understood by strangers
- 22-24 months: two word sentences, >50 words, 75% understood by strangers
- 30-36 months: almost all speech understood by strangers

Average age for teeth eruption:

- Lower central incisors
- Upper central incisors
- Upper lateral incisors
- Lower lateral incisors
- Lower first molars
- Upper first molars
- Lower cuspids
- Upper cuspids
- Lower 2nd molars
- Upper 2nd molars
- Erupt at 6 months
- Erupt at 7.5 months
- Erupt at 9 months
- Erupt at 11 months
- Erupt at 12 months
- Erupt at 14 months
- Erupt at 16 months
- Erupt at 18 months
- Erupt at 20 months
- Erupt at 24 months.

Cont..

PRIMARY DENTITION

	Upper Teeth	Erupt	Exfoliate
 A diagram showing the upper arch of primary teeth. From left to right, the teeth are labeled: Second molar, First molar, Canine (cuspid), Lateral incisor, and Central incisor. Arrows point from the text labels to the corresponding teeth in the diagram.	Central incisor	8-12 months	6-7 years
	Lateral incisor	9-13 months	7-8 years
	Canine (cuspid)	16-22 months	10-12 years
	First molar	13-19 months	9-11 years
	Second molar	25-33 months	10-12 years
	Lower Teeth	Erupt	Exfoliate
 A diagram showing the lower arch of primary teeth. From left to right, the teeth are labeled: Central incisor, Lateral incisor, Canine (cuspid), First molar, and Second molar. Arrows point from the text labels to the corresponding teeth in the diagram.	Second molar	23-31 months	10-12 years
	First molar	14-18 months	9-11 years
	Canine (cuspid)	17-23 months	9-12 years
	Lateral incisor	10-16 months	7-8 years
	Central incisor	6-10 months	6-7 years

Fine Motor Development



Red Flags in infant development

- Unable to sit alone by age 9 months
- Unable to transfer objects from hand to hand by age 1 year
- Abnormal pincer grip or grasp by age 15 months
- Unable to walk alone by 18 months
- Failure to speak recognizable words by 2 years.

Toddler growth - **Weight**

- During the toddler stage growth slows considerably.
- Formula to calculate normal weight of children over 1 year of age is
- **Age in years X 2+8 = kg.**
- e.g., The weight of a child aged 4 years

$$4 \times 2 + 8 = 16$$

NB: Daytime bladder and bowel control by 24-30 months

Fine Motor - toddler

- 1 year old: transfer objects from hand to hand
- 2 year old: can hold a crayon and color vertical strokes
 - Turn the page of a book
 - Build a tower of six blocks

Fine Motor – Older Toddler

- 3 year old: copy a circle and a cross – build using small blocks
- 4 year old: use scissors, color within the borders
- 5 year old: write some letters and draw a person with body parts

Toddler



Issues in parenting - toddlers

- Stranger anxiety – should disappear by age **2 ½ to 3 years**
- Temper tantrums: occur weekly in **50 to 80% of** children – peak incidence **18 months** – most disappear by age **3**
- Sibling rivalry: aggressive behavior towards new infant: peak between **1 to 2 years** but may be prolonged indefinitely
- Thumb sucking
- Toilet Training

Summary of milestones(birth to 1.5yrs)

- Social smile: 4-6 weeks
- Neck support: 3-4 months
- Sitting with support: 4-5 months
- Sitting without support: 6-7months (Palmar grasp (6 months))
- Crawling: 9 months + (pincer grasp)
- Pulling to stand: 10 months
- Walking with support: 11-12 months
- Walking without support: 12 months to 15 months

Pre-School



Preschooler growth

Weight:

The preschooler gains approximately
1.8kg/year.

Height:

He doubles birth length by 4-5 years of
age.

Fine motor and cognitive abilities

- Buttoning clothing
- Holding a crayon / pencil
- Building with small blocks
- Using scissors
- Playing a board game
- Have child draw picture of himself

Red flags: preschool

- Inability to perform self-care tasks, hand washing simple dressing, daytime toileting
- Lack of socialization
- Unable to play with other children
- Able to follow directions during exam
- Performance evaluation of pre-school teacher for kindergarten readiness

School-Age



School age

Weight:

- School-age child gains about **3.8kg/year**.
- Boys tend to gain slightly more weight through **12 years**.
- **Weight Formula for 7 - 12 yrs**

$$= \frac{(\text{age in yrs} \times 7) - 5}{2}$$

Height:

- The child gains about 5cm/year.

School Years: fine motor

- Writing skills improve
- Fine motor is refined
- Fine motor with more focus
 - Building: models
 - Sewing
 - Musical instrument
 - Painting
 - Typing skills
 - Technology: computers

School performance

- Ask about favorite subject
- How they are doing in school
- Do they like school
- By parent report: any learning difficulties, attention problems, homework
- Parental expectations

Red flags: school age

- School failure
- Lack of friends
- Social isolation
- Aggressive behavior: fights, fire setting, animal abuse

School Age: gross motor

- 8 to 10 years: team sports
- Age ten: match sport to the physical and emotional development

School Age



School Age: cognitive

- Greater ability to concentrate and participate in self-initiating quiet activities that challenge cognitive skills, such as **reading, playing computer and board games.**

Adolescent

- As teenagers gain independence they begin to challenge values
- Critical of adult authority
- Relies on peer relationship
- Mood swings especially in early adolescents

Adolescent

Weight:

- Growth spurt begins earlier in girls (10–14 years, while it is 12–16 in boys).
- Males gains 7 to 30kg, while female gains 7 to 25kg.

Height:

- By the age of 13, the adolescent triples his birth length.

Cont.. height

- Males gains 10 to 30cm in height.
- Females gains less height than males as they gain 5 to 20cm.
- Growth in height ceases at 16 or 17 years in females and 18 to 20 in males

13 to 18 Year Old



Adolescent behavioral problems

- Anorexia
- Attention deficit
- Anger issues
- Suicide

Adolescents



Adolescent Teaching

- Relationships
- Sexuality – STD's / AIDS
- Substance use and abuse
- Gang activity
- Driving
- Access to weapons

Questions

- ??????

Adolescents

