



PATTERN OF GROWTH AND DEVELOPMENT

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Pattern of growth and development

Growth : it is increase in body mass .

- Or: change in body size weight resulting from increase in number or size of cell , it is quantitative and measurement in term by centimeter or kilograms.

Development : a gradual change in advancement / function from lower to higher stage ,it is qualitative .

- Or: it is progress toward maturity.
- Or : it is assessed in term of acquisition .

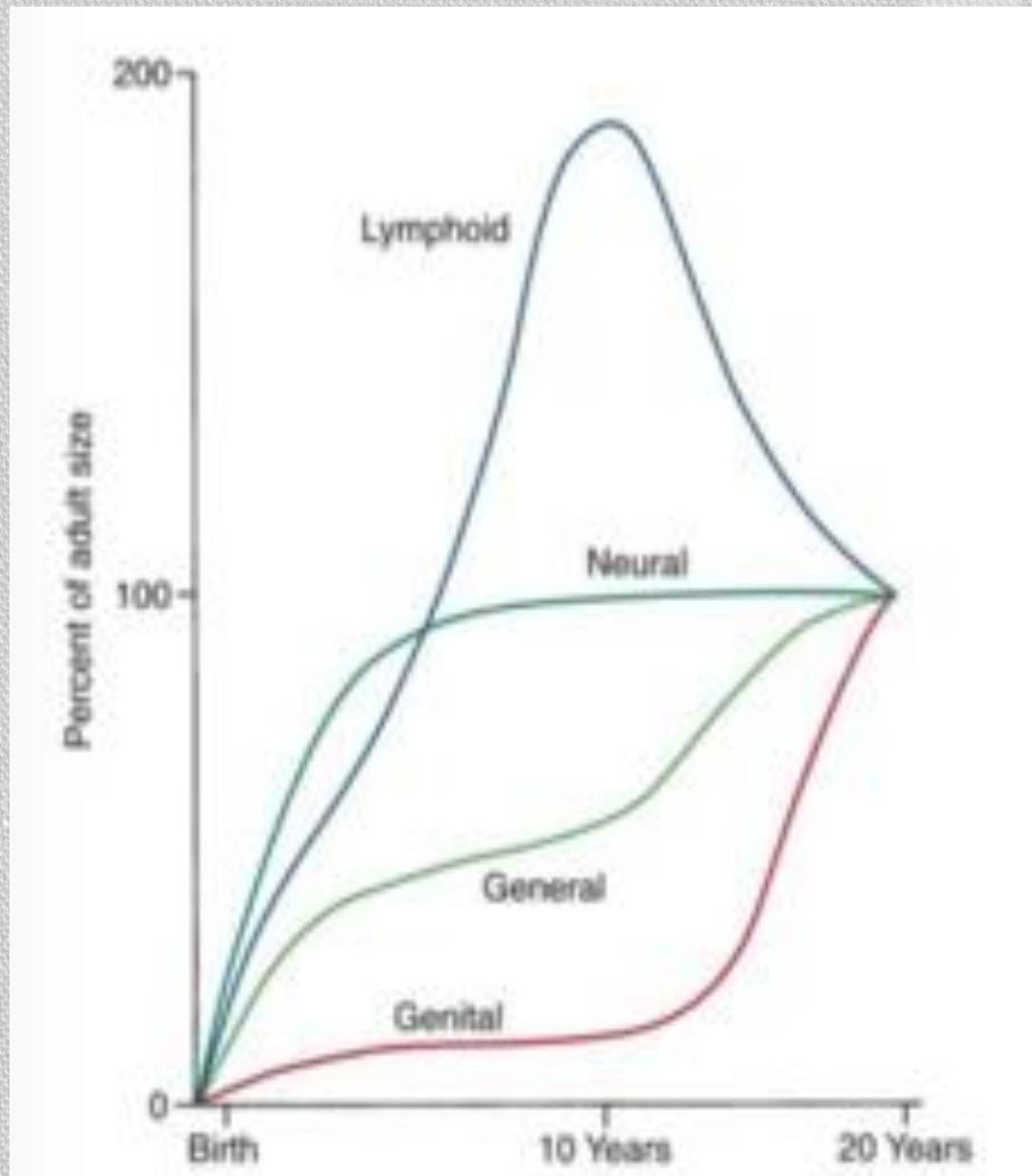
Domains of development

* **physical domains** : body size , weight , thickness , body preparation, appearance , brain development, precipitins capacities , physical health.

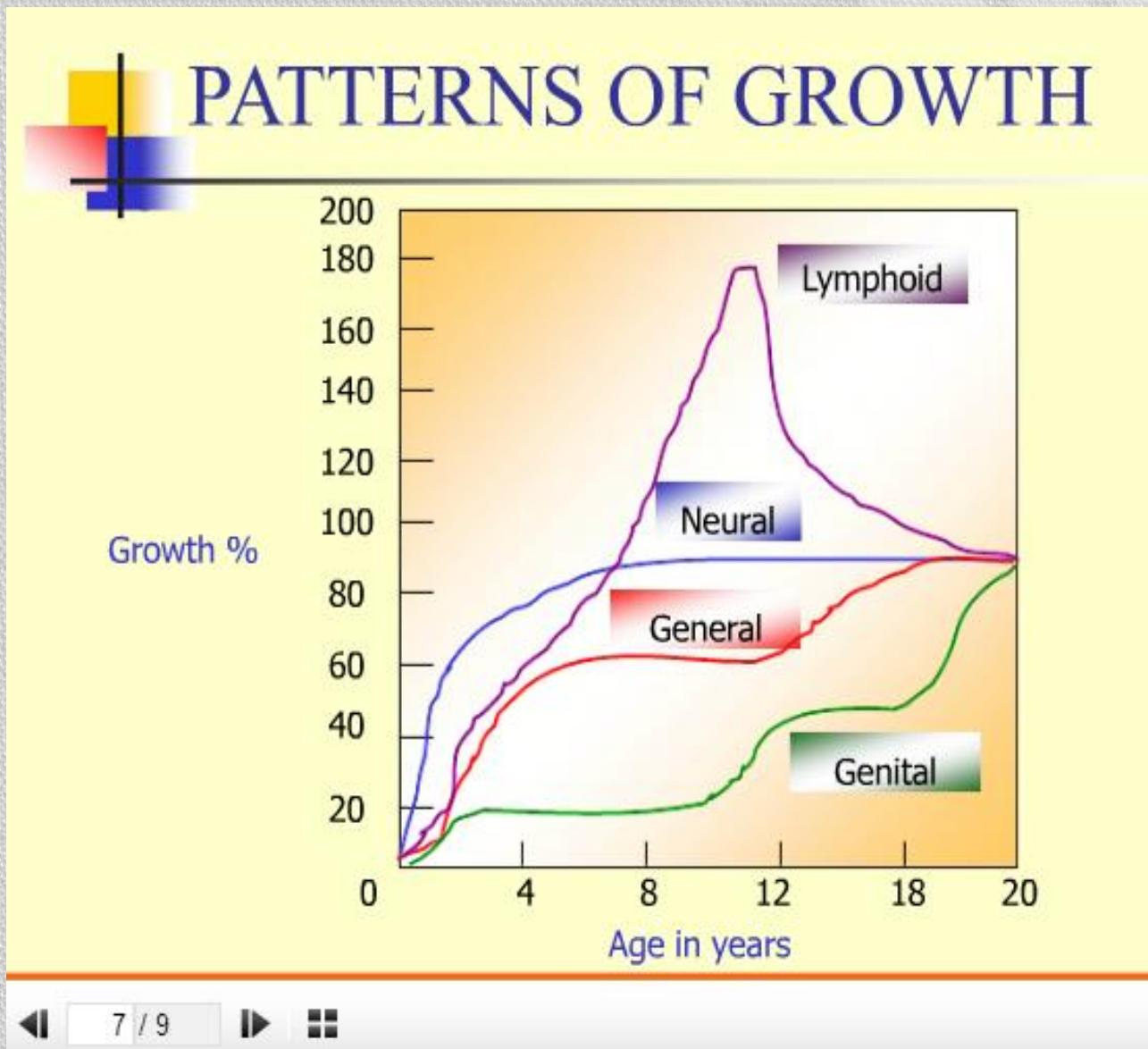
* **cognitive domains** : thought process and intellectual abilities , including attention , memory , problem solving , creating, academic and every day knowledge , language.

* **social / emotional domains** : self-knowledge (self esteem, ethic identity , sexual identity) moral reasoning, understanding and expression of emotions , self regulation , understanding other inter personal skill and friendship

Curve of pattern of growth and development



Curve of pattern of growth and development



Body Weight

Weight:

- Average birth weight 3 kg → lose 10% body weight → **regain BW by 10 days** → gain at 25-30 gm/day for 1st 3 mths → 400 gm /month till end of 1st year
- **Roughly, BW doubles by 5 mths**
- **trebles by 1 year**
- **4 times by 2 yrs**
- **6 times at 5 yrs**
- **10 times at 10 yrs**
- Or, gains **2 kg/yr between 3- 7 yrs**
- **3 kg/yr after that till pubertal spurt**

Height:

- **50 cm at birth**
- **60 cm at 3 mths**
- **75 cm at 1 yr**
- **100 cm at 4 yrs**
- **gain 5 cm/yr till 10 yrs**



VELOCITY OF GROWTH :

- **Serial measurements** of growth parameters over a period of time
- One time measurement does not indicate the rate of growth
- An abnormal percentile may only present once the factors retarding growth are profound or persist for a long time
- Plotting growth over a period of time provides a good epidemiologic tool for **early detection** of malnutrition, infections & growth disorders eg: **Road to Health Charts**

ERUPTION OF TEETH:

Primary Teeth

- Lower central incisors 5-8 months
- Upper central incisors – a month later
- Lateral incisors – within next 3 months
- 1st Molars – 12-15 months
- Canine - 18-21 months
- 2nd Molars – 21 – 24 months

Permanent teeth:

- 1st molar – 6 year
- Central & lateral incisors – 6-8 years
- Canines & premolars –9-12 years
- 2nd molar - 12 years
- 3rd molar – 18 years or later

BONE AGE:

- An indicator of physiological development
- Distinct from chronological age
- More advanced in girls - by 1 yr in early childhood; 2 yrs in mid childhood
- Assessed by number, shape & size of ossification centers and density size & shape of ends of bones
- Which bones to Xray?
- Newborn – Xray of foot & knee
- Infant 3-9 months– shoulder
- 1-13 years– wrist & hands
- 12-14 years– elbow & hip

Stages of Growth and Development

- **Infancy**
 - Neonate
 - Birth to 1 month
 - Infancy
 - 1 month to 1 year
- **Early Childhood**
 - Toddler
 - 1-3 years
 - Preschool
 - 3-6 years
- **Middle Childhood**
 - School age
 - 6 to 12 years
- **Late Childhood**
 - Adolescent
 - 13 years to approximately 18 years

Stages of growth and development:

Stages in growth and development up to adulthood

FEMALES

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

Infancy

Childhood

Puberty

Adolescence

Adulthood

Infancy

Childhood

Puberty

Adolescence

Adulthood

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

MALES

BEHAVIORAL DEVELOPMENT:

- As age advances, child acquires better coordination of motor activity and reacts to environment willfully
- Development is a continuous process and different levels of development (milestones) are achieved at an anticipated age (+/- few months)
- Early primitive reflexes are lost
- **4 areas of development:**
 - Gross motor
 - Fine motor (adaptive)
 - Social
 - Language

GROSS MOTOR : Involves control of child over his body. Tested in :

Ventral Suspension: Baby held in prone position and lifted off the bed. Newborn – head flops down

- 4-12 weeks– brings head to plane of body and then above plane of body

Supine :

- Child placed supine and gently pulled up by the arms
- Newborn – head lag
- By 16-20 weeks– head in plane of body or ahead with back straight

Prone:

- **Newborn – can turn head to 1 side**
- **1 month– lifts chin momentarily**
- **3 month– lifts head and upper chest**
- **6 month–lifts head & chest**
- **5-8 months– rolls over, first back to side and front**
- **8 months– crawls**

Sitting:

- 5 month– sits with support
- **8 month– sits steadily with back straight, without support**
- 10 month– pulls from supine to sitting position

Standing:

- 4 month-Bears weight on legs
- 9 month– early stepping movements, pulls to standing with help of furniture
- **10 month– cruising**
- **13 –15 months– walks unsupported**
- 15 month– walks sideways/backwards

Climbing stairs –

- 2 year– climbs stairs – 2 feet per step
- **3 year– climbs up stairs – one foot per step**
- **4 year– climbs down one foot per step**



Stage	Age	Characteristics
Infant	Birth to 1 year	Period of rapid growth and change; attachments to family members and other caregivers are formed; trust develops.
Toddler	1 to 3 years	Motor ability, coordination, sensory skills developing; basic feelings, emotions, a sense of self, and being independent become important.
Preschooler	3 to 6 years	Continued physiological, psychological, and cognitive growth; better able to care for selves, interested in playing with other children; beginning to develop a concept of who they are.
School age	6 to 12 years	Interested in achievement; ability to read, write, and complete academic work advances; understanding of the world broadens.
Adolescent	12 to 19 years, or later	Transition period between childhood and adulthood; physiological maturation occurs, formal operational thought begins; preparation for becoming an adult takes place.

Key Gross motor milestones:

- **3 month– neck holding**
- **5 month– sitting with support**
- **8 month– sitting without support**
- **9 month–standing with support**
- **10 months – cruising**
- **12 month– standing without support**
- **14 month– walking without support**
- **18 month– running**
- **24 month– walking upstairs**

Clinical Assessment



Fig.4.3 Prone posture. Prone is not raised and head is held off the neck; temporarily usual at 6 weeks age.

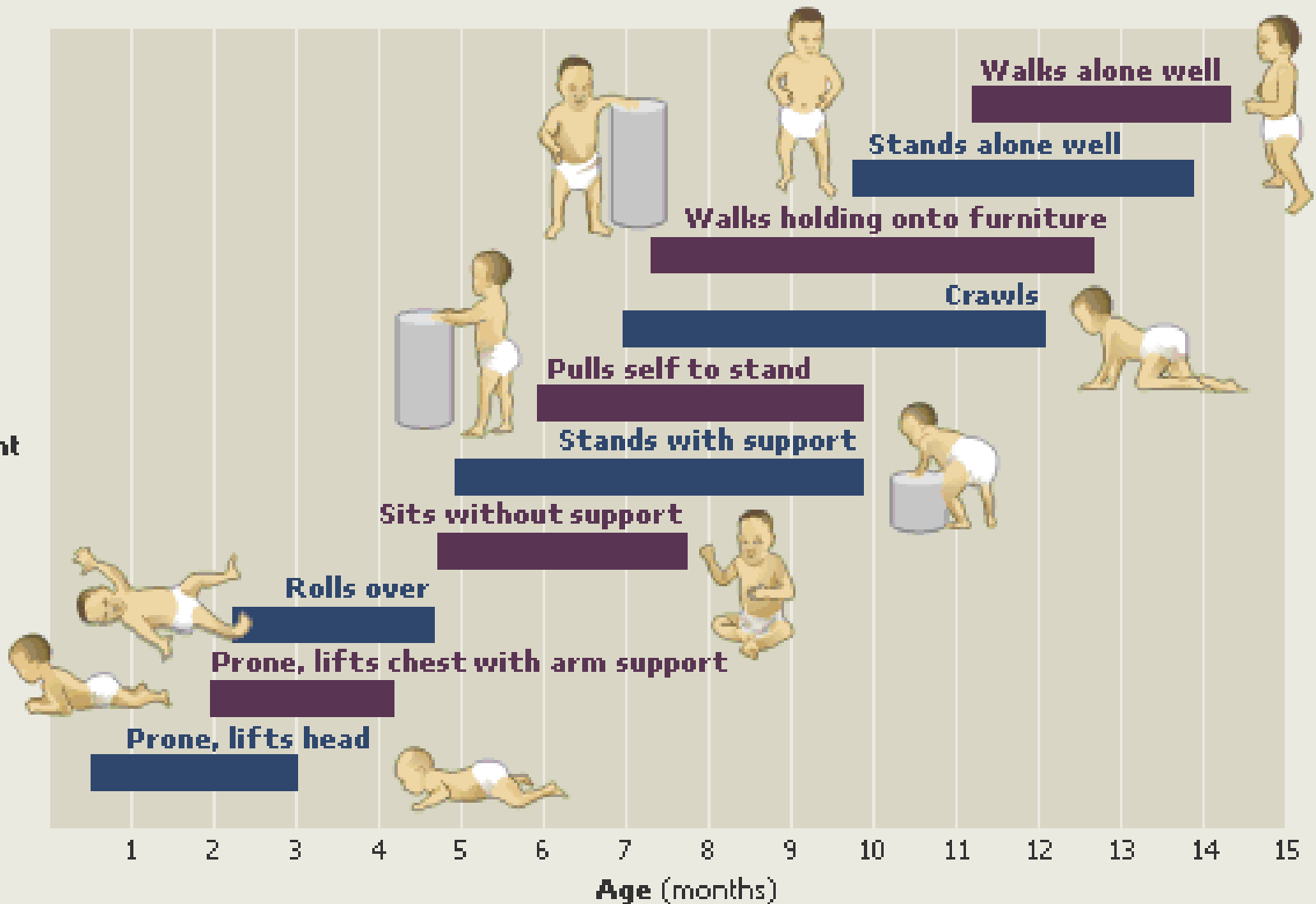


Fig.4.4 Prone position. Chest is maintained off the couch and body weight is supported on forearms during 16-20 weeks of age.



Fig.4.5 Transition progresses. Infant is being pulled down - starts to sitting position by holding of forearms. Chest is completely head up, in a one-forearm holdy.

Stages of motor development



FINE MOTOR OR ADAPTIVE MILESTONES

- **FINE MOTOR OR ADAPTIVE MILESTONES:**

Includes eye coordination, hand eye coordination, hand mouth coordination and manipulation with hands

- **Tested with red ring, pen torch, red cubes (2.5 cm), pellet, cup with handle, spoon, book with thick pages, red pencil/crayon, paper, wooden blocks, doll, mirror**

PERSONAL & SOCIAL DEVELOPMENT:

- 1 month - regards face of mother/caretaker
- **2 month - social smile**
- 3 month - recognises mother/caretaker
- 6 month - enjoys mirror
- 7-8 months - separation anxiety
- 9 month - waves bye-bye

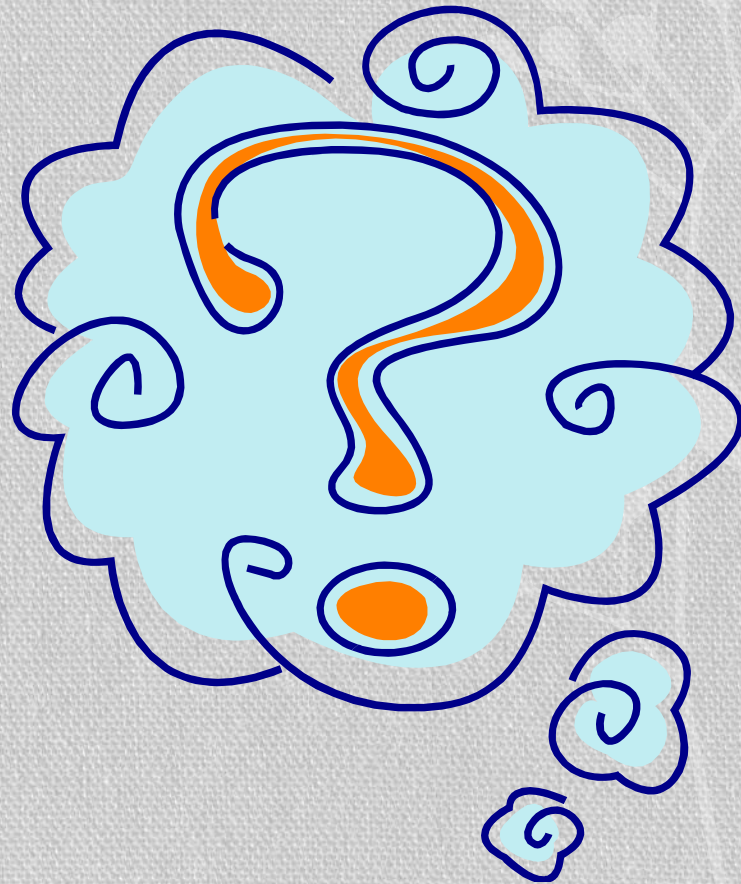
LANGUAGE DEVELOPMENT:

- 1 month- turns head towards sound
- 3-5 months- vowel sounds, gurgles
- 6 month- monosyllables
- 9 month- bisyllables
- 10 month- understands spoken speech
- **12 month- speaks 2 words with meaning**
- 18 month- 20 words
- **24 month- joins 2-3 words in a short sentence**
- 3 years- 250 words

BOWEL & BLADDER CONTROL:

- Early months - gastrocolic reflex → defecates asfter each feed
- 7 month- no relation to feeds
- Toilet trainable by 18mths - 2 years
- Developmental Delay
- 3 Step diagnosis
 - Clinical
 - Screening tools
 - Psychometric scales

QUESTIONS



References

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