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Child Development

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Objectives

- To outline the link between embryology and clinical practice…examples from 2 systems
- To define child development and its assessment
- To outline the factors affecting development
- To use the framework model to rehearse developmental assessment
- To look at abnormal development

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Outline

- The overall context
- Teratogenesis – causes and effect
- Recap embryology of nervous and urogenital systems
- Specific examples outlining prevention and treatment
- Renal development and examples
- Genital development and examples
- Developmental milestones
- Abnormal development

The overall context

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The paediatric history

- Presenting complaint
- History of presenting complaint
- Past medical history
- Past surgical history
- Allergies
- Current medication history
- Dietary history
- Immunisation history
- Developmental history
- Family history
- Social history
- Review of symptoms

Obstetric history

- *Gestational age at birth*
- *Complications perinatal period*
- *Antenatal screening bloods – TORCH/HIV*
- *Chronic conditions and what medications*
- *Other "drugs" use*

- *Milestones*
- *Delay*
- *What/where/when*

- *consanguinity*

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Causes-teratogenesis

- Infectious agents-TORCH, HIV, syphilis, varicella, hepatitis
- Physical agents-X-rays and hyperthermia
- Chemical agents-phenytoin, valproate, lithium, amphetamines, ACE inhibitors, alcohol, cocaine
- Hormones-androgens
- Maternal diabetes

T=Toxoplasma

O=Other

R=Rubella

C=Cytomegalovirus

H=Herpes

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Effects

- Aplasia → Absent
- Hypoplasia → Underdeveloped
- Dysplasia → Abnormal shape
- Hyperplasia → Too big
- Ectopia → Abnormal position

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The urogenital system

The renal system

- Abnormal function
- Abnormal position
- Abnormal drainage

The genitalia

- Ambiguity

Recap……renal development

- Mesonephric duct→ureteric bud
- Ureteric bud dilates→renal pelvis, and splits→major calyces
- Each calycx→consecutive divisions→minor calyces and renal pelvis
- Thus, ureteric bud→ureter, renal pelvis, calyces and collecting tubules

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Abnormal function

- Ducts surrounded by undifferentiated tissue
- Ureteric buds fail to branch
- Nephrons do not develop
- Failure to differentiate → poor renal development and function
- This leads to reduced fetal urine → amniotic fluid → hypoplastic lungs

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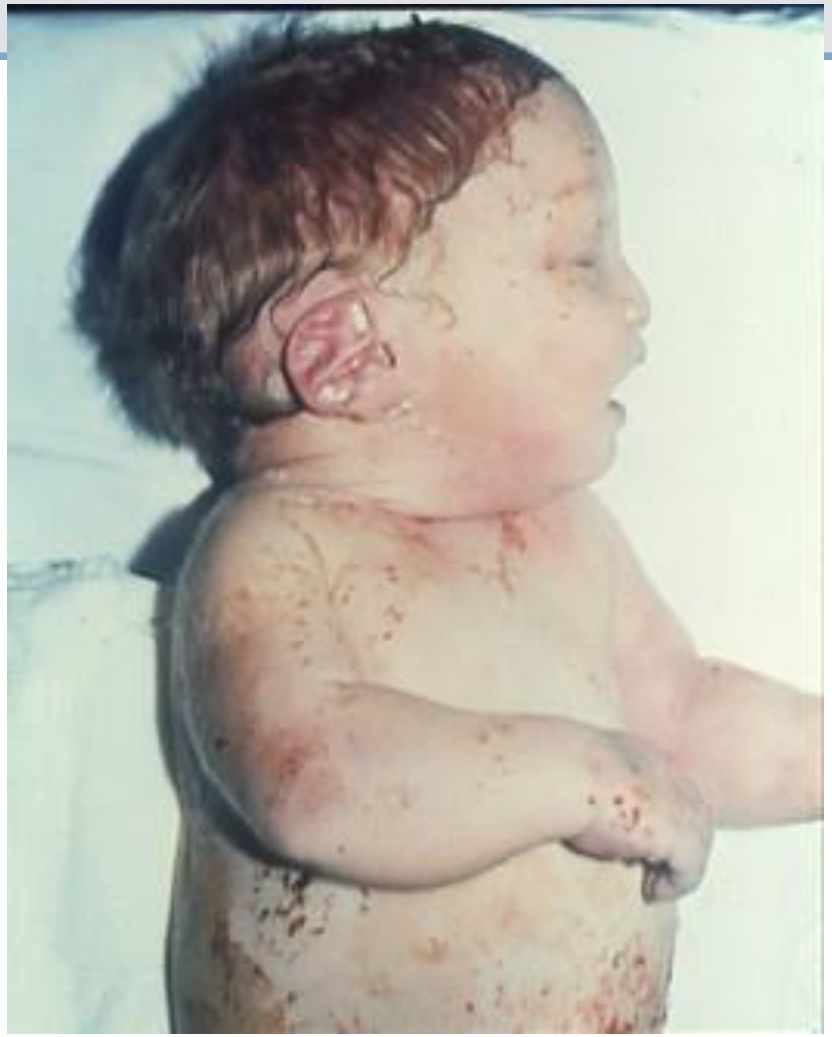
Abnormal function

- Potter's syndrome
  - Bilateral renal agenesis
  - Anuria
  - Oligohydramnios
  - Hypoplastic lungs
  - Other defects
  - Characteristic features
  - Lethal



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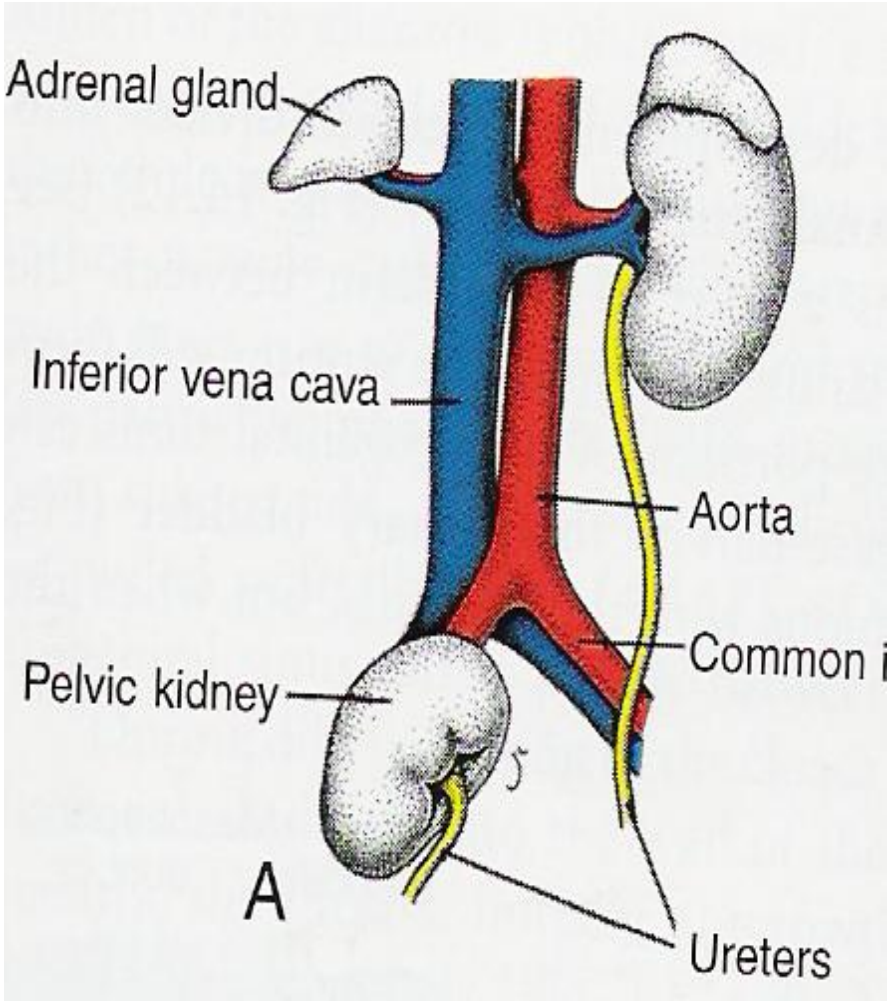
Abnormal position



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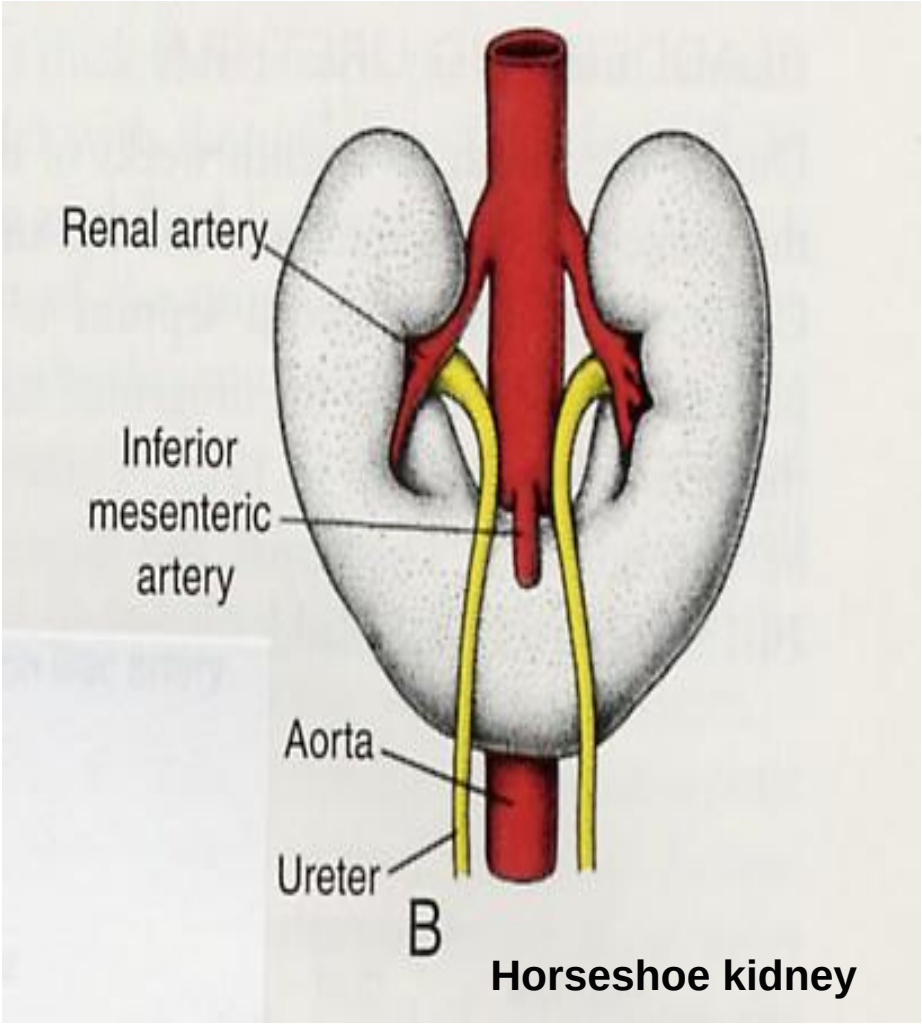
Abnormal formation

•Failure of ascent of kidneys→fusion of lower poles→horseshoe kidney



Horseshoe kidney

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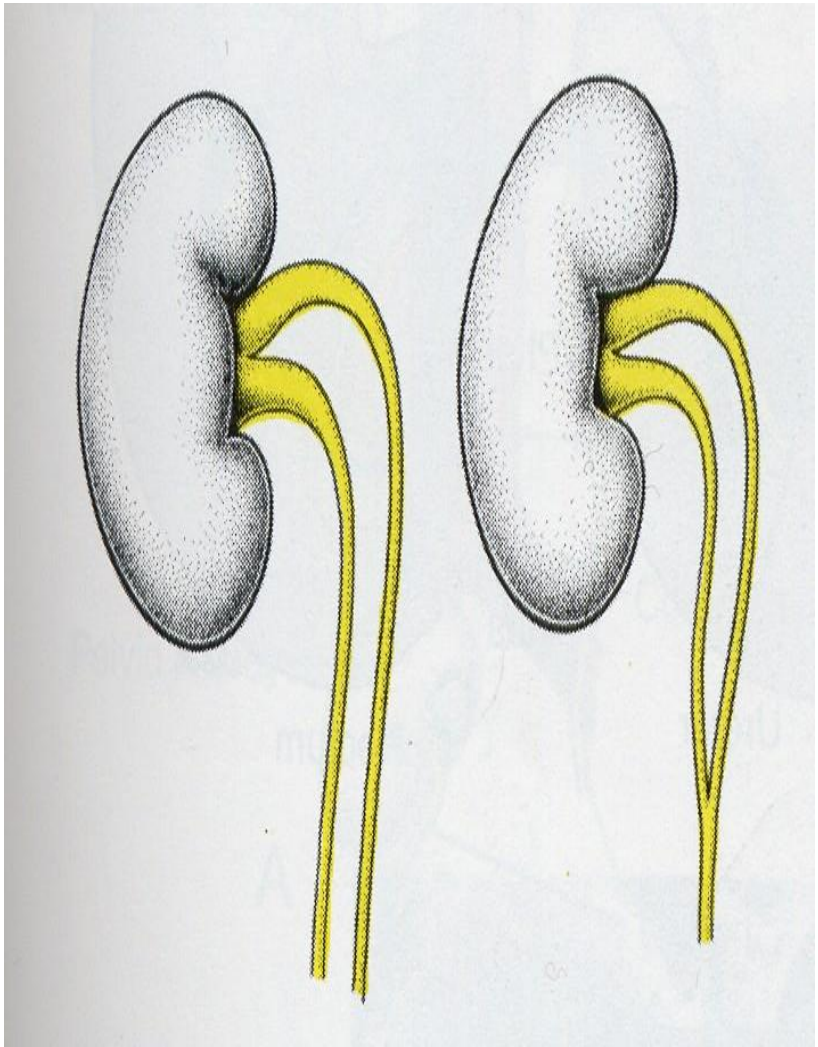
Abnormal drainage

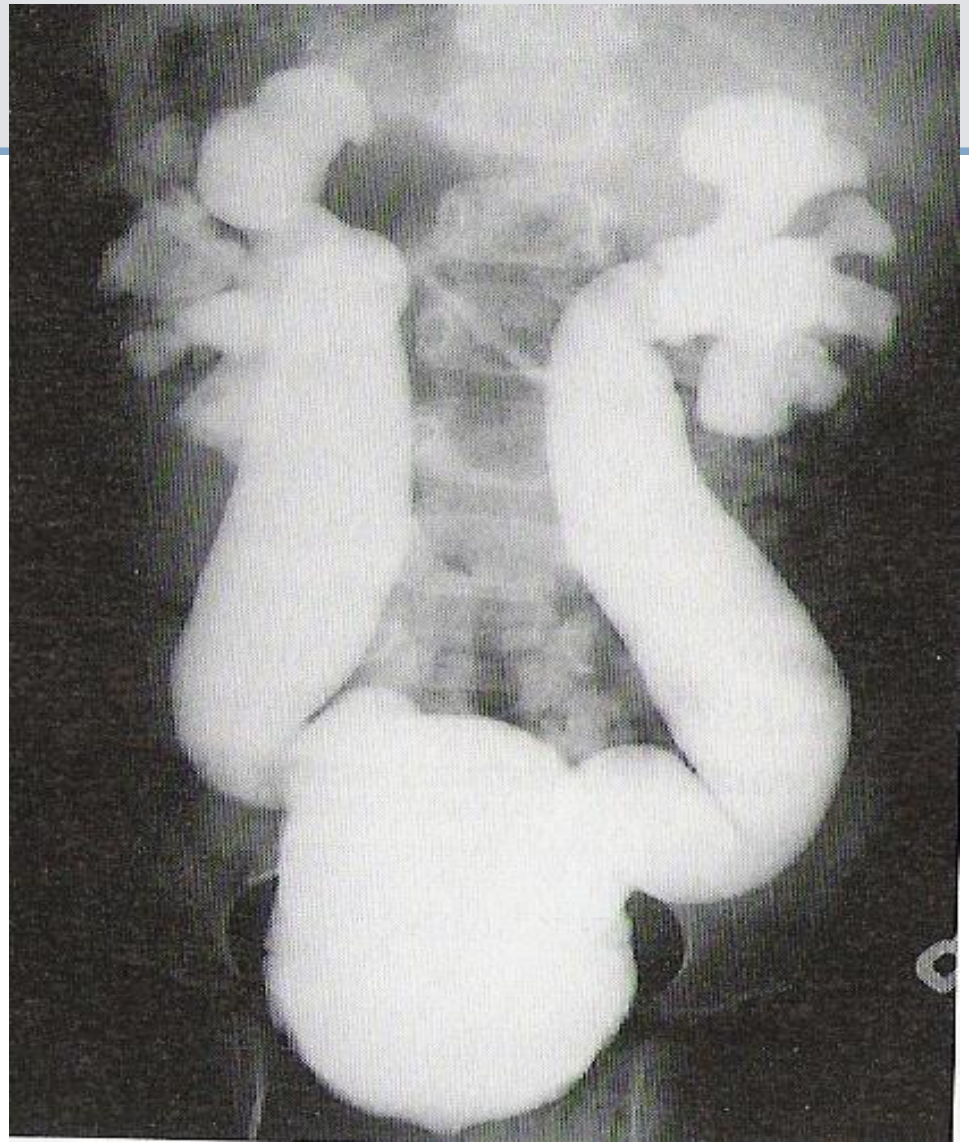
- Ureteric buds split
- Splitting partial or complete
- Extra ureter may insert abnormally
- May lead to (recurrent) urine infections and reflux→renal scarring→hypertension



Gross dilatation of

- pelvic calcyces
- ureters
- bladder

as a result of severe vesicoureteric reflux



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The consequences

- Vesicoureteric reflux
- Recurrent urinary tract infections
- Renal scarring
- **Renal hypertension**
- **Renal failure**

Recommended imaging schedule for infants younger than 6 months

Test	Responds well to treatment within 48 hours	Atypical UTI[a]	Recurrent UTI[a]
Ultrasound during the acute infection	No	Yes[c]	Yes
Ultrasound within 6 weeks	Yes[b]	No	No
DMSA 4–6 months following the acute infection	No	Yes	Yes
MCUG	No	Yes	Yes

Recommended imaging schedule for infants and children 6 months or older but younger than 3 years

Test	Responds well to treatment within 48 hours	Atypical UTI[a]	Recurrent UTI[a]
Ultrasound during the acute infection	No	Yes[c]	No
Ultrasound within 6 weeks	No	No	Yes
DMSA 4–6 months following the acute infection	No	Yes	Yes
MCUG	No	No[b]	No[b]

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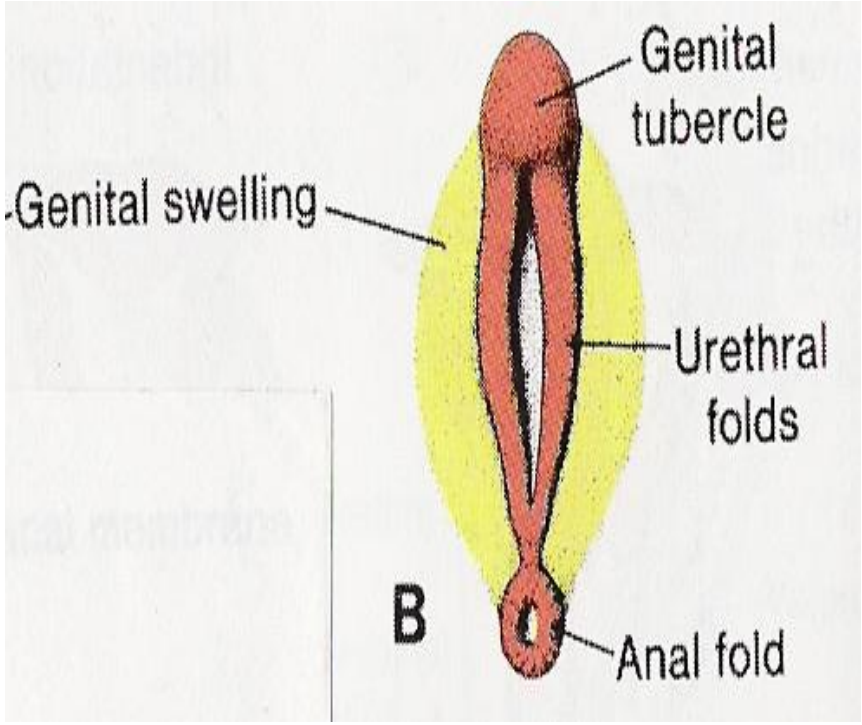
Recap....development of genitalia

- Indifferent at early stage
- In males, androgens are required→elongation of the genital tubercle to become the phallus
- Urethral folds close over urethral plate to become penile urethra
- Absence of SRY→ovary
- Presence of SRY→testis



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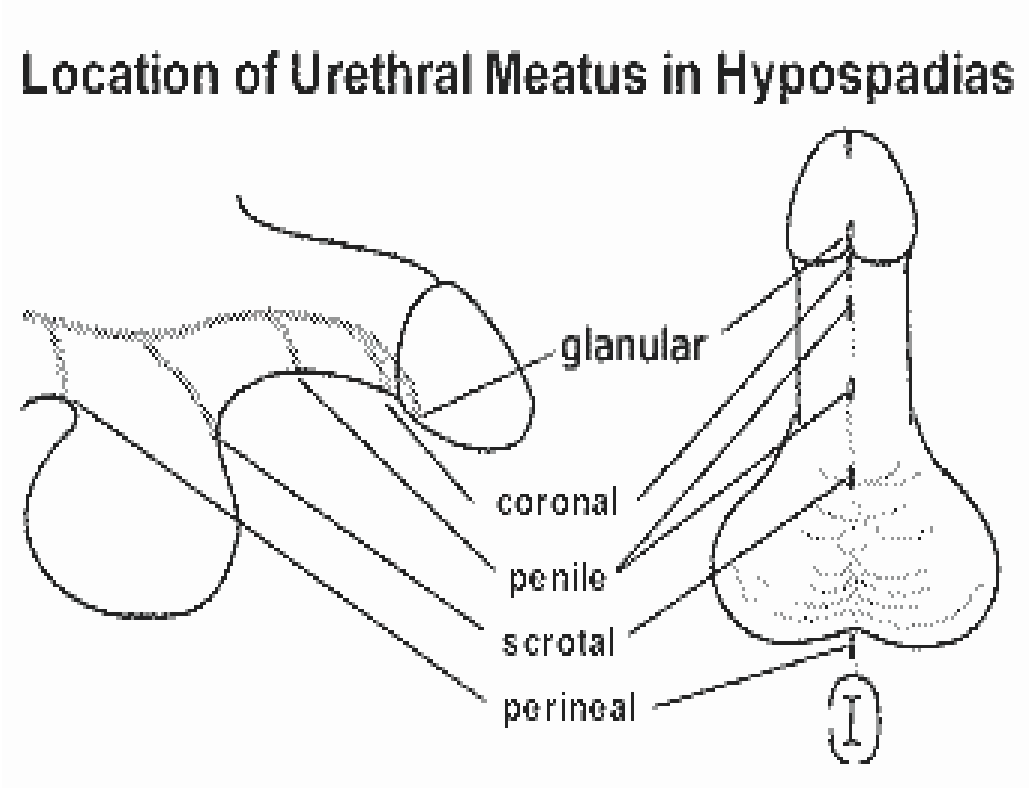
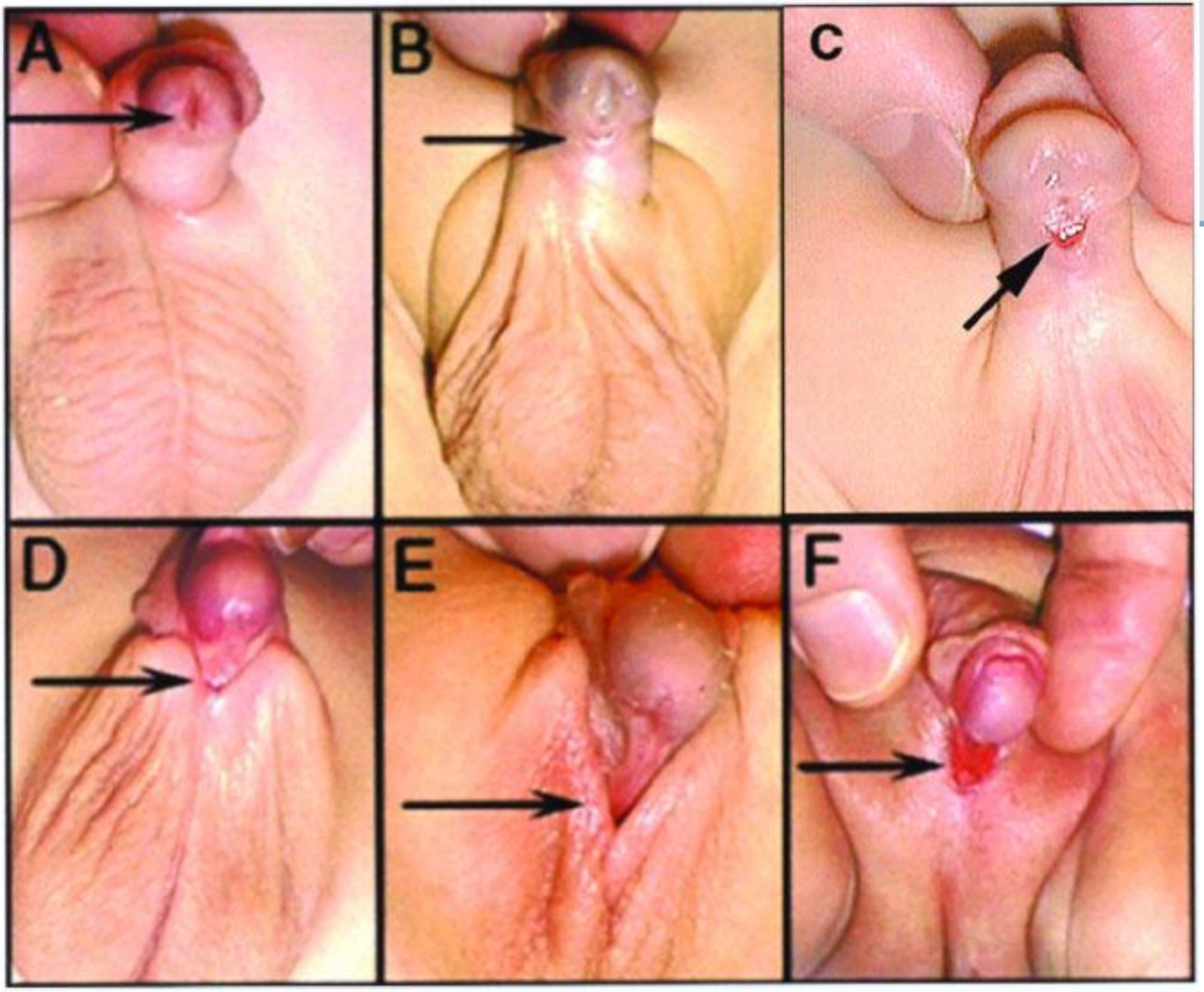
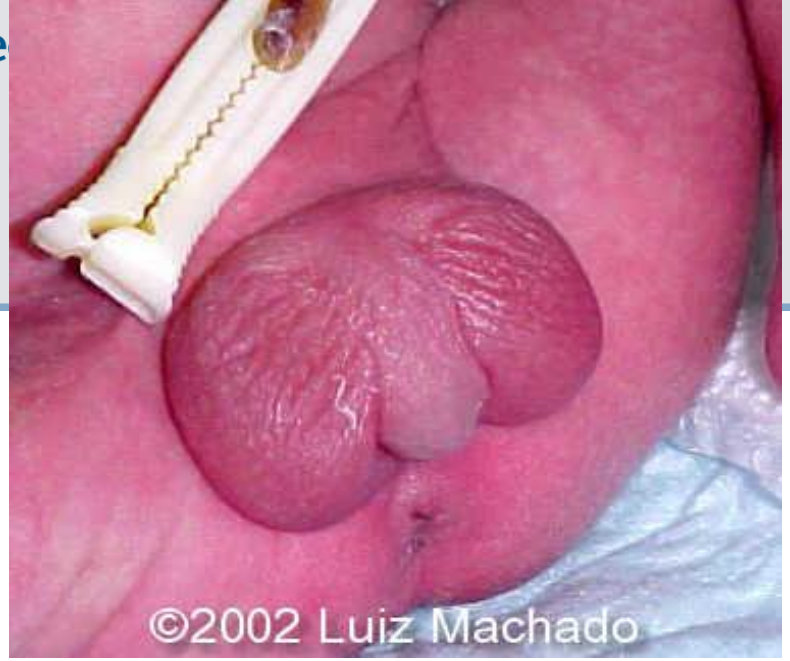
Hypospadias

- Incomplete fusion of the urethral folds
- Openings of the urethra occur along the inferior aspect of the penis




A
B
C
D
E
F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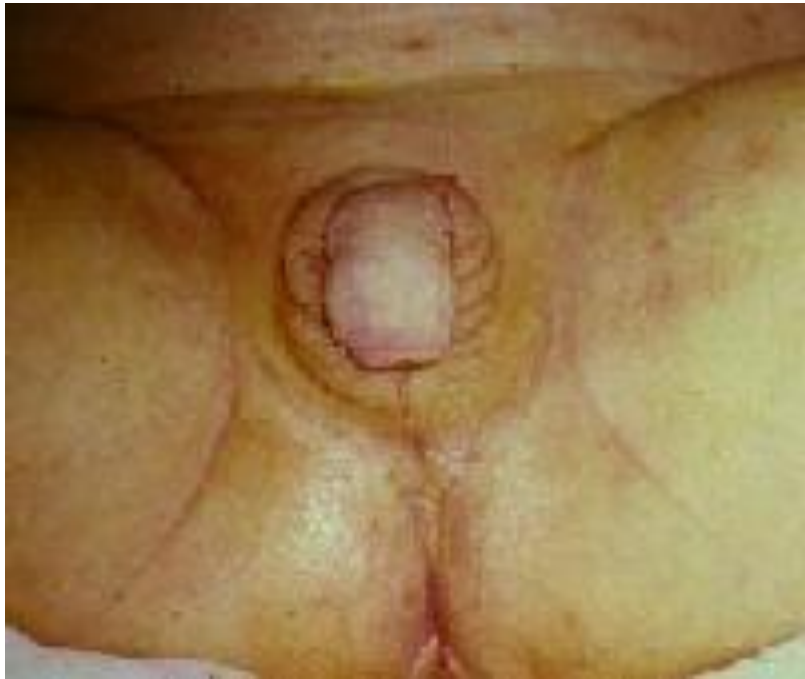

Ambiguous genitalia

Numerous causes

- Point mutations or deletions of the SRY gene
- Biochemical abnormalities resulting in imbalance in steroid hormones
- End-organ or hormone receptor resistance

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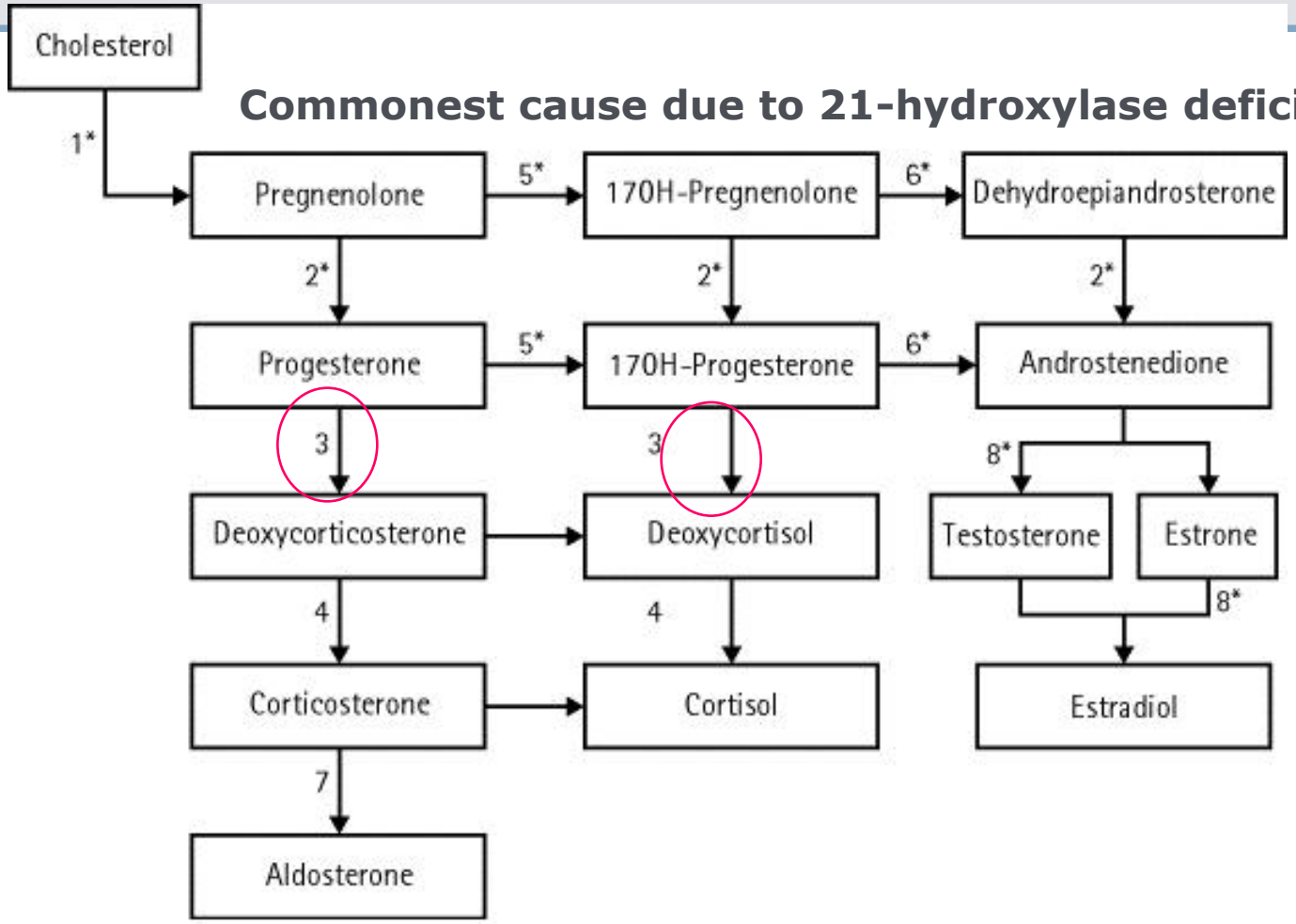
Biochemical abnormalities

Commonest cause due to 21-hydroxylase deficiency



Hormonal and clinical consequences

- Decrease aldosterone
- Decrease cortisol
- Increase oestradiol

- salt losing crisis and shock in males
- over-virilisation in females
  - psychological implications of appearance and future reproductive potential
- Other causes may result in hypertension
- Management $\Rightarrow$ mineralocorticoids ± glucocorticoids ± surgery

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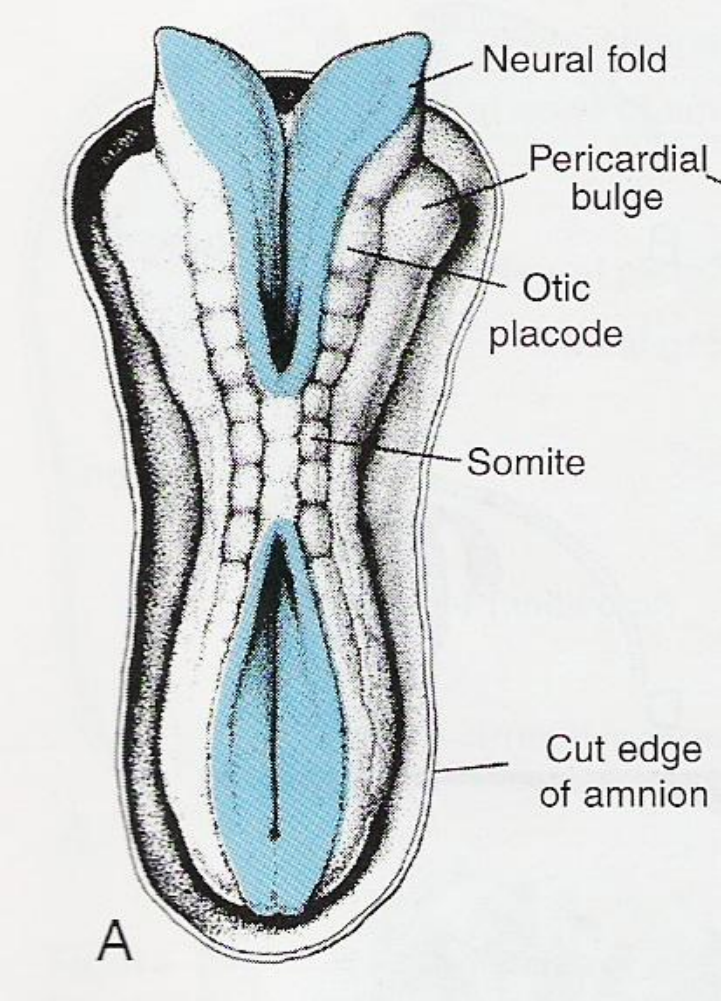
CNS embryology

- Begins in 3rd week
- Neural plate elevates to form neural folds
- Neural folds fuse to form neural tube



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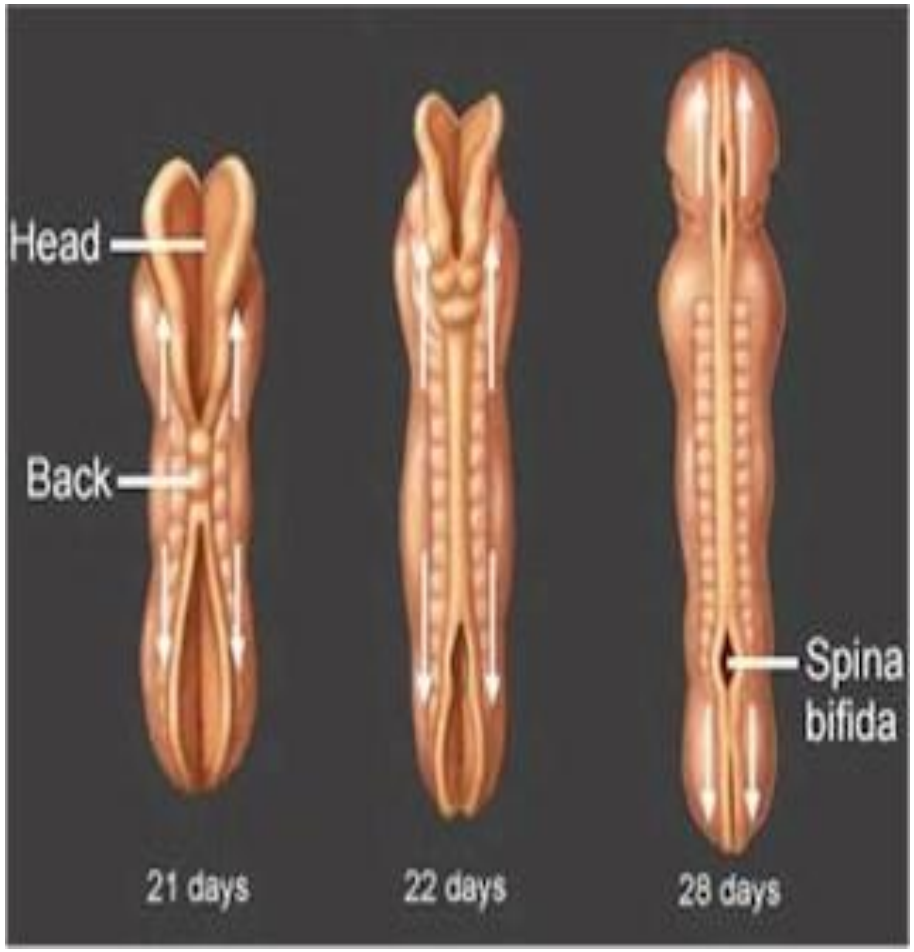
When things go wrong:



- Failure of fusion→neural tube defects
- Anencephaly-failure of rostral fusion
- Spina bifida-failure of caudal fusion
- AEDs and genetics are risk factors

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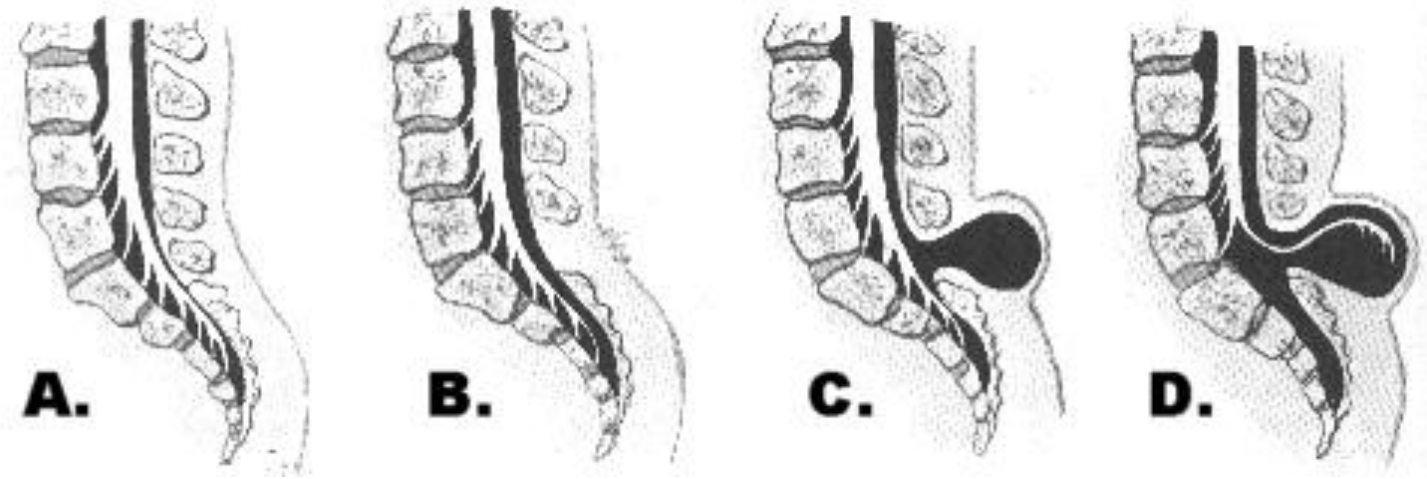
Spina bifida



A: Normal spine

B: Spina bifida occulta

C: Meningocele } Spina bifida

D: Myelomenogocele } cystica

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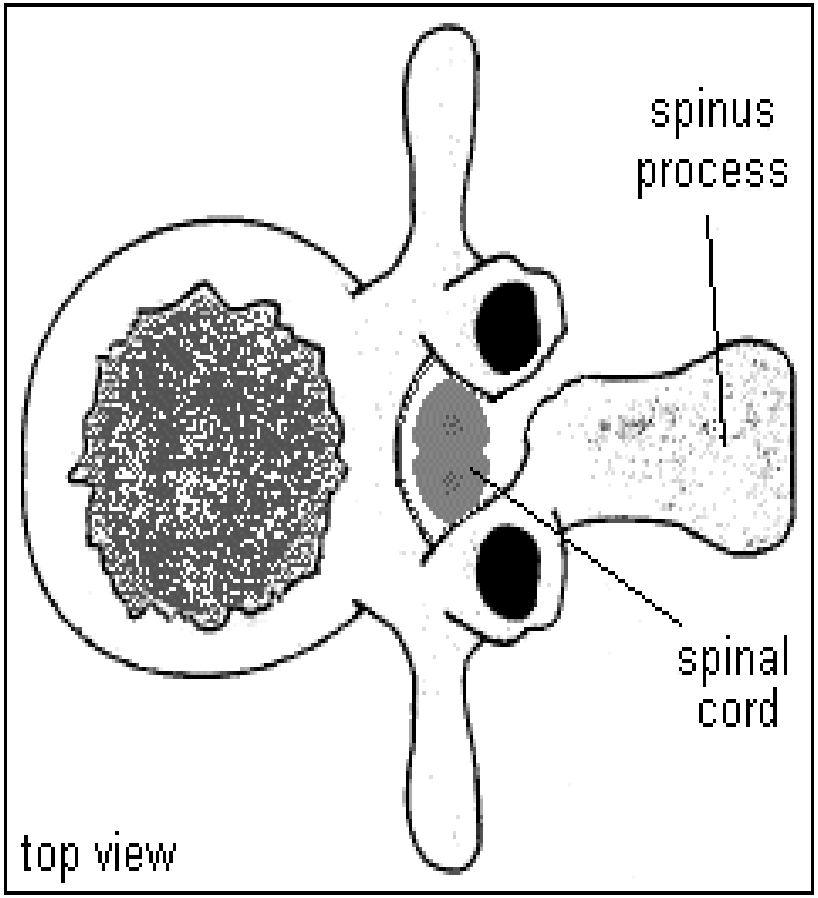
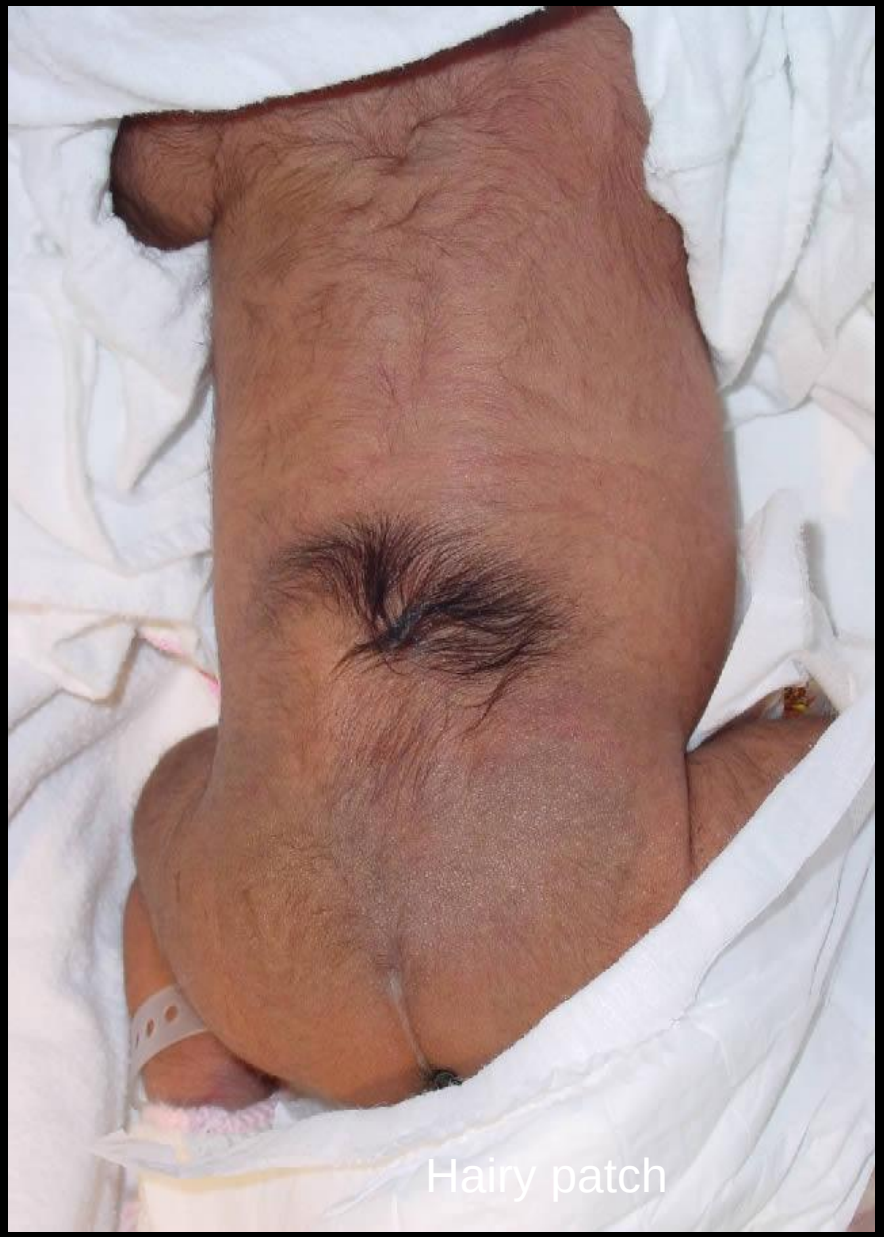
Spina bifida occulta

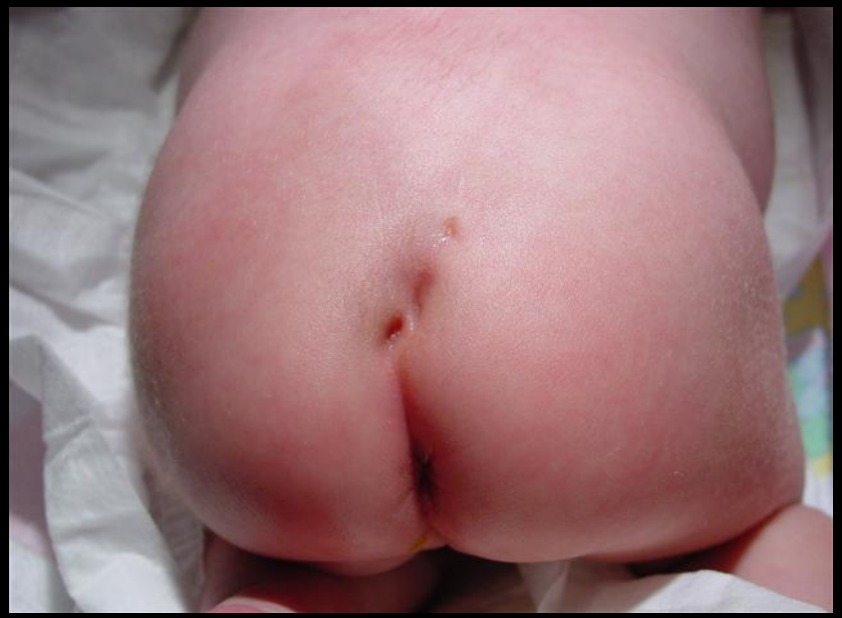
- Defect in vertebral arches covered by skin
- Does not usually involve underlying neural tissue
- Occurs in lumbosacral region
- Usually marked by a patch of hair or dimples overlying the defect





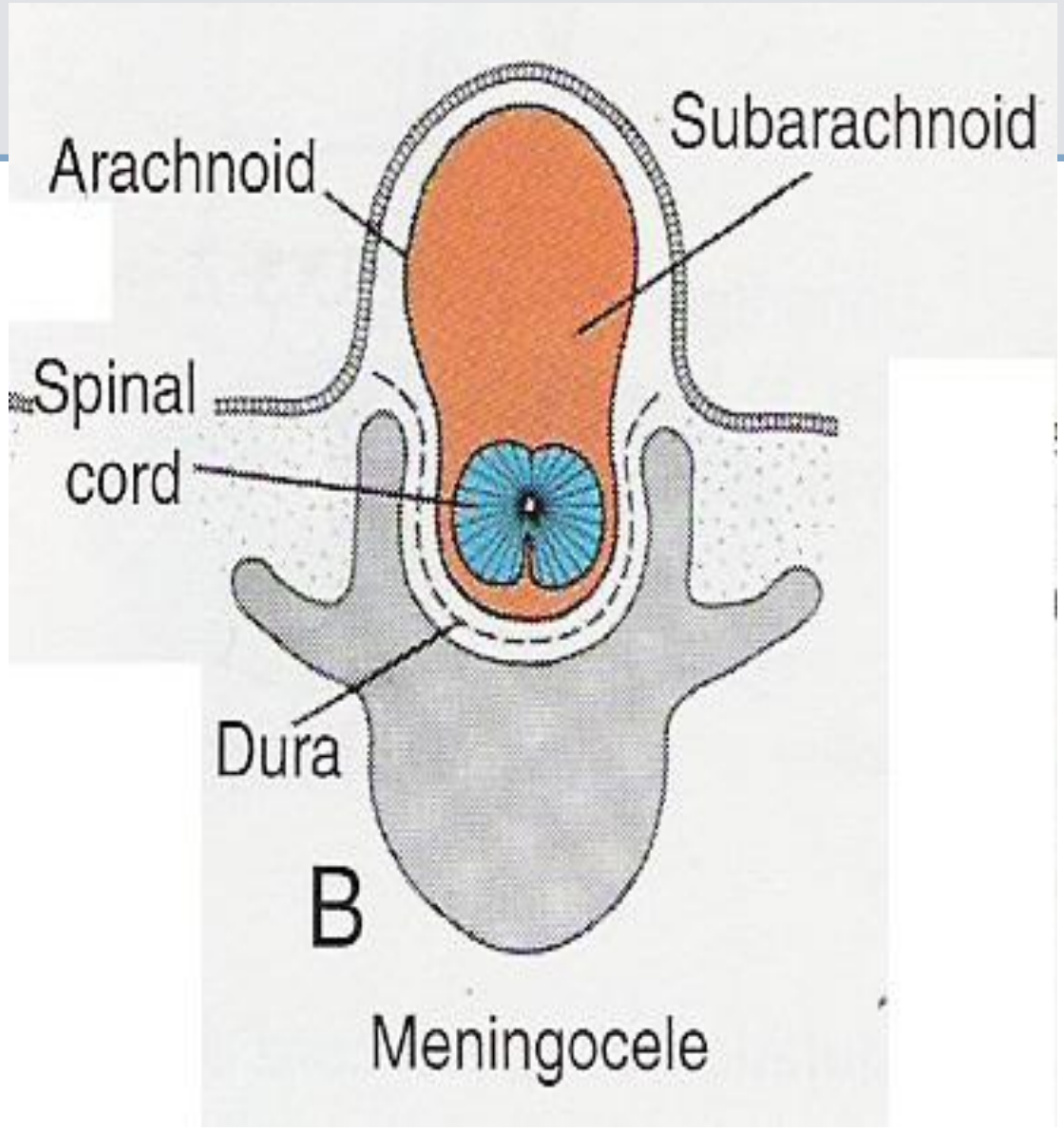
Hairy patch

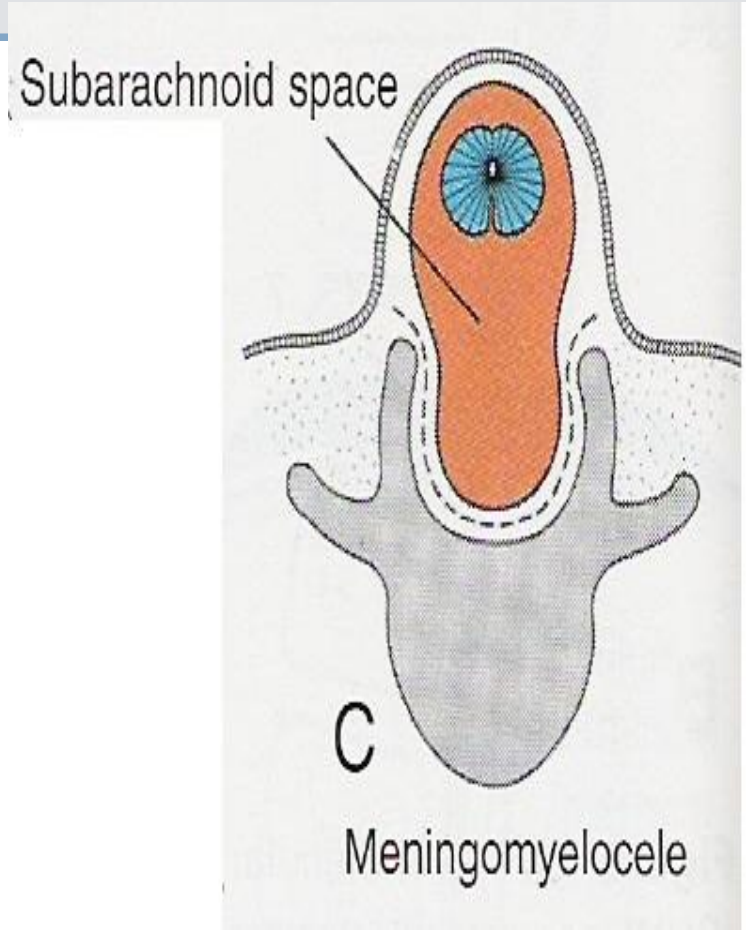
Sacral dimples

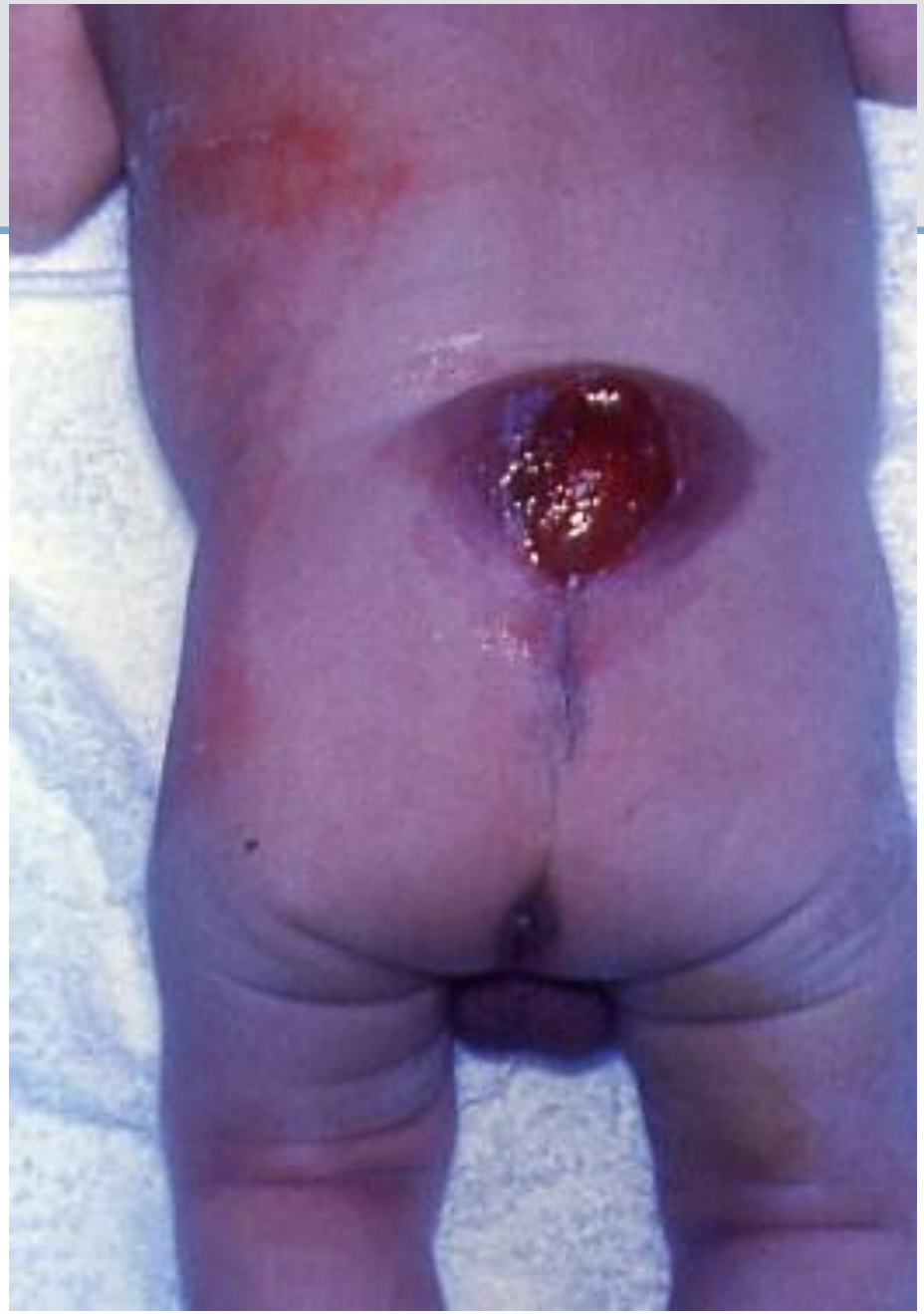


Spina bifida cystica

- Severe defect
- Meninges and/or spinal cord protrude through vertebral arch defect to form cyst-like sac
- Most lie in lumbosacral region
- Result in neurological deficits


Arachnoid
Subarachnoid
Spinal
cord
Dura
B
Meningocele


Subarachnoid space
C
Meningomyelocele



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Complications of spina bifida cystica

Neurogenic bowel
- incontinence

Neurogenic bladder-
- recurrent infections
- incontinence

Lower limb paralysis

Fractures

Joint contractures

Developmental deformities

-learning impairment

-hydrocephalus

(2^{o} to meningitis)

Hearing
Conductive or sensorineural hearing impairment

Vision
Squint
Impaired visual acuity
Visual field deficits

Orthopaedic
Hip subluxation/dislocation
Fixed joint contractures
Dynamic muscle contractures
Painful muscle spasm
Spinal deformity
Osteoporosis/fractures

Specialist health visitor
Help coordinate multidisciplinary and multiagency care
Advice on development of play or local authority schemes e.g. Portage

Dietician
Advice on feeding and nutrition

Social worker/ Social services
Advice on benefits: disability, mobility, housing, respite care, voluntary support agencies
Day nursery placements
Advocate for child and family
Register of children with special needs

Psychologist (clinical and educational)
Cognitive testing
Behaviour management
Educational advice

Gastrointestinal
Gastro-oesophageal reflux
Oromotor incoordination
Aspiration of food or saliva
Constipation

Urogenital
Urinary tract infection
Delay in establishing continence
Unstable bladder
Vesico-ureteric reflux
Neuropathic bowel and bladder

Common medical problems

Child Development Service

Paediatrician
Assessment, investigation and diagnosis
Continuing medical management
Coordination of input from therapists and other agencies - health, social services, education

Respiratory
Respiratory infections
Aspiration pneumonia
Chronic lung disease
Sleep apnoea

Neurological
Epilepsy
Microcephaly/ hydrocephalus
Cerebral palsy

Nutrition
Poor weight gain
Failure to thrive

Behaviour
Organic or reactive
Sibling behaviour
Parental distress

Speech and language therapist
Feeding
Language development
Speech development
AAC (augmentative and alternative communication) aids e.g. Makaton sign language, Bliss symbol boards, voice synthesizers

Occupational therapist
Eye-hand coordination
ADL (activities of daily living) - feeding, washing, toileting, dressing, writing
Seating
Housing adaptations

Physiotherapist
Balance and mobility
Postural maintenance
Prevention of joint contractures, spinal deformity
Mobility aids, orthoses

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Diagnosis, prevention & treatment

Diagnosis

- Prenatally by ultrasound
- α-fetoprotein (AFP) in maternal serum and amniotic fluid

Prevention

- Folic acid from 2 months prior to conception reduces risk

Treatment

- Surgery in utero at 28 weeks gestation
- Individual management of complications

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To summarise....

- The overall context
- Teratogenesis – causes and effect
- Recap embryology of nervous and urogenital system
- Illustrated how embryology can aid understanding of clinical scenario

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CHILD DEVELOPMENT – DEVELOPMENTAL FRAMEWORK

Outline

- Where does it all fit in?
- Definition of development
- Domains of development
  - Gross motor and posture
  - Fine motor and vision
  - Language and hearing
  - Social and behaviour
- Assessment of development

Where does it all fit in?

Cellular and molecular biology

⇓

Fertilisation and embryogenesis

⇓

Growth and **development**

What is development?

- Global impression of a child which encompasses growth, increase in understanding, acquisition of new skills and more sophisticated responses and behaviour

- It serves to endow the child with increasingly complex skills in order to function in society

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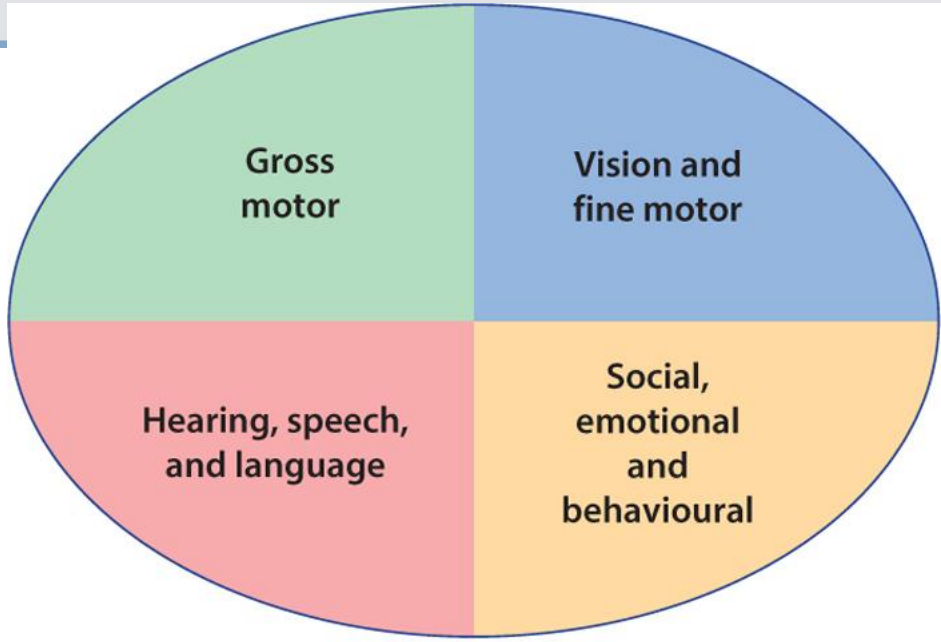
What influences development

- genetic factors
- biochemical
- environmental influences
  - internal milieu
  - maternal illness
  - teratogens

Domains of development

- Gross motor and posture
- Fine motor and vision
- Language and hearing
- Social and behaviour



Developmental norms are called **milestones**-they describe recognised patterns of development that children are expected to follow

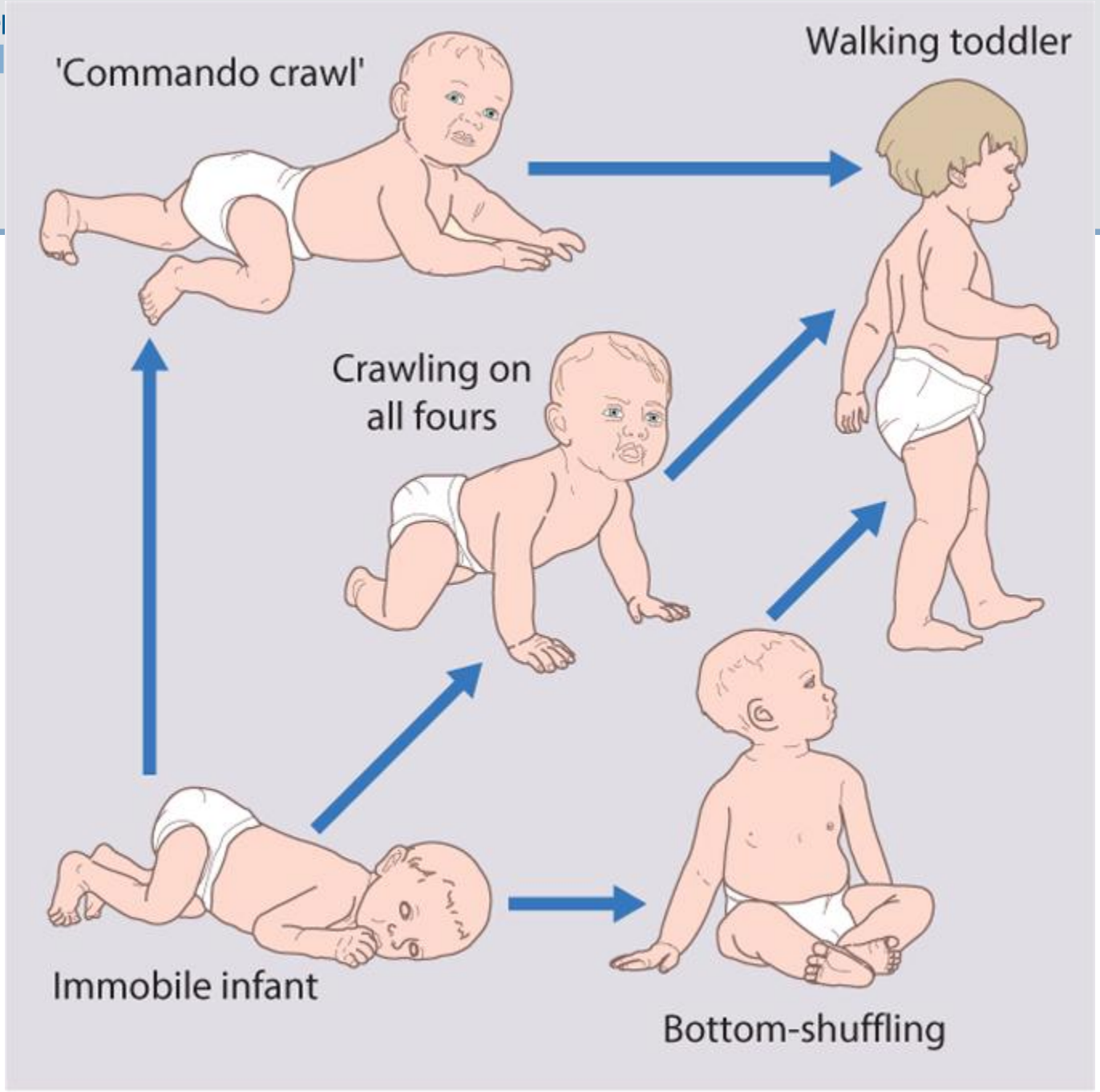
Gross motor and posture

Looks at posture and execution of large movements

- Standing
- Walking
- Running
- Kicking a ball
- Climbing stairs
- Peddling a tricycle

Gross motor

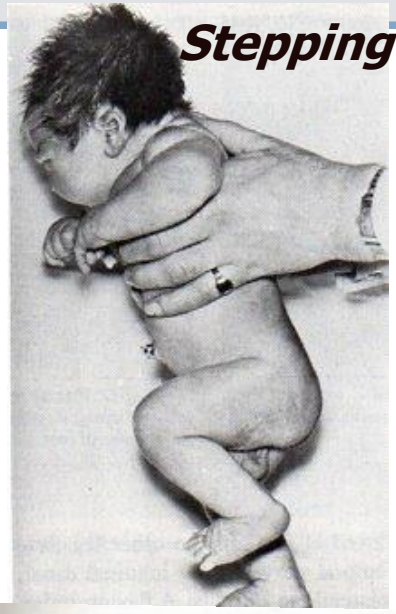
- Develops in a cephalo-caudal direction
- Lying mobile ⇒ standing/walking
- Flexion ⇒ extension
- Rolling ⇒ sitting ⇒ crawling ⇒walking

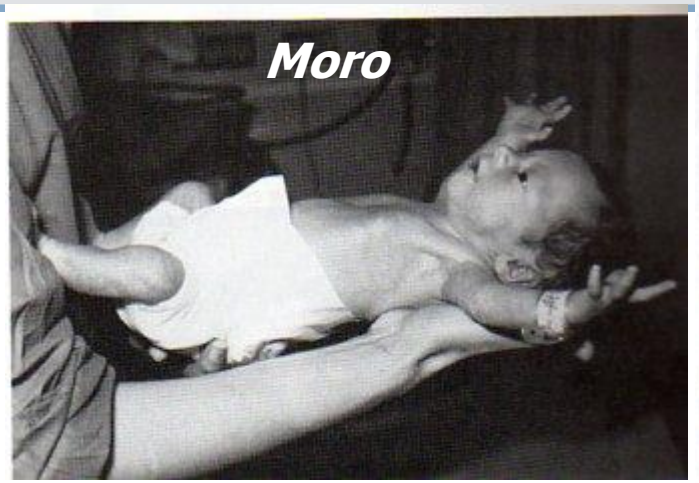


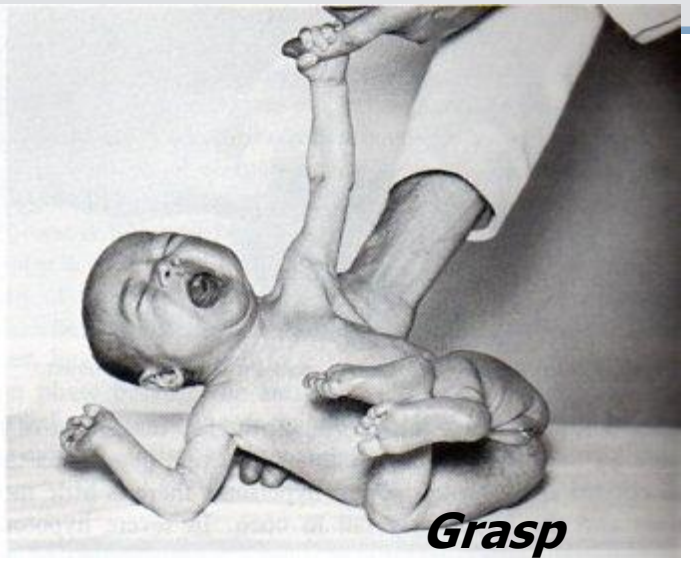
Primitive reflexes

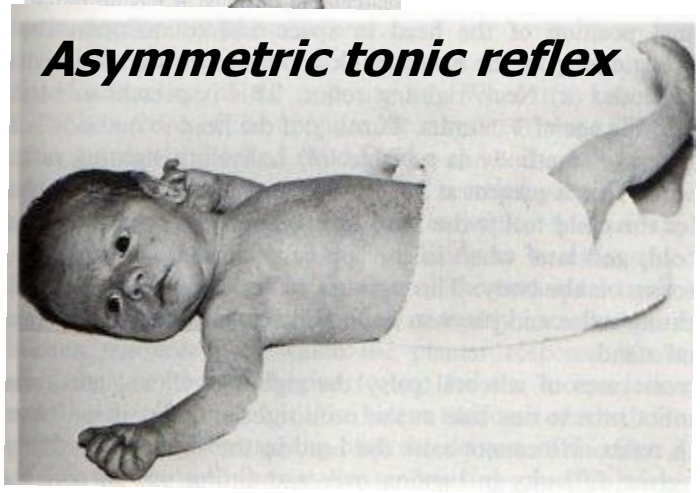
- Are protective and have a survival value
- Promote proper orientation
- Promote postural support and balance

Primitive reflexes

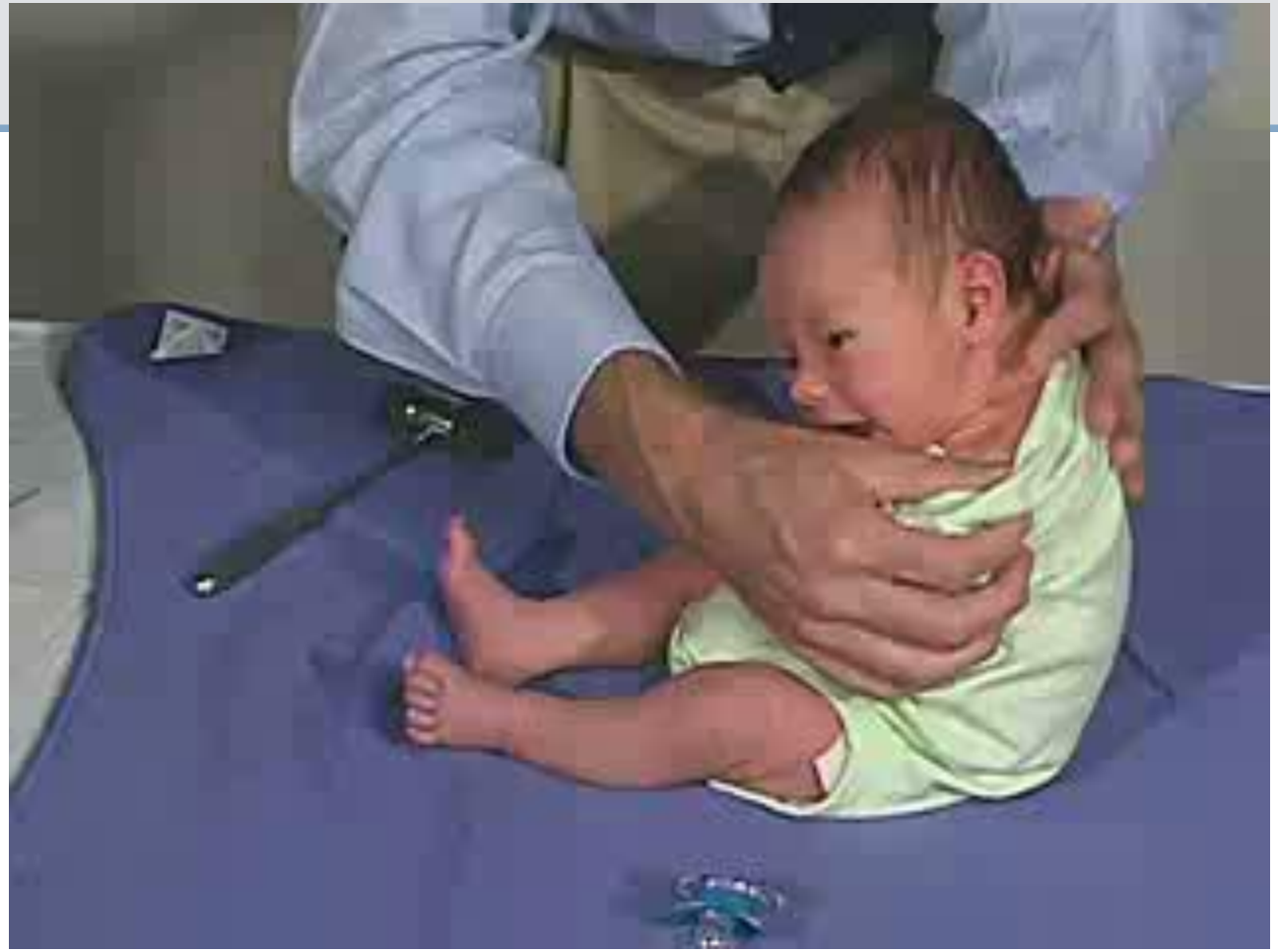






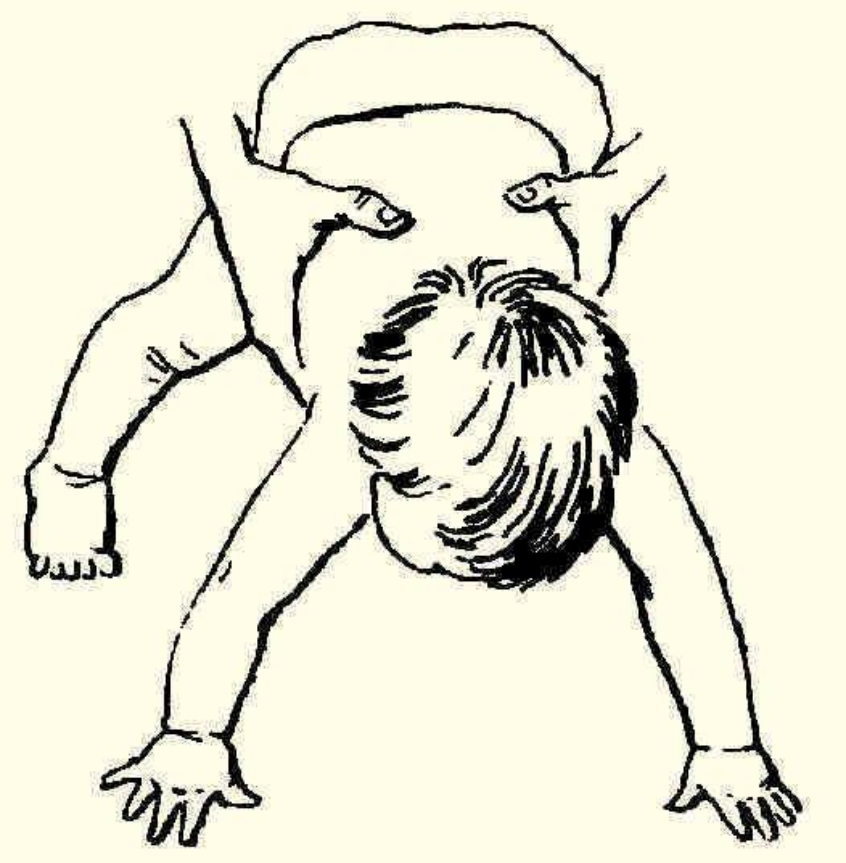


These should disappear by 4-6 months



Protective or righting responses

- Have to develop before can attain motor development
- Head righting
- Downward parachute by 4-6 months
- Forward parachute by 7-9 months



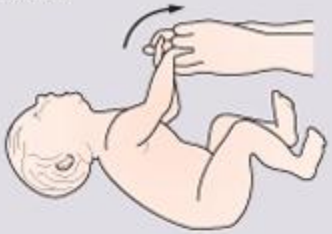
Forward parachute

Gross motor development (median ages)

newborn

Limbs flexed, symmetrical postures

newborn



Marked head lag on pulling up

6–8 weeks

Raises head to 45°

6–8 months

Sits without support
- at 6 months: with round back
- at 8 months: with straight back (shown)

8–9 months

Crawling

10 months

Walks around furniture

12 months

Walking unsteadily,
broad gait, hands apart

15 months

Walks alone steadily

Fine motor and vision

- Looks at hand function and hand-eye coordination
- Also tends to give some information of cognitive function
  - Holding objects
  - Picking up objects
  - Pointing
  - Waving
  - Throwing/catching

Vision and fine motor (median ages)

6 weeks

Newborn – follows face in midline.
Follows moving object or face by turning the head (illustrated).

4 months

Reaches out for toys

6 months

Palmar grasp

7 months

Transfers toys from one hand to another

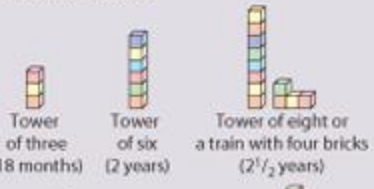
10 months

Mature pincer grip

16–18 months

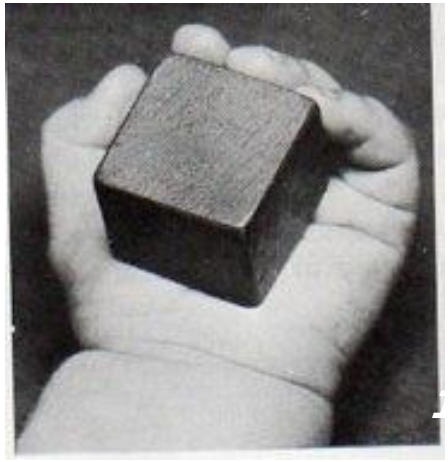
Makes marks with a crayon

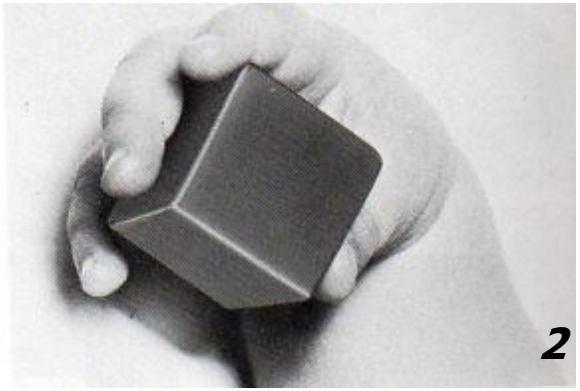
14 months–4 years

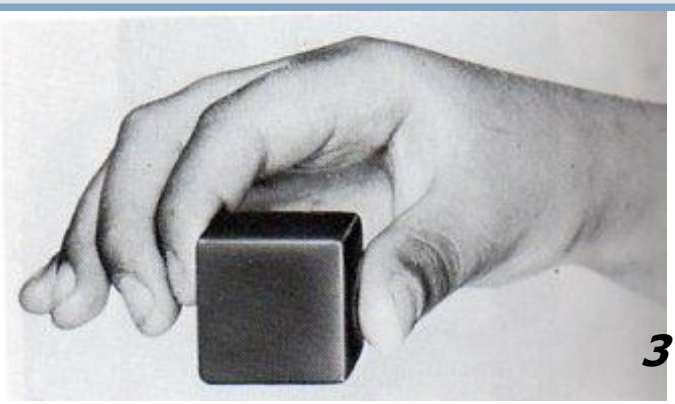


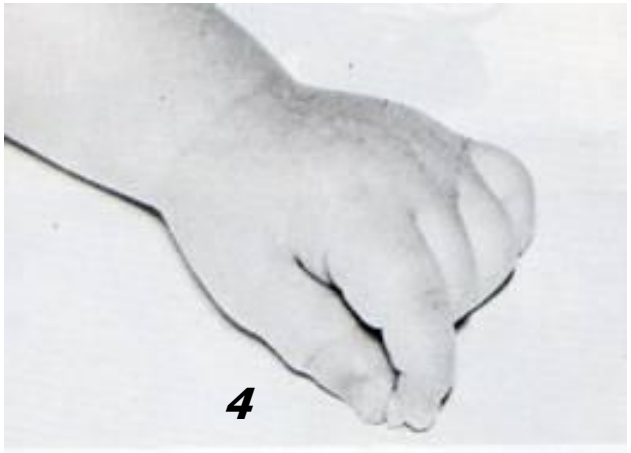
2–5 years

Ability to draw without seeing how it is done.
Can copy (draw after seeing it done) 6 months earlier.



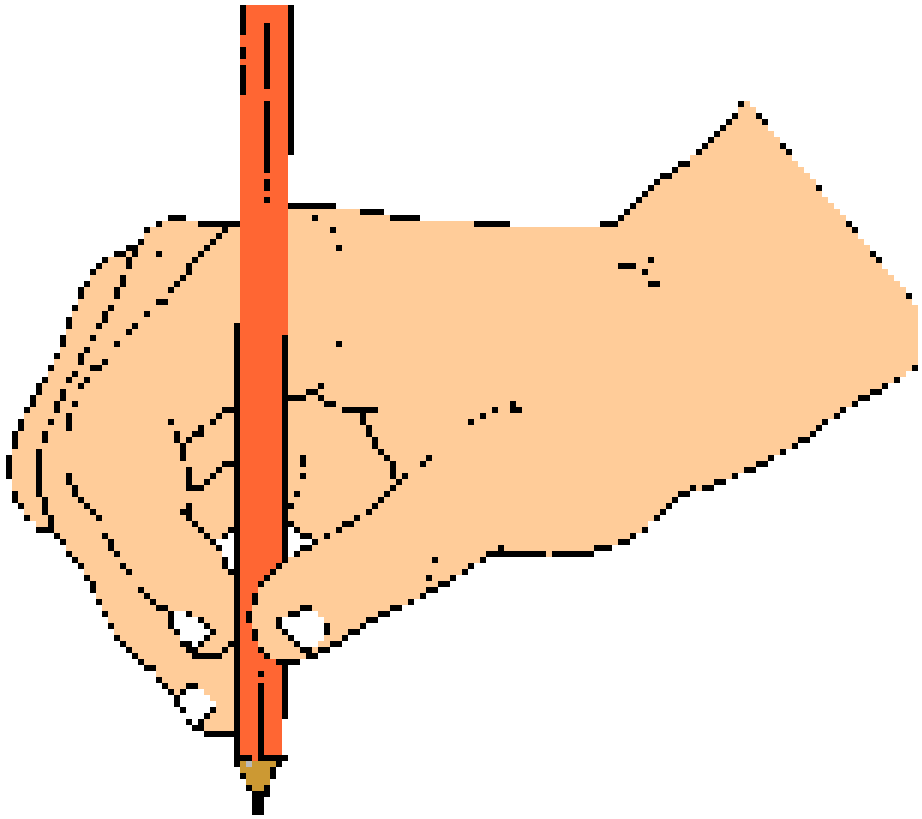






1. *Palmar grasp = 6 m*
2. *Intermediate grasp = 8 m*
3. *Mature grasp = 12 m*
4. *Pincer grasp = 12 m*

Tripod grasp



Language and hearing

Normal hearing is needed for normal speech

- Babbling
- Words
- Sentences
- Social communication

Hearing, speech and language (median ages)

Social, behaviour and play

- Looks at interaction with others and self care skills
- Stranger awareness
- Play
- Feeding
- Toileting
- Dressing

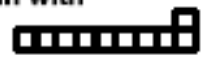
Social, emotional and behavioural development (median ages)

Age	Gross motor control	Vision and fine motor	Language and hearing	Social and daily living skills
2–4 months	Head steady in sitting	Follows object through 180°	Squeals with pleasure	Smiles
5–8 months	Sits without support	Passes cube hand to hand	Turns to soft voice Baba/Gaga babble (up to 10 months)	Feeds self biscuit
9–14 months	Stands with support	Neat pincer grasp of raisin	Mama or Dada specifically	Indicates needs by gesture
12–16 months	Walks well alone	Stack of two cubes (up to 21 months)	Three words (up to 21 months)	Drinks from a cup
15–24 months	Walks up steps	Scribbles spontaneously	Points to one body part	Removes garment
21–36 months	Jumps on the spot	Draws vertical line in imitation	Uses plurals and phrases	Puts on clothing Plays tag with other children
3–4 1/2 years	Balances on one foot for 5 s	Copies a ladder Draws a face	Understands cold, tired and hungry Asks 'Wh' questions	Separates from mother

Developmental Milestones Table

AGE	Gross Motor	Vision & Fine Motor	Speech & Language	Personal Social
6 weeks	**Pull to sit:** Head lag and rounded back. **Ventral Suspension:** Head momentarily in same plane as body. **Prone:** Pelvis high but knees no longer under abdomen. Chin raised occasionally.	Fixates and follows to 90 °	Vocalising by 8/52 Quiets to sound. Startles to sound.	Smiles responsively.
3 months	**Pull to sit:** Only slight head lag. Head occasionally bobs forward. **Ventral Suspension:** Head above plane of body. **Prone:** Pelvis flat. Lifts head up 45° - 90°.	Hand regard. Follows object from side to side (180°) **Hands held loosely**. Grasp object placed in hand. Not reaching out.	Squeals with delight. Turns head to sound.	Laughs.
5 months	**Pull to sit:** NO head lag and sits with straight back. Lying supine : Feet to mouth.	**Reaches for objects**. Plays with toes.		**Mouthing**.
6 months	**Pulls to sit:** Lifts head off couch in anticipation. **Sits with support**. **Bears full weight on legs**. **Prone:** Supports weight on hands with chest and upper abdomen off couch. **Rolls prone to supine**.	**Palmar grasp** of cube with ulnar approach. Moves head and eyes in all directions. No squint (after 4 months).		
7 months	Sits with hands on couch for support. **Rolls from supine to prone.**	Feeds self with biscuits. Transfers objects form hand to hand. Rakes at pea.	Babbling in single syllables. Babbling in combined syllables at 8 months. Distraction Test.	Stranger anxiety.

AGE	Gross Motor	Vision & Fine Motor	Speech & Language	Personal Social
9 months	**Sits steadily. Leans forward but cannot pivot.** **Stands holding on.** **Pulls self to stand.**	**Inferior pincer grasp**. (Scissors grasp).	Localises sound at 3 feet, above and below the ear level.	Feeds with spoon occasionally. **Looks for fallen toys**. Understands "NO!"
10 months	Crawls on abdomen. Pull self to sit.	Index approach. Uses index finger to poke at pea. Able to let go of cube in hand.		Waves "Bye bye" Plays "Pat-a-Cake"
11 months	Creeping on all FOURS Pivoting. Cruising. Walks with 2 hands held.		**ONE word** with meaning.	Plays "peek-a-boo"
1 year	**Gets from lying to sitting to crawling to standing.** Walks like a bear. Walks with ONE hand held. **Walks well (13 months).** **Stands alone.**	**Neat pincer grasp.** Bangs 2 cubes. **Sees and picks up hundreds and thousands**.	Understands phases. (e.g. where is your shoes). **2 - 3 words with meaning.** Localising sound above head.	Casting (13 months) Less mouthing. Shy.
15 months	**Creeps upstairs**. **Stoops for toy and stands up without support**. (best at 18 months)	Tower of 2 cubes. Scribbles spontaneously (15-18 months)	More words. Points to objects he wants. Continual jabber and jargon.	Takes off shoe. Feeds self with cup (able to pick up and put down) and spoon (but spills). **Mouthing stops.**
18 months	**Gets up and down stairs holding on to rail or with one hand held.** Pulls toy or carries doll. Throws ball without falling. Sits on a chair.	**Tower of 3 cubes**. Scribbles spontaneously. **Visual test**: Picture charts. Handedness (18 - 14 months).	Points to 2 - 3 body parts. Picture Cards - identify one.	Imitates housework. **Toilet trained**. Uses spoon well. Casting stops.

AGE	Gross Motor	Vision & Fine Motor	Speech & Language	Personal Social
2 years	Goes up and down stairs alone, 2 feet per step. Walks backwards (21 months) Runs. Picks up toy without falling. Able to throw and kick ball without falling.	**Tower of 6 cubes** **Imitates cube of train with no chimney.**  Imitates straight line. Visual test: Snellen chart.	Joins 2 - 3 word in a sentence. Uses 'you' 'me' 'I'. Picture cards - Names 3 objects.- Points to 5. Obeys 4 simple commands. Points to 4 body parts.	**Puts on shoes, socks, pants**. **Dry by day**. Play near other children but not with them.
2 1/2 years	Jumps on both feet. Walks on tip toes.	**Tower of 8.** **Imitates train with chimney.**  Holds pencil well. Imitates  and	**Knows FULL name and sex.** **Names one colour.**	
3 years	**Goes up stairs one foot per step.** **Down stairs 2 feet per step**. Jumps off bottom step. Stands on 1 foot for seconds. **Rides tricycle**.	Tower of 9. **Imitates bridge**. with cubes:  Copies  Imitates  Draw a man test. (3 - 10y)	**Can count to 10** **Names 2 colours.** Nursery rhymes. Understands "on", "in", "under".	Unbuttons. Dresses and undresses fully if helped with buttons and advised about correct shoe. **Dry by night.** **Plays with others.**
3 1/2 years		Copies bridge.		
4 years	Goes up and down stairs one foot per step. Skips on one foot. Hops on one foot.	Imitates gate with cubes. Copies  Goodenough test 4.	**Names 3 colours**. Fluent conversation. Understands "in front of", "between", behind".	Buttons clothes fully. **Attends to own toilet needs**.
4 1/2 years		Copies gate with cubes. Copies square. Draws recognisable man and house.		

Age† (months)	Gross motor control	Vision and fine motor	Language and hearing	Social and daily living skills
3	Complete head lag*	Following with eyes	Searching for sounds with eyes	Smiling
6	Preference for one hand Persistent Moro*	Squint*	Head turn to soft voice	Interest in people
9	Sitting with support	Persistent hand regard*	Ba-ba-ba babble	Awareness of strangers
12	Pulling to stand Standing with support	Pincer grasp	Trying one or two words	Constant* mouthing
18	Walking alone	Constructive play with blocks Casting toys*	Six words Constant dribbling*	Pointing at items Finger feeding
24	Running	Turning book pages	Fifty single words	Interested in other children Helps in dressing
36	Kicking a ball	Drawing lines	2–3 word phrases Echolalia*	Active play with peers
48	Pedalling and hopping	Drawing a face	Sentences and 'Wh' questions	Imaginative play Toilet trained — day

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NORMAL RANGES (APPROXIMATELY 25TH CENTILE TO 90TH CENTILE)

Age	Gross motor control	Vision and fine motor	Language and hearing	Social and daily living skills
2-4 months	Head steady in sitting	Follows object through 180°	Squeals with pleasure	Smiles
5-8 months	Sits without support	Passes cube hand to hand	Turns to soft voice Baba/Gaga babble (up to 10 months)	Feeds self biscuit
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21-36 months	Jumps on the spot	Draws vertical line in imitation	Uses plurals and phrases	Puts on clothing Plays tag with other children
3-4½ years	Balances on one foot for 5 s	Copies a ladder Draws a face	Understands cold, tired and hungry Asks 'Wh' questions	Separates from mother

WARNING SIGNS TO WORRY ABOUT

Age (months)†	Gross motor control	Vision and fine motor	Language and hearing	Social and daily living skills
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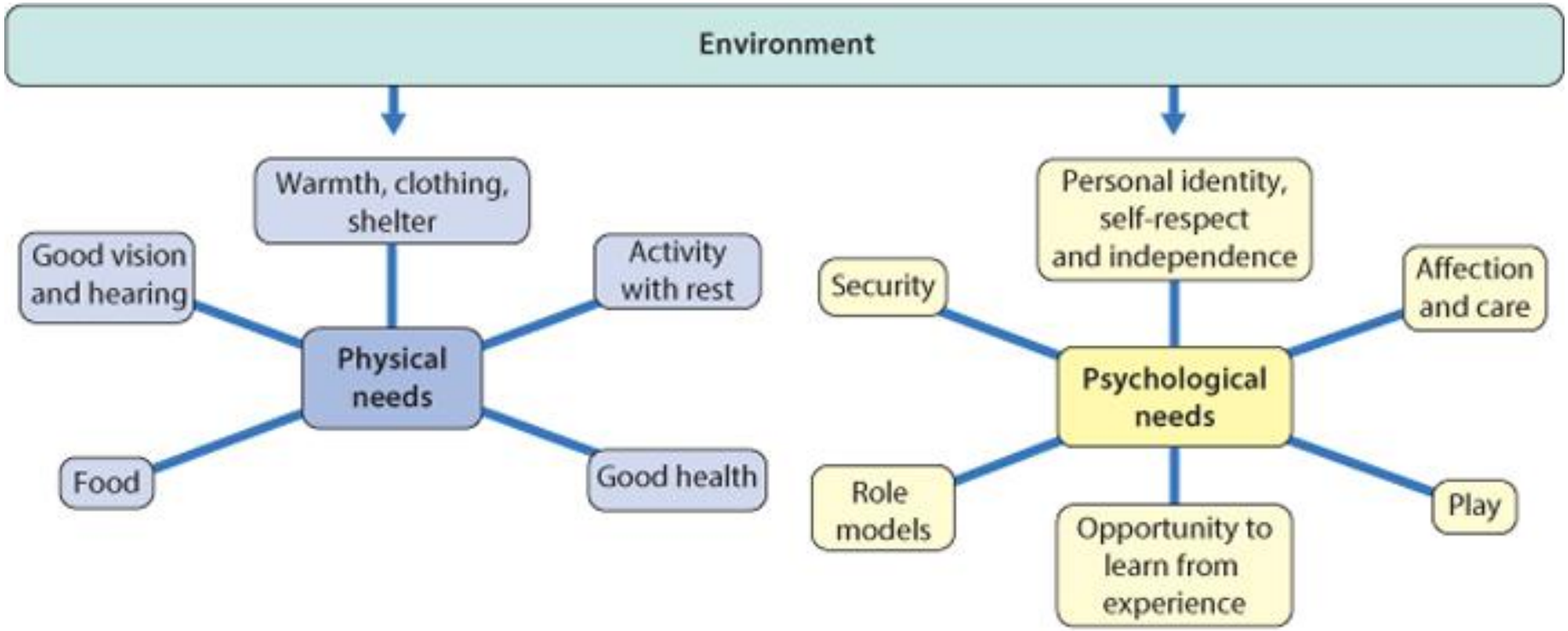
Developmental assessment.....setting the scene



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Developmental assessment…1

2-2½ year review

Your child is 2-2½ years old and is learning many new skills, such as:

* wanting to explore everything and be more independent
* wanting to run and climb and always being on the go
* enjoying messy play but not sharing!
* starting to join up words and trying to repeat words you say. Favourite words are "NO" and "MINE!"
* enjoying books and joining in with songs and rhymes
* liking being close to you and having cuddles and hugs
* playing with other children
* using a spoon at mealtimes and using a feeder cup
* starting to show an interest in potty training
* turning from laughter to anger very quickly, which can be hard work

S/he has got used to tooth brushing with a fluoride toothpaste.
S/he has been to the dentist.

***Birth to Five* gives information about what children are usually doing at this age.**

Other things you may want to talk about at the review are:

* speech and language
* learning
* diet
* behaviour
* safety
* your own health

You may find it helpful to write down here anything you would like to discuss at the 2-2½ year review:

.....

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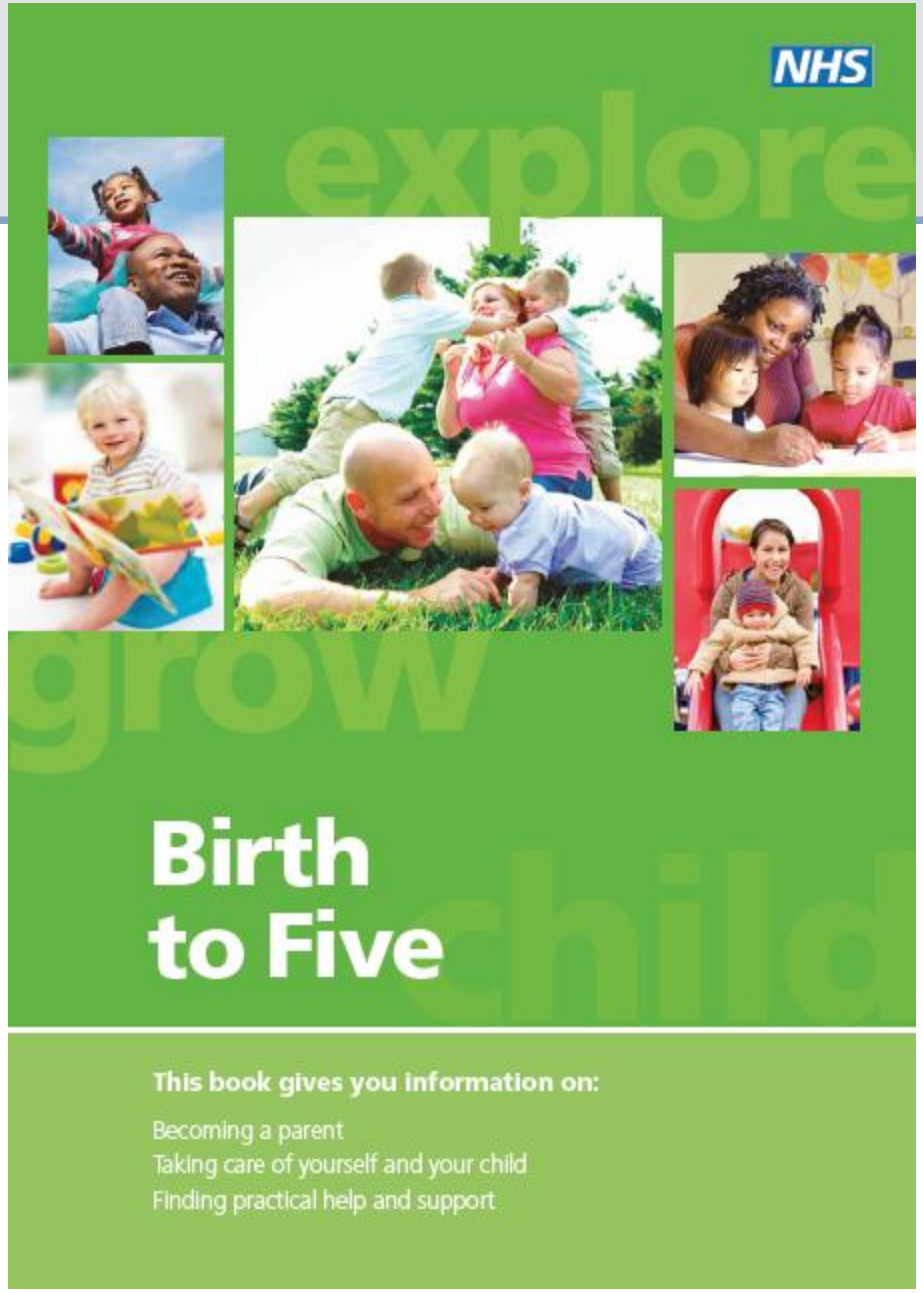

Developmental assessment…2

Observe the child

- Gross motor
- Fine motor
- Speech
- Social & play

Use play

Do not force your agenda

Give the child appropriate props

- Bricks & ‘thousands’
- Pencil & paper & crayons
- Ball
- Doll
- Pictures

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Developmental assessment…3

- Standardised tests
  - **S**chedule **o**f **G**rowing **S**kills (0-5 years)
  - Griffiths Mental Development Scales (0-8 years)

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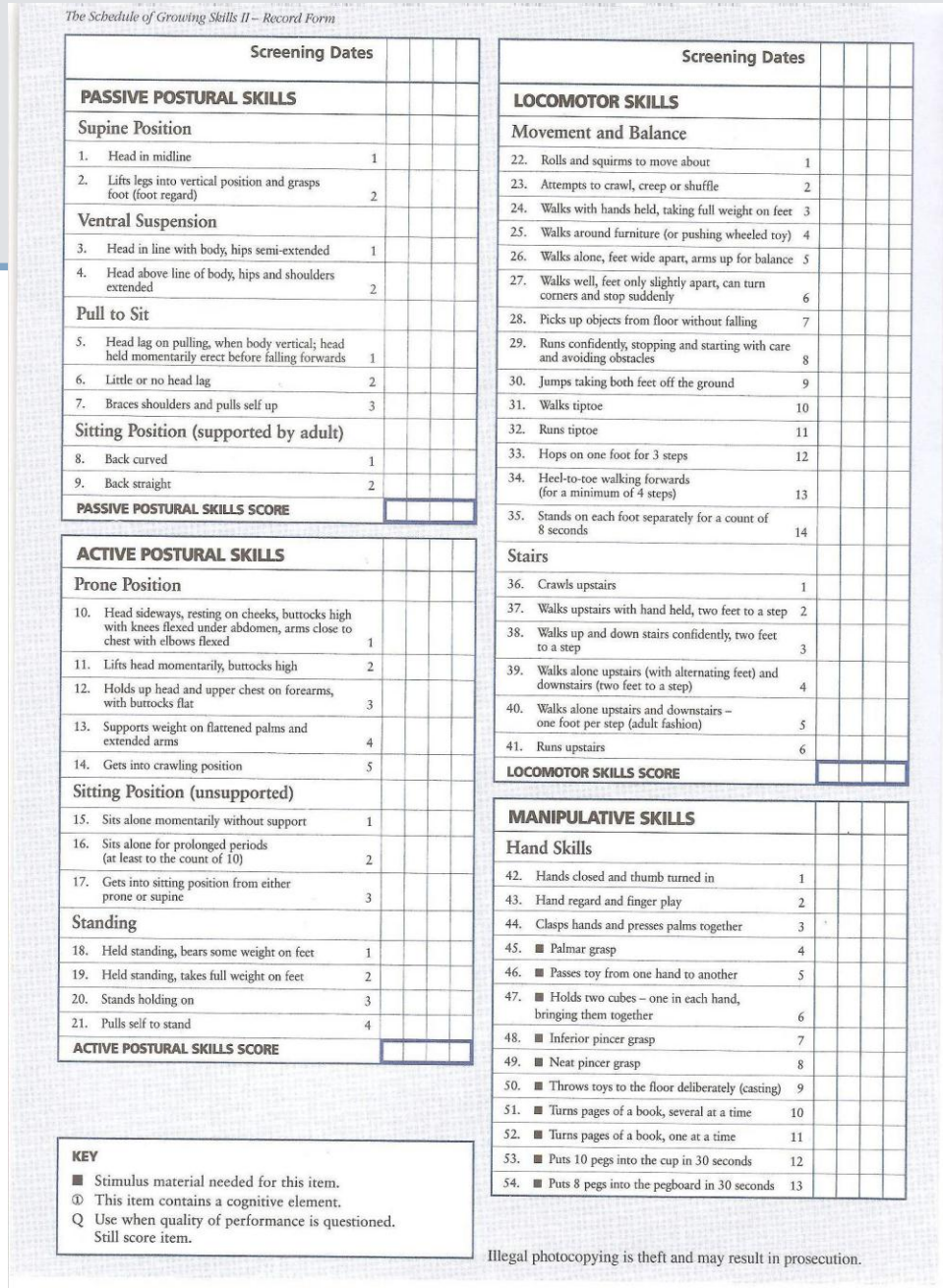
SOGS II



The Schedule of Growing Skills II – Record Form

	Screening Dates			
PASSIVE POSTURAL SKILLS				
Supine Position				
1. Head in midline	1			
2. Lifts legs into vertical position and grasps foot (foot regard)	2			
Ventral Suspension				
3. Head in line with body, hips semi-extended	1			
4. Head above line of body, hips and shoulders extended	2			
Pull to Sit				
5. Head lag on pulling, when body vertical; head held momentarily erect before falling forwards	1			
6. Little or no head lag	2			
7. Braces shoulders and pulls self up	3			
Sitting Position (supported by adult)				
8. Back curved	1			
9. Back straight	2			
PASSIVE POSTURAL SKILLS SCORE				

ACTIVE POSTURAL SKILLS				
Prone Position				
10. Head sideways, resting on cheeks, buttocks high with knees flexed under abdomen, arms close to chest with elbows flexed	1			
11. Lifts head momentarily, buttocks high	2			
12. Holds up head and upper chest on forearms, with buttocks flat	3			
13. Supports weight on flattened palms and extended arms	4			
14. Gets into crawling position	5			
Sitting Position (unsupported)				
15. Sits alone momentarily without support	1			
16. Sits alone for prolonged periods (at least to the count of 10)	2			
17. Gets into sitting position from either prone or supine	3			
Standing				
18. Held standing, bears some weight on feet	1			
19. Held standing, takes full weight on feet	2			
20. Stands holding on	3			
21. Pulls self to stand	4			
ACTIVE POSTURAL SKILLS SCORE				

	Screening Dates			
LOCOMOTOR SKILLS				
Movement and Balance				
22. Rolls and squirms to move about	1			
23. Attempts to crawl, creep or shuffle	2			
24. Walks with hands held, taking full weight on feet	3			
25. Walks around furniture (or pushing wheeled toy)	4			
26. Walks alone, feet wide apart, arms up for balance	5			
27. Walks well, feet only slightly apart, can turn corners and stop suddenly	6			
28. Picks up objects from floor without falling	7			
29. Runs confidently, stopping and starting with care and avoiding obstacles	8			
30. Jumps taking both feet off the ground	9			
31. Walks tiptoe	10			
32. Runs tiptoe	11			
33. Hops on one foot for 3 steps	12			
34. Heel-to-toe walking forwards (for a minimum of 4 steps)	13			
35. Stands on each foot separately for a count of 8 seconds	14			
Stairs				
36. Crawls upstairs	1			
37. Walks upstairs with hand held, two feet to a step	2			
38. Walks up and down stairs confidently, two feet to a step	3			
39. Walks alone upstairs (with alternating feet) and downstairs (two feet to a step)	4			
40. Walks alone upstairs and downstairs – one foot per step (adult fashion)	5			
41. Runs upstairs	6			
LOCOMOTOR SKILLS SCORE				

MANIPULATIVE SKILLS				
Hand Skills				
42. Hands closed and thumb turned in	1			
43. Hand regard and finger play	2			
44. Clasps hands and presses palms together	3			
45. ■ Palmar grasp	4			
46. ■ Passes toy from one hand to another	5			
47. ■ Holds two cubes – one in each hand, bringing them together	6			
48. ■ Inferior pincer grasp	7			
49. ■ Neat pincer grasp	8			
50. ■ Throws toys to the floor deliberately (casting)	9			
51. ■ Turns pages of a book, several at a time	10			
52. ■ Turns pages of a book, one at a time	11			
53. ■ Puts 10 pegs into the cup in 30 seconds	12			
54. ■ Puts 8 pegs into the pegboard in 30 seconds	13			

KEY

■ Stimulus material needed for this item.
① This item contains a cognitive element.
Q Use when quality of performance is questioned. Still score item.

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Griffiths

	Subscale A Locomotor	Response
1	Jumps off 1 step D; Tx2	
2	Static balance 1: can stand on one foot for 3+ seconds D; Tx2 C	
3	Can rise from kneeling without using hands D C; Tx2	
4	Can run fast indoors or in a small outside space	
5	Can stand and walk tip-toe: 6+ steps D C; Tx2	

	Subscale B Personal-Social	Response
1	Puts away toys when encouraged to do so R	
2	Gives first name	
3	Assists with small household tasks on request R	
4	Uses spoon and fork together, without help R	
5	Knows own gender	

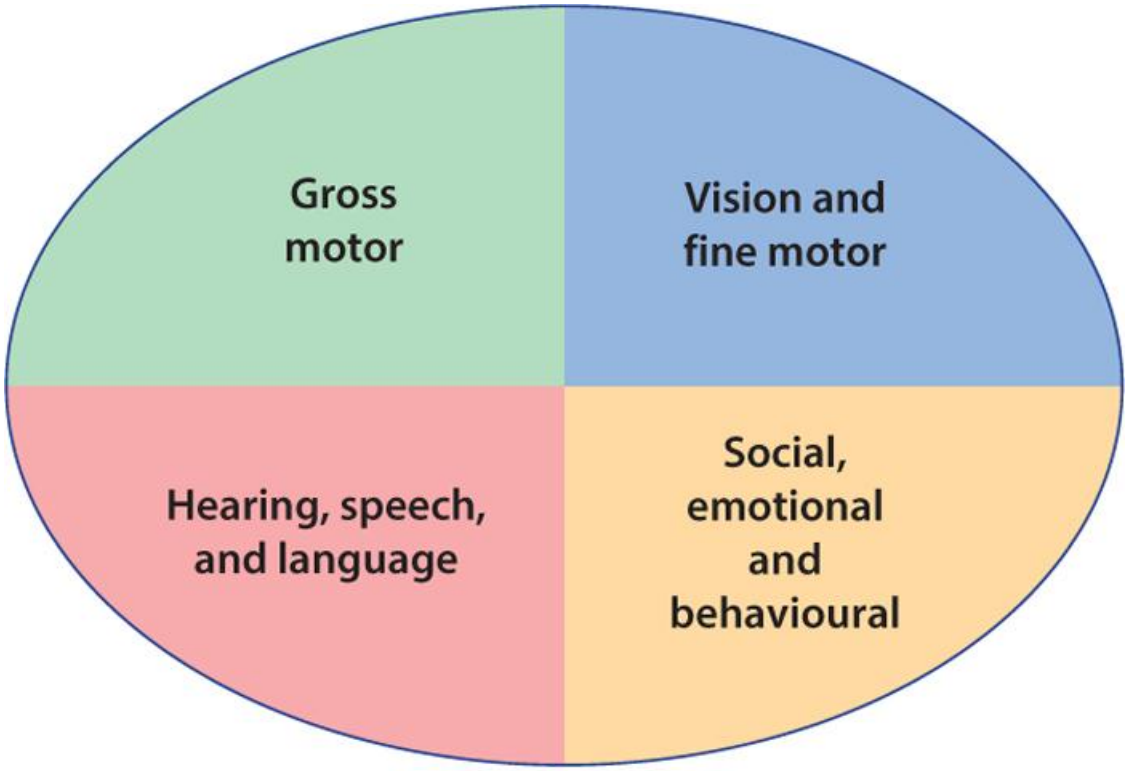
	Subscale C Language	Response
1	Names 12 objects in box	
2	Picture vocabulary (12) (NB: Administer after item FIII.10)	
3	Defines by use (2+)	
4	Picture description: names 6+ objects in large picture	
5	Uses 2 or more descriptive words	

	Subscale D Eye and Hand Co-ordination	Response
1	Builds a tower of 8+ bricks D C; Tx2	
2	Copies a horizontal stroke D	
3	Handles scissors: tries to cut D C	
4	Threads 6 beads D C	
5	Copies a circle: Stage 1 Tx2	

	Subscale E Performance	Response
1	4-squares board: 50 secs Tx2 C	
2	6-hole board: 50 secs Tx2 C	
3	Returns 9 bricks to box and puts lid on: 50 secs Tx2 C	
4	Reassembles screw toy D C; Tx2	
5	4-squares board: 40 secs Tx2 C	

	Subscale F Practical Reasoning	Response
1	Knows 'penny' or 'money'	
2	Repeats one digit (8; 2; 7) P	
3	Compares two insets for size	
4	Repeats 2 digits (1-6; 5-3; 9-4) P	
5	Knows 'big' and 'little'	

So.....



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Developmental milestones

While looking at the video make notes on what skills each child is able to perform in each of the 4 developmental domains

Estimate the developmental age of the child using the table of milestones

	A	B	C
Gross motor/ posture			
Fine motor/ vision			
Language/ hearing			
Social/ behaviour			

Abnormal Development

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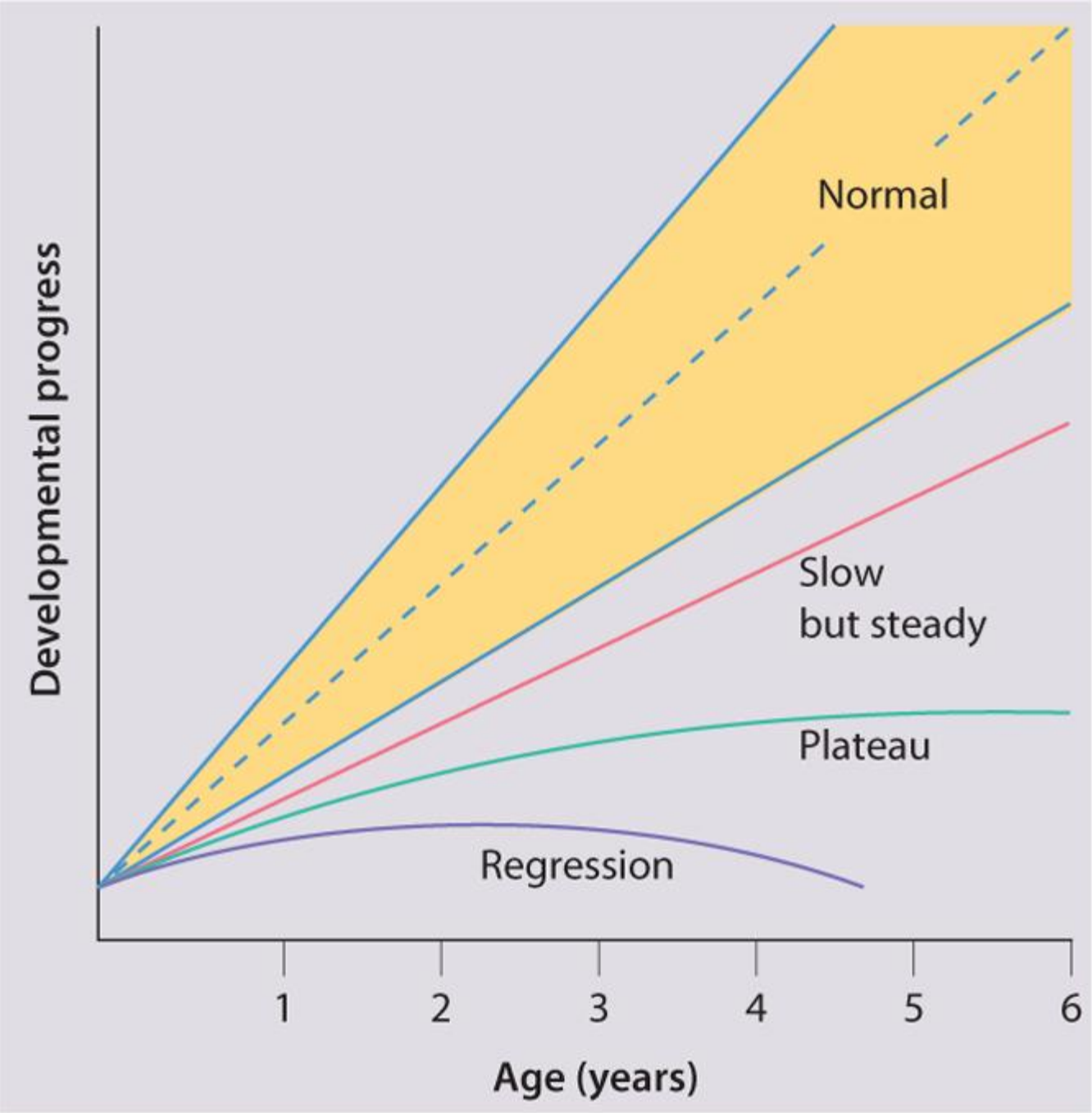
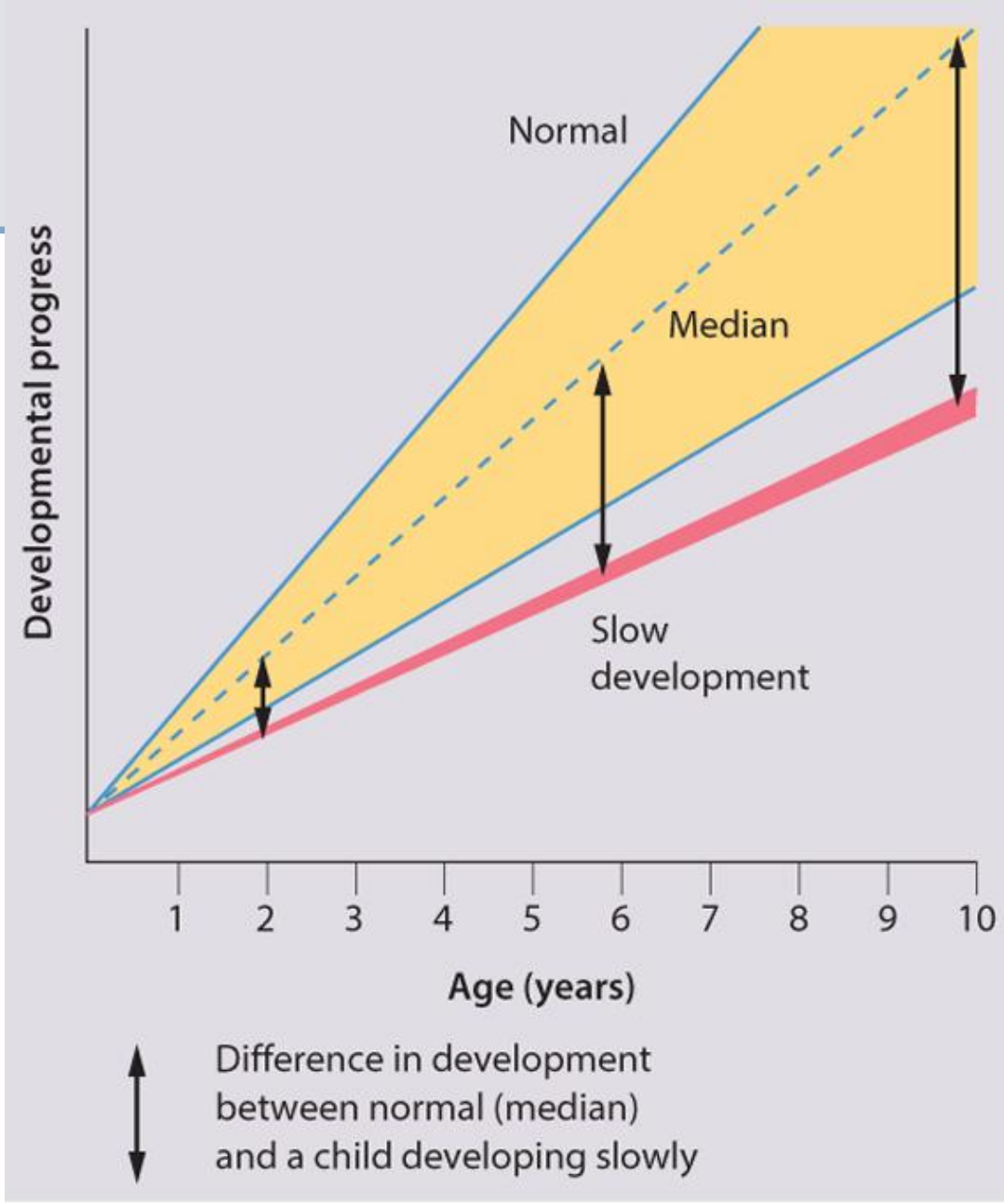
The Questions

What is the problem?
Where is the problem?
Which key development field is worst affected?
Why did things go wrong?
When did things go wrong?
How did things go wrong?
Who is affected?
What can be done?





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What is the problem?

Cerebral Palsy – a prototype of abnormal development

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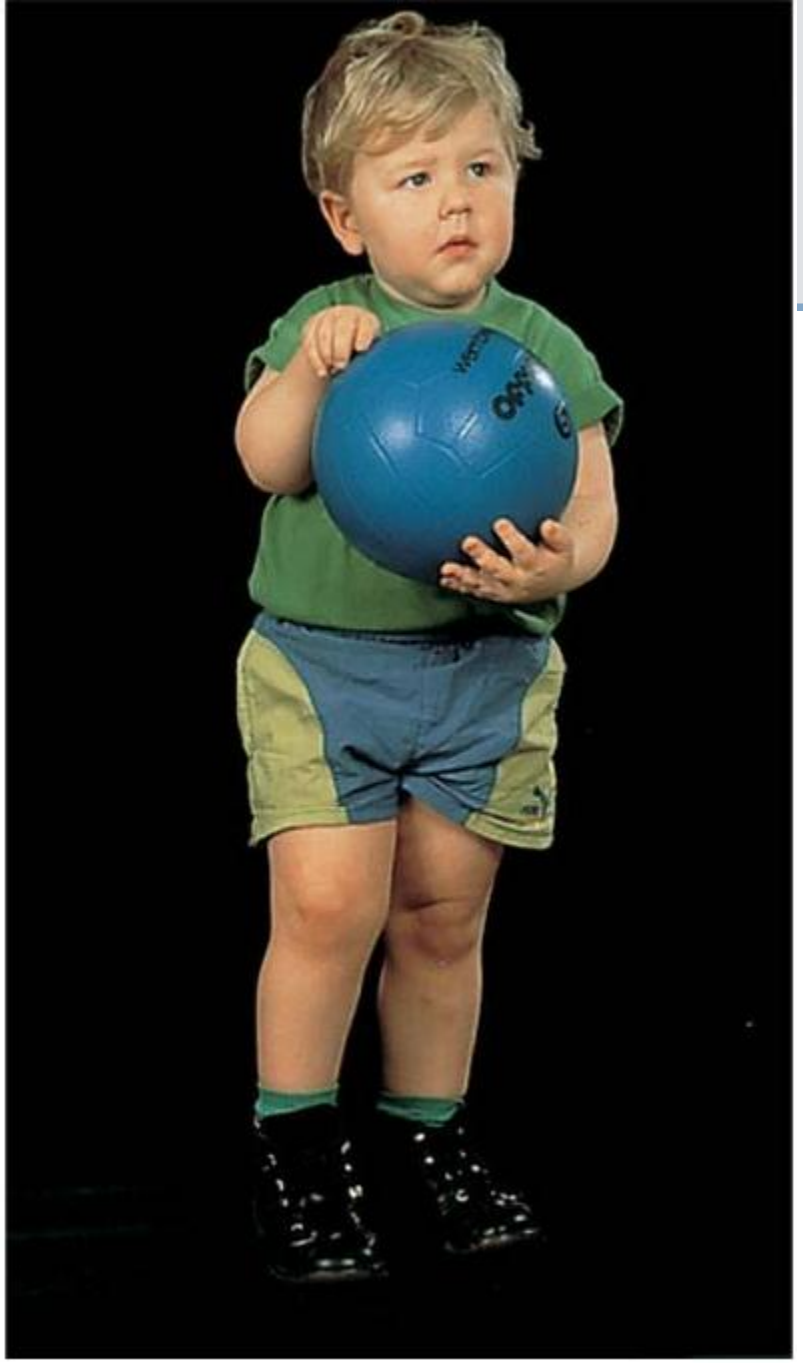
Definition

- is a disorder of movement and posture due to a non-progressive lesion of motor pathways in the developing brain.
- the clinical manifestations emerge over time, reflecting the balance between normal and abnormal cerebral maturation.
- is the most common cause of motor impairment in children, affecting about 2 per 1000 live births.

Other problems

- learning difficulties (about 60%)
- epilepsy (40%)
- squints (30%)
- visual impairment from errors of refraction and cortical damage (20%)
- hearing impairment (20%)
- speech and language disorders (due to hearing loss, oromotor incoordination and learning difficulties)
- behaviour disorders
- feeding problems
- joint contractures, hip subluxation, scoliosis.



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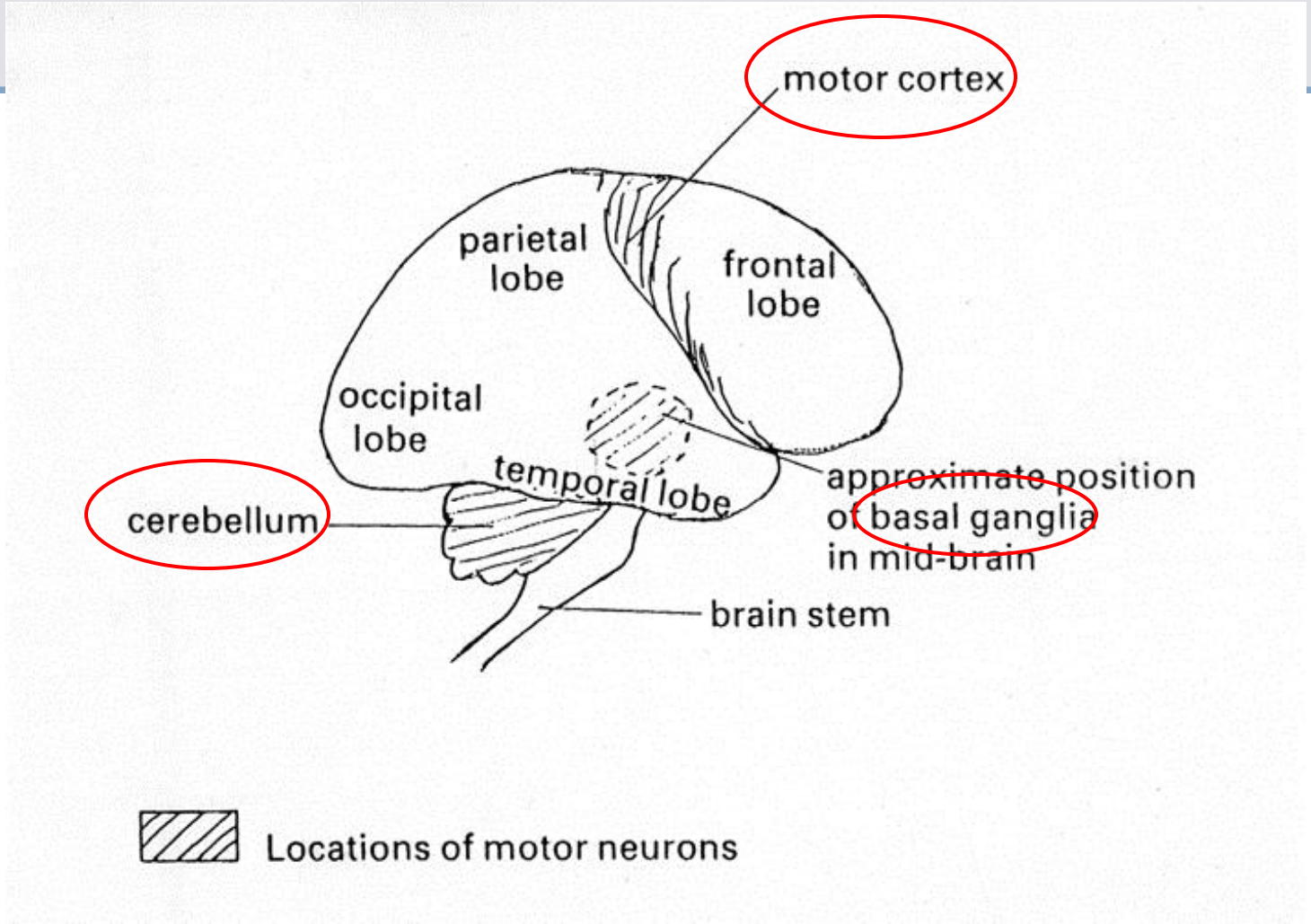
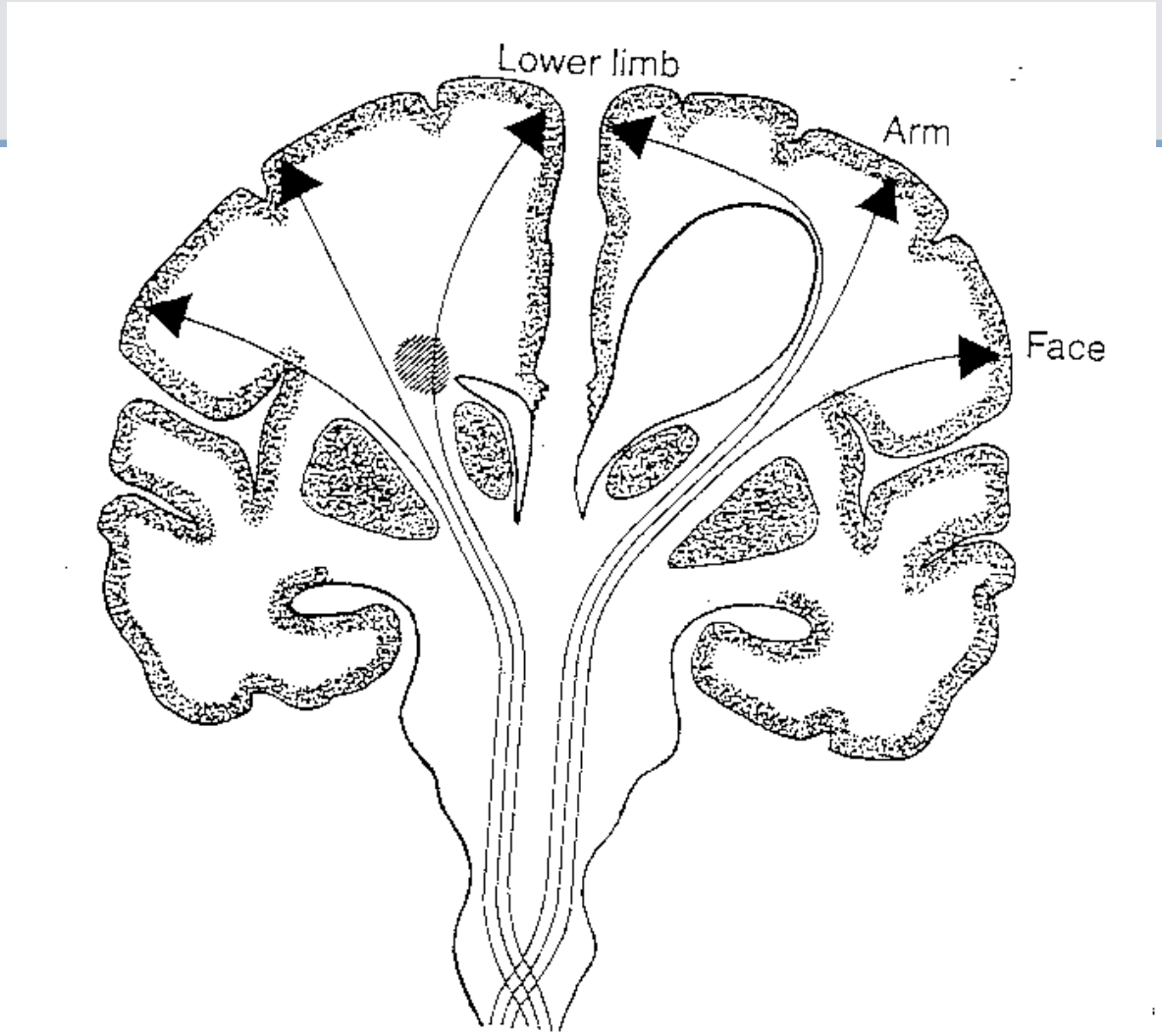
Where is the problem?

Motor neurones


motor cortex
parietal lobe
frontal lobe
occipital lobe
temporal lobe
cerebellum
approximate position of basal ganglia in mid-brain
brain stem
Locations of motor neurons


Lower limb
Arm
Face

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Why did things go wrong?

Genetic

Acquired

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When did things go wrong?

Prenatal

Perinatal

Infancy

Early childhood

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How did things go wrong?

Hypoxia-ischaemia

Hypoglycaemia

Infections

Trauma

Other

Causes

- ~ 80% of cerebral palsy is antenatal in origin - genetic syndromes and congenital infection.

- Only about 10% of cases are thought to be due to hypoxic-ischaemic injury at birth

- About 10% are postnatal in origin.
  - rise in survival of extremely preterm infants meningitis/encephalitis/encephalopathy,
  - head trauma symptomatic hypoglycaemia, hyperbilirubinaemia.

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Who is affected?

Babies (Preterm/Term)

Infants

Young children

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What can be done?

Hearing
Conductive or sensorineural hearing impairment

Vision
Squint
Impaired visual acuity
Visual field deficits

Orthopaedic
Hip subluxation/dislocation
Fixed joint contractures
Dynamic muscle contractures
Painful muscle spasm
Spinal deformity
Osteoporosis/fractures

Specialist health visitor
Help coordinate multidisciplinary and multiagency care
Advice on development of play or local authority schemes e.g. Portage

Dietician
Advice on feeding and nutrition

Social worker/ Social services
Advice on benefits: disability, mobility, housing, respite care, voluntary support agencies
Day nursery placements
Advocate for child and family
Register of children with special needs

Psychologist (clinical and educational)
Cognitive testing
Behaviour management
Educational advice

Gastrointestinal
Gastro-oesophageal reflux
Oromotor incoordination
Aspiration of food or saliva
Constipation

Urogenital
Urinary tract infection
Delay in establishing continence
Unstable bladder
Vesico-ureteric reflux
Neuropathic bowel and bladder

Common medical problems

Child Development Service

Paediatrician
Assessment, investigation and diagnosis
Continuing medical management
Coordination of input from therapists and other agencies - health, social services, education

Respiratory
Respiratory infections
Aspiration pneumonia
Chronic lung disease
Sleep apnoea

Neurological
Epilepsy
Microcephaly/ hydrocephalus
Cerebral palsy

Nutrition
Poor weight gain
Failure to thrive

Behaviour
Organic or reactive
Sibling behaviour
Parental distress

Speech and language therapist
Feeding
Language development
Speech development
AAC (augmentative and alternative communication) aids e.g. Makaton sign language, Bliss symbol boards, voice synthesizers

Occupational therapist
Eye-hand coordination
ADL (activities of daily living) - feeding, washing, toileting, dressing, writing
Seating
Housing adaptations

Physiotherapist
Balance and mobility
Postural maintenance
Prevention of joint contractures, spinal deformity
Mobility aids, orthoses

VIDEO

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(Final) Summary

- Basic review of embryology
- Mapped how abnormalities→ →clinical scenario
- Normal development and milestones
- Framework tool for assessment
- When development is abnormal – an example

- Year 3 – Introduction to Clinical Specialties

Any questions?

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Acknowledgements and further reading

Dr Annie Dai, Consultant Community Paediatrician

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