**Normal Development and Behavior**

Must know the normal to be able to recognize any abnormality and for prompt referral

**Points:**

* Human beings have the longest period of childhood.
* Fastest growth of the brain is during the first 2 years of life (grows 5x the brain growth)
* Brain smooth as a child then develops sulci as it grows in the adult brain.
* Myelination is completed by the 2nd year of life and all sutures close by 12 years.
* We are born with a fixed number of neurons and it growth is determined by the speed of a child’s thoughts thereby creating connections (this is myelination).
* Each sphere of the brain is specialized. Human learn from caregiver by observation (eye contact and interaction), while animals learn by instinct.
* First sense to develop is touch and is important in growth.
* Child functional development is influenced by social and emotional factors.

**When and why do we assess development?**

**After 6 weeks of birth?**

* Ask about difficult pregnancy, convulsions after birth, dimorphic behavior, and routine.
* If the child is blinded for the first two week of life, he is blind for life because of lack of optic nerve stimulation leading to cortical blindness, and if he is brought up among mute parents he can be deaf also. Therefore, take congenital cataract seriously or it leads to blindness and detect hearing problems & all other abnormalities at an early age.
* **Screening for abnormalities can be detected by history physical and interpretation.**

**History:**

* Normal birth weight is 2.5kg (optimal). Pre-term development differs than term small babies.
* Pre-term babies are more prone to bleeding (such as occipital, intraventricular hemorrhage) and hypoglycemia,
* while term small babies are more prone to hypoglycemia. These babies have inadequate glycogen stores which usually starts at the last month of gestation.
1. Infections: TORCH transmitted via placenta therefore vaccinate against rubella before getting pregnant.
2. Ask about mother’s pregnancy for example hypertension (pre-eclampsia) can cause placental insufficiency making the baby small for term.
3. Fetal distress is determined by APGAR score and can be detected from history (cries immediately, breaths spontaneously and breast feeds within 24 hours). If these parameters are present then the fetus is at no risk of anoxia. If there is risk of anoxia place and NG tube because the fetus will not be able to swallow.
4. Emotional deprivation = children at the orphanage have different development than those raised at home among their parents. Two parents talking and stimulating the baby is healthy and should start at birth. During birth and 1st hour and eyes are open for bonding and the first person you see is considered by the infant as the parent.
5. Determine immediate insult to the brain:
	1. If delay in milestone development then accelerated more likely to be cerebral palsy
	2. If normal milestone development than delayed then neurodegenerative diseases.

**Physical Examination:**

Check for any dysmorphic feature by craniofacial examination.

Head circumference is the most important parameter because it reflects the size of the brain (macro or micro cephaly).

Four developmental parameters that should be explored for proper development:

1. Gross motor development (sitting, crawling, walking, and running).
2. Hand function is important because it is a tool for fine motor development and vision are related to each others because if you cant see you cant reach. Representation of the tongue is equal to the rest of the body.

First two are the least important in reflecting the brain development.

1. Language development for communication.
2. Social development most important in reflecting the brain development.

In-Utero the baby is flexed to economize the space and remains up to 6 months then starts to de-flex.

* At 6 weeks of life: the head turns 90 degrees and sits with head lag. Baby also smiles in response to stimuli.
* 4 months old: he can reach his mouth and loses the head lag.
* 6 months old: sit with hands on the floor and back rounded and on prone position he can roll over. The baby develops a sort of adaptation by being able to move an object from one hand to another. This is important for communication and to integrate the two sides of the brain.
* 10 months old: sits alone and needs help to stand. If the patient can perform the opponens function with hand that means the child is neurologically intact. Speech starts with consonants followed by vowels (mama, baba).
* 1 year: walks with one hand held and walks independently by 15 months if he cant walk by 18 months, it is abnormal. Lets go of an object upon request, which is important for interaction before that he wont let go easily you have to take it by force.
* 18 months old: with one hand held can go up the stairs, build 3 cubes on top of each other. Can imitate a vertical stroke of drawing not circular or horizontal and can point 3 points of the body (eyes, mouth, ears) and can name a picture. Cannot form a sentence.
* 24 months: walk up and down the stairs one step at a time, make a tower of 6 cubes, drawing involves both a circular and vertical course, and make simple sentences.

**Interpretation:**

* If the baby is pre-mature (e.g. fetus born during the 8th month of gestation, its development at 9 months is that of an 8 month old baby).
* Walking and running is not the reflective parameter, but talking and interacting is.
* Delay in language development can be due familial deafness, therefore screen for hearing problems, it can also be due to lack of stimulation or autism.
* If everything is normal except walking, think of spinal causes i.e. spina bifida.
* By the end of assessment you should know if it is global or local retardation and if global (gross motor, fine motor, sensory, or speech), think of insult to the brain.
* Read Denver Developmental Screening Test- it assesses the 4 developmental parameters.

**Developmental quotient is a range:**

It has been established that breast fed children are smarter than bottle fed because of the presence of folic acid that is important for myelination.

IQ range is 100 normal.

Most important factor in intelligence development of the child is the mother.