Cerebral palsy in children, Birth to Adolescence

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What does every parent want?

Children no matter their ability/disability and functional level, they must reach their highest potential!

What you will learn today?

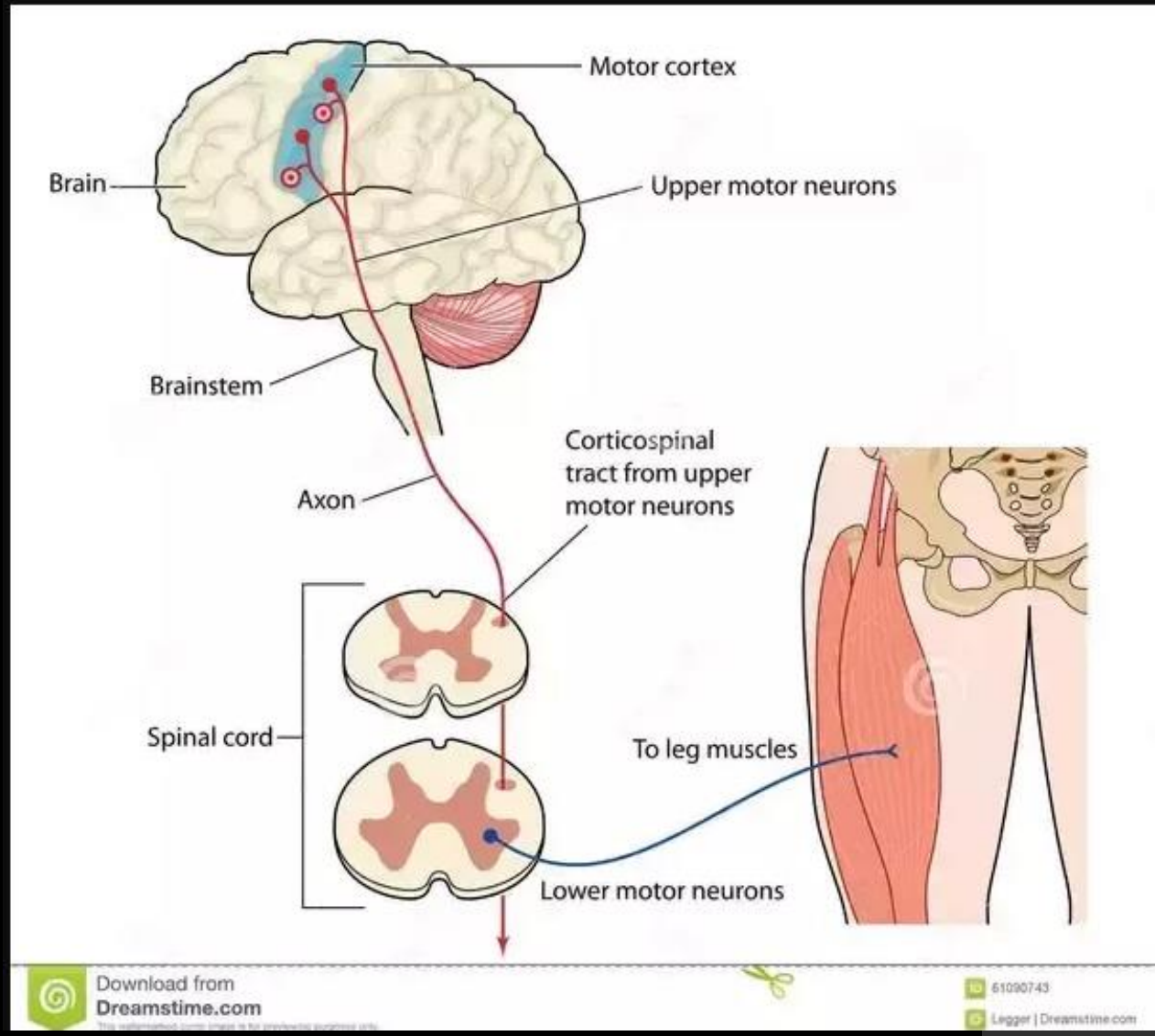
1. Few important facts about Cerebral Palsy
2. Can you/we prevent Cerebral Palsy? How can we predict risk for Cerebral palsy?
3. Understand co-morbidities of CP and their screening and surveillance.
4. Importance of early detection and intervention
5. What can you do to help your child with CP?
6. Importance of self care. Can individuals with CP be achievers?
7. How can you advocate for your child?

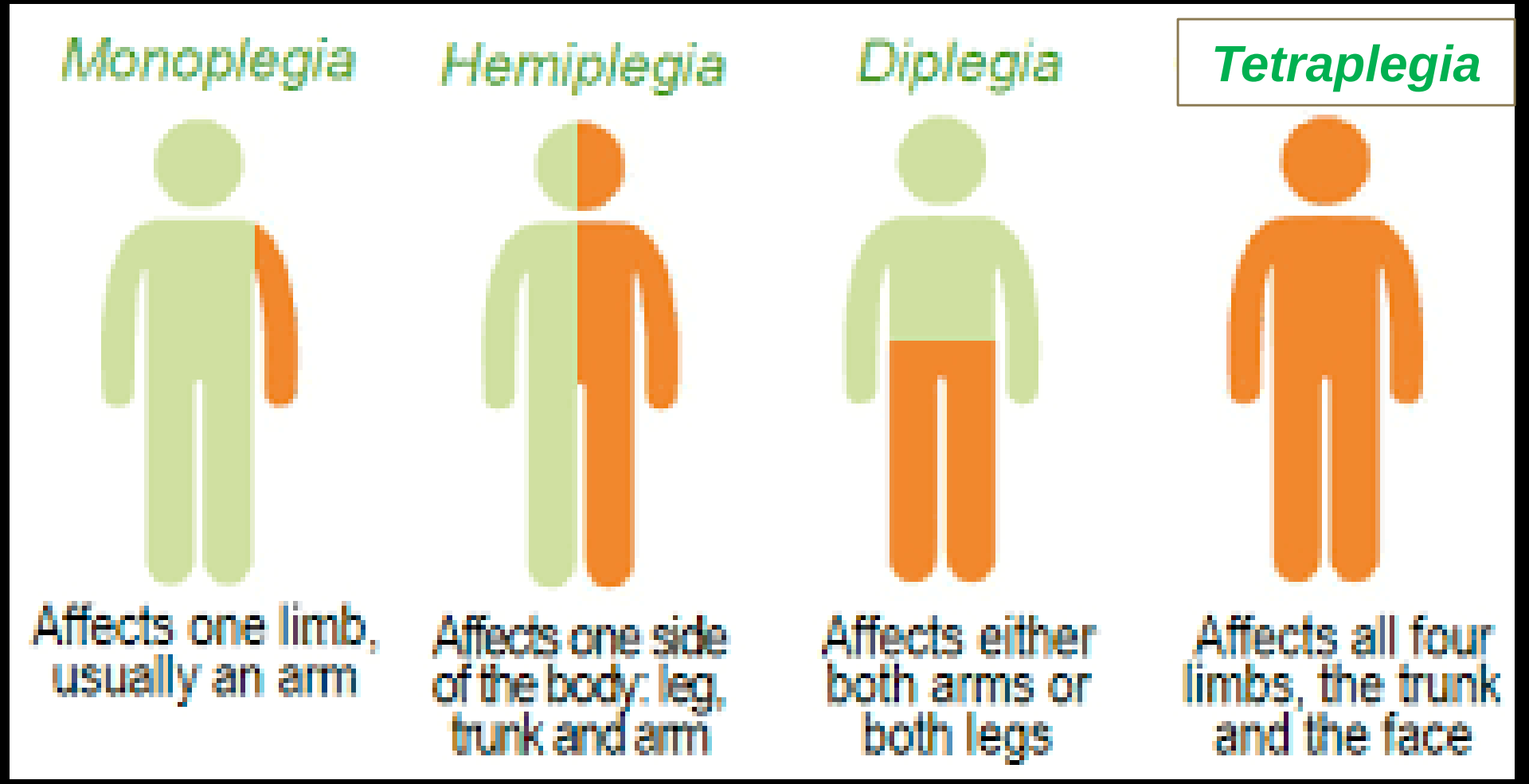
What is Cerebral palsy?

Cerebral means having to do with the brain.

Palsy means weakness or problems with using the muscles.

In CP, there is damage to nerve pathways in the brain that controls muscle movement

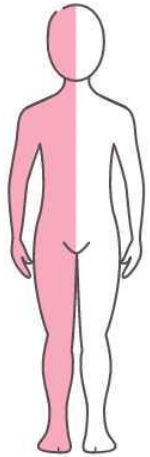



Monoplegia
Hemiplegia
Diplegia
Tetraplegia
Affects one limb, usually an arm
Affects one side of the body: leg, trunk and arm
Affects either both arms or both legs
Affects all four limbs, the trunk and the face

SPASTIC CP

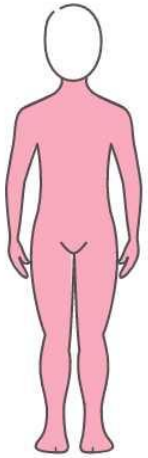
ATHETOID AND DYSKINETIC CP

ATAXIC CP

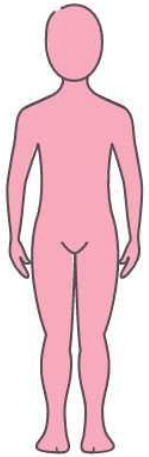


HEMIPLEGIA

DIPLEGIA

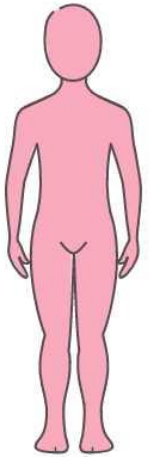


QUADRIPLEGIA



ATHETOID

DYSTONIC



ATAXIC

PYRAMIDAL

Impairment of motor planning, coordination, muscle strength regulation, motor learning and fine motor skills.

EXTRAPYRAMIDAL

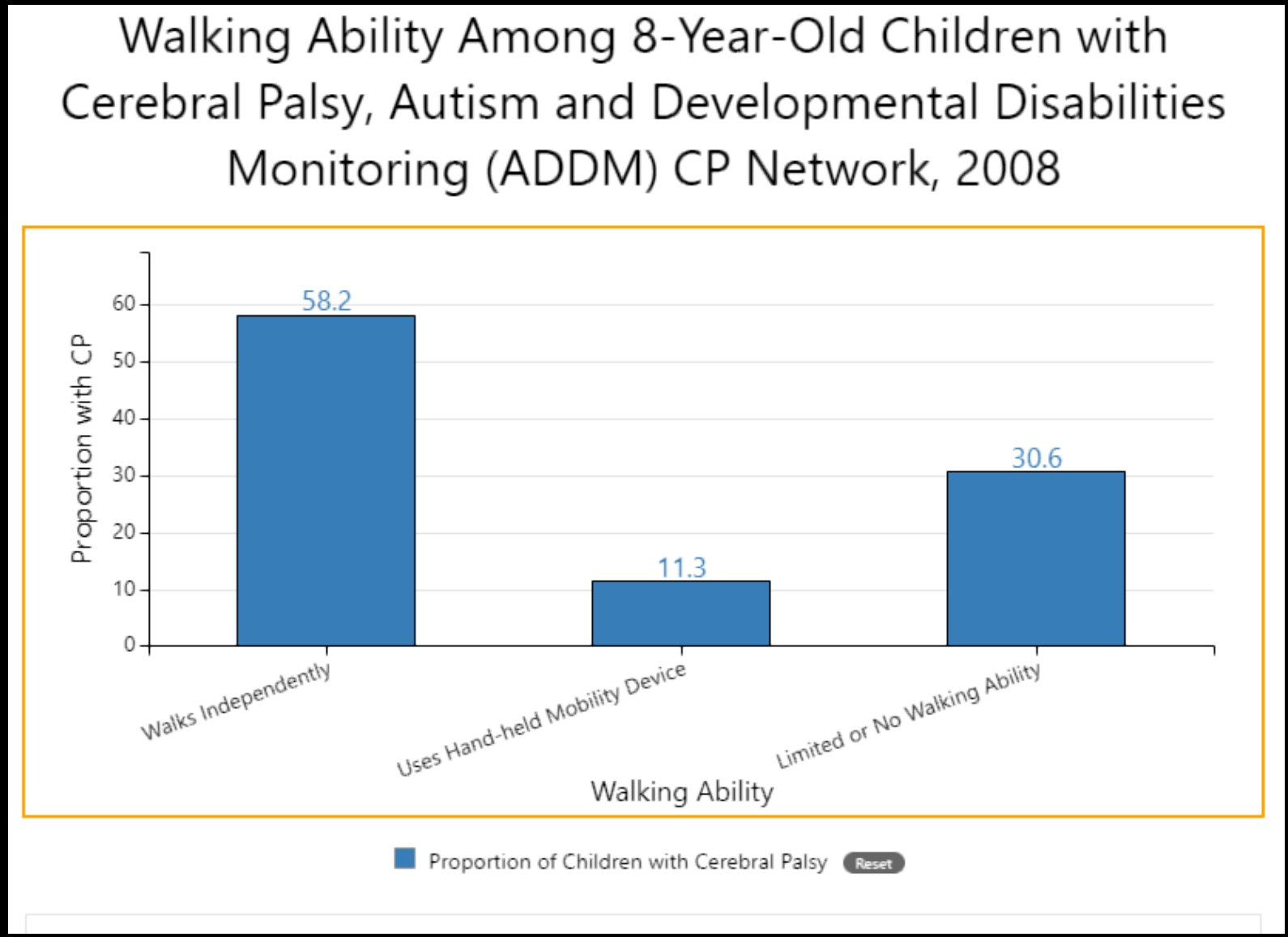
Persistent or poorly inhibited ‘primitive’ reflexes, abnormal organization of movement and posture, hyperactive reflexes and abnormal muscle tone, including spasticity.

Facts about Cerebral Palsy

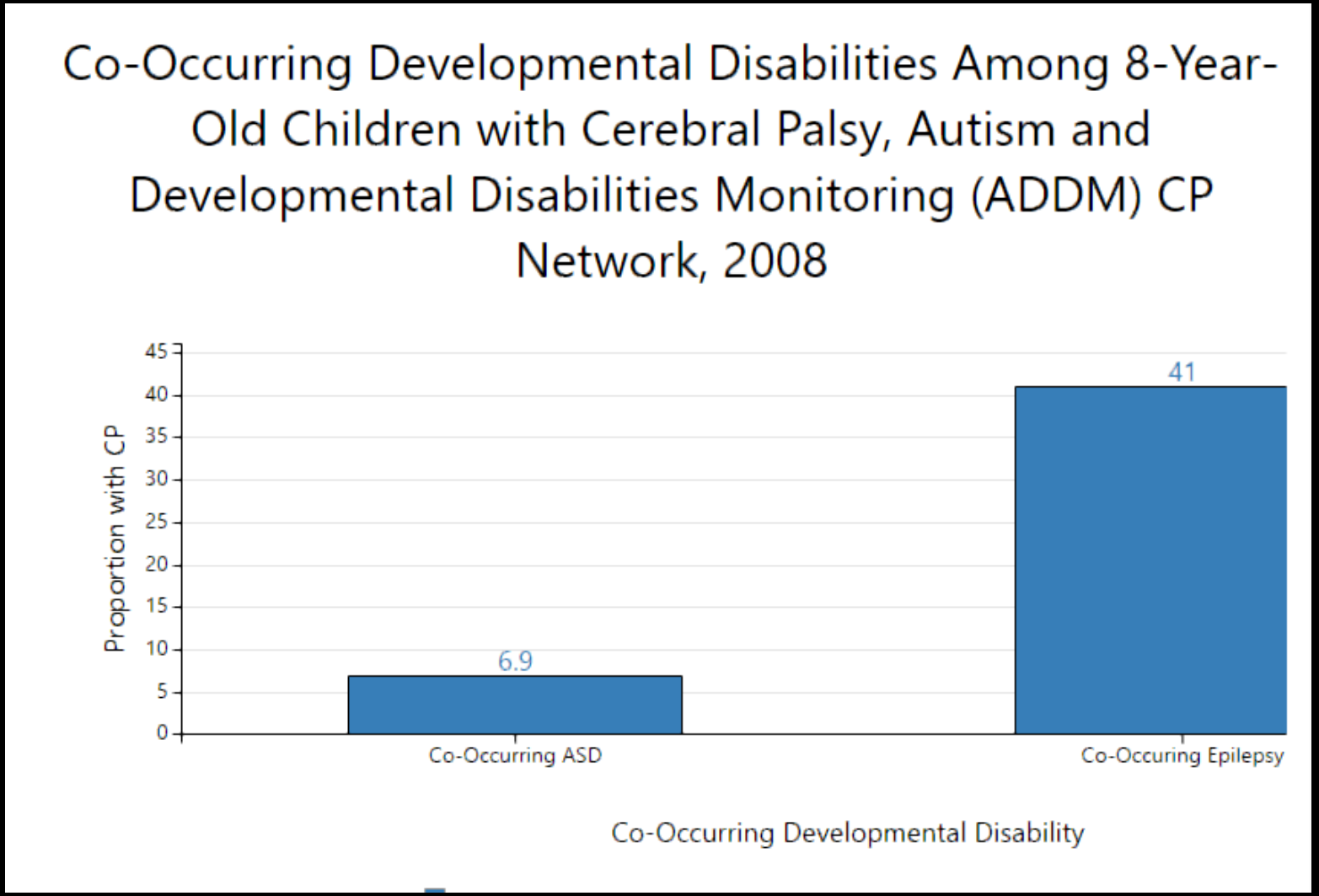
1. Cerebral palsy (CP) affects a person's ability to move and maintain balance and posture.
2. CP affects each child differently
3. The most common motor disability of childhood. About 1 in 323 children has been identified with CP (Autism 1 in 54 as per CDC)
4. M > F
5. Most (about 75%-85%) children with CP have spastic CP.
6. Over half (about 50%-60%) of children with CP can walk independently.

[CDC.gov]

Facts about CP



Facts about CP



Facts about CP

- If a child can sit or roll at 2 years of age it is likely, but not certain, that they will be able to walk unaided by age 6. (NICE guidelines)

- Ambulatory status was related to developmental quotient and visual acuity: (E Fedrizzi ,Child Neuro, 2000)

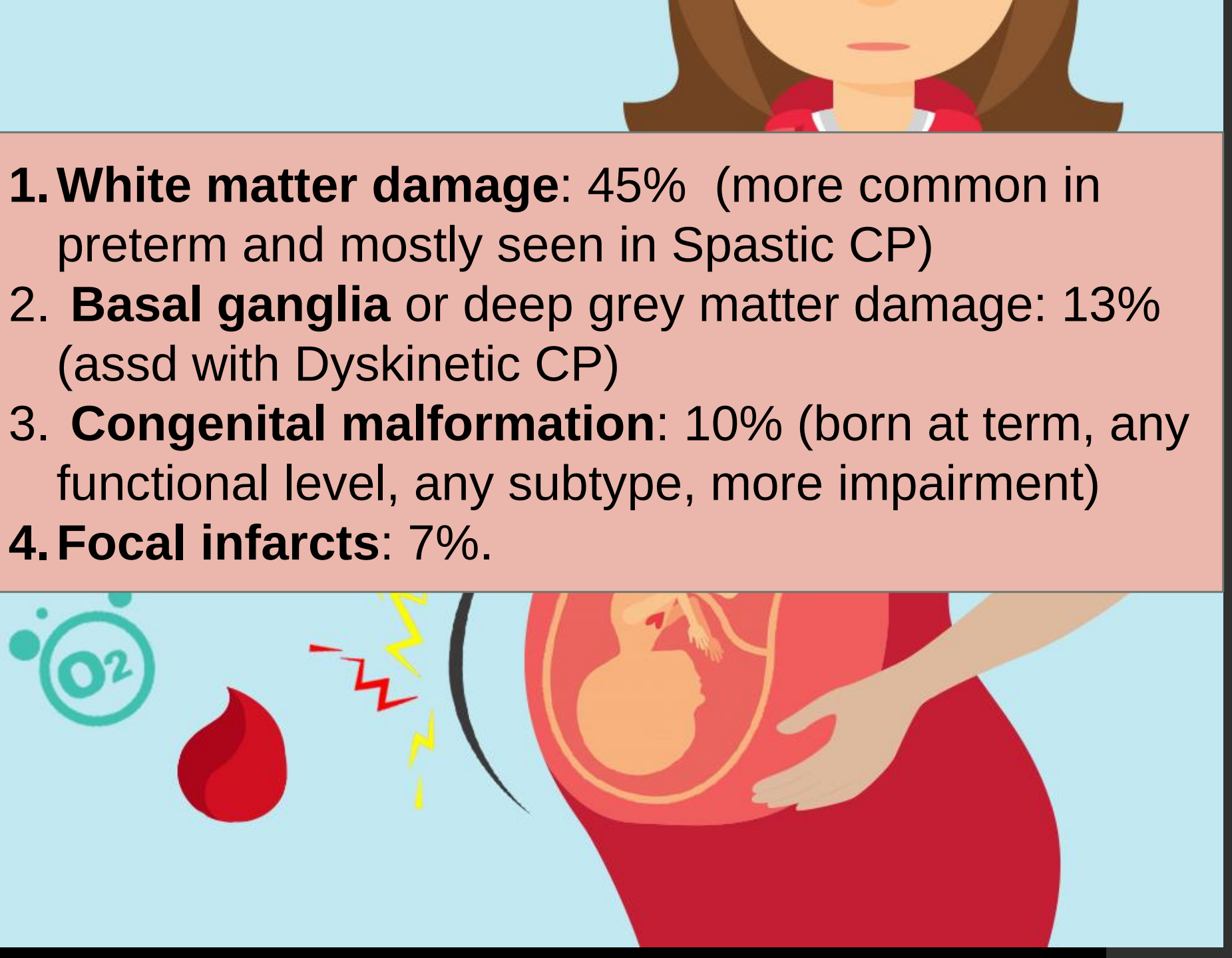
Facts about CP

1. Despite advances in maternal care and obstetrical intervention in recent decades, the incidence of CP has not declined
2. Early intervention can not only alleviate and prevent severity of disability but also get you the support you need early and so reduce anxiety in family.
3. Without continuous appropriate care, complications like muscle fibrosis, joint contracture , bony deformities may ensue.

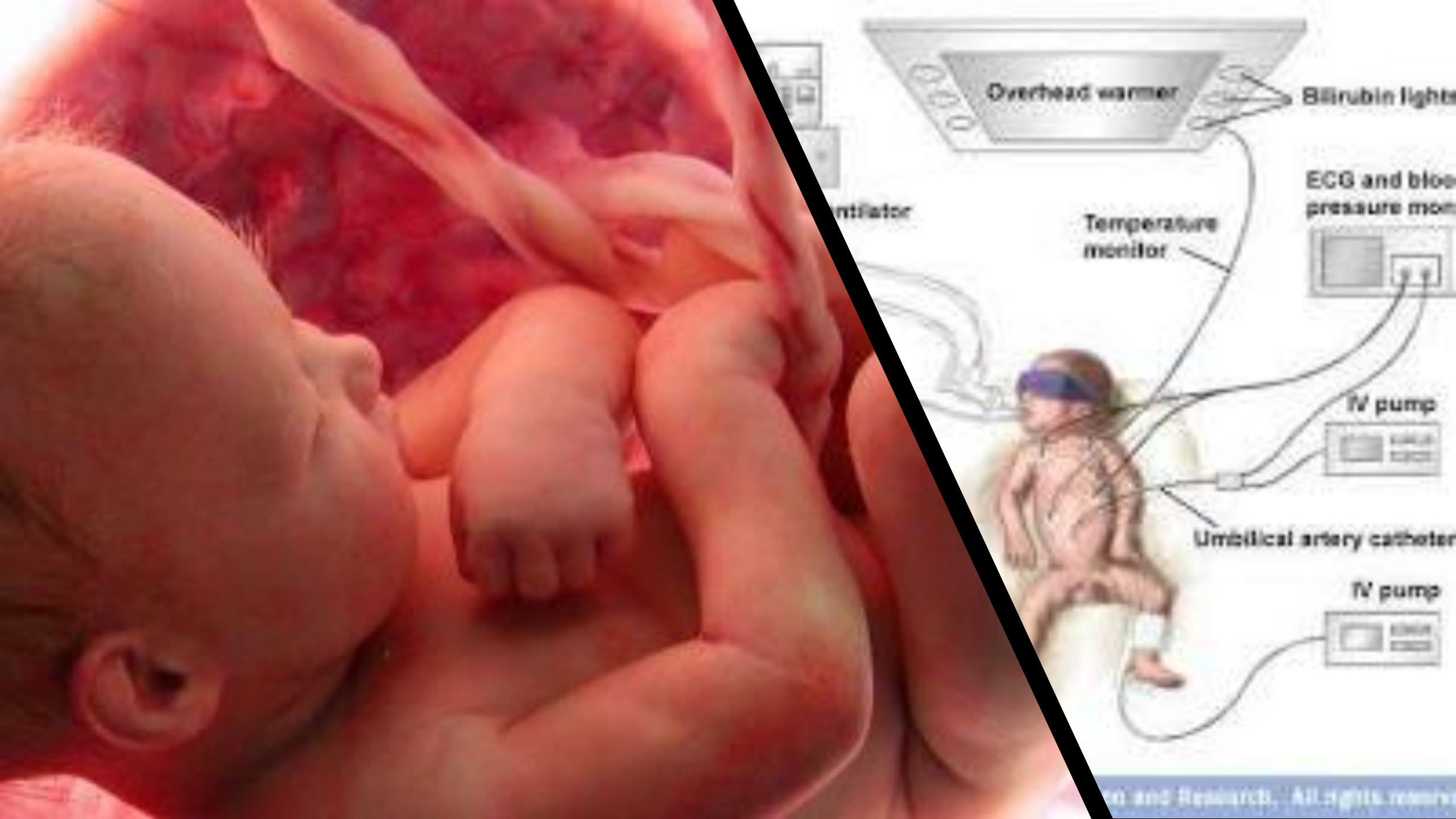
HIE

can be caused
event that com
blood and oxyg
the fetus.

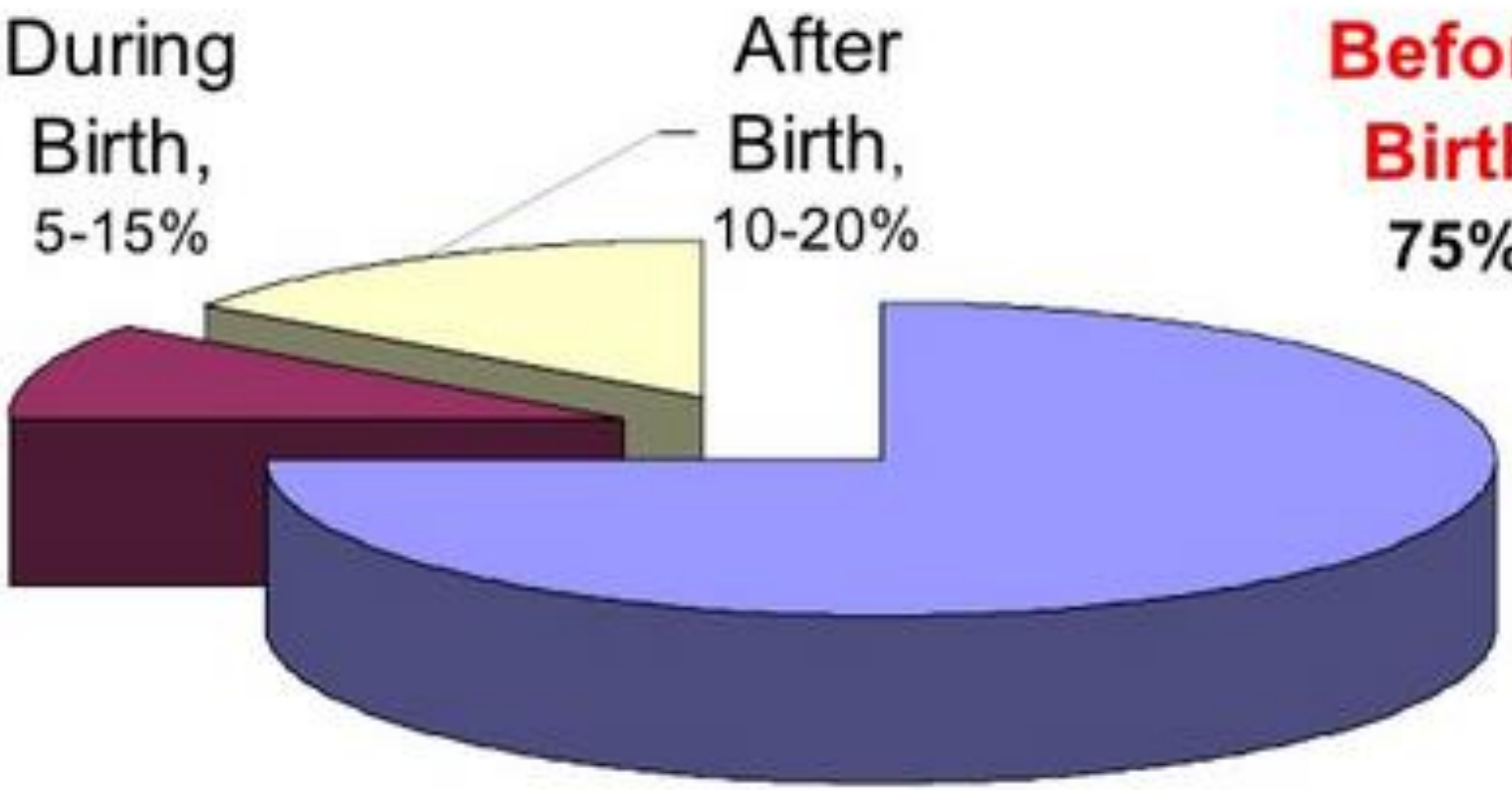
1. **White matter damage**: 45% (more common in preterm and mostly seen in Spastic CP)
2. **Basal ganglia** or deep grey matter damage: 13% (assd with Dyskinetic CP)
3. **Congenital malformation**: 10% (born at term, any functional level, any subtype, more impairment)
4. **Focal infarcts**: 7%.



HIE Help Center


Overhead warmer
Bilirubin lights
ECG and blood pressure monitor
Temperature monitor
IV pump
Umbilical artery catheter
IV pump

CP Cases



*Several causes are **preventable or treatable***

Risk factors for CP

Congenital CP

1. Being born to
2. Being born to
3. Being born a
   more
4. Being concei
   technology. 1
5. Maternal illne
   pregnancy, a
   maternal wei
6. Kernicterus (a
   newborn jaundice goes untreated)
7. Having complications during or immediately after birth

Some times CP is caused by brain damage that happens more than 28 days after birth. (Acquired CP)

- Having a brain infection, such as meningitis
- Suffering a serious head injury

The specific cause of CP in some children is unknown.

When should you do Neuroimaging (MRI/NSG)? (NICE guidelines)

1. Early Neurosonogram esp at term or at discharge from NICU may reliably predict risk for CP
2. MRI if diagnosis not clear
3. MRI useful after 2-3 weeks of life- Periventricular leukomalacia (PVL) is strongly associated with cerebral palsy.
4. 89% children with cerebral palsy were found to have abnormal MRIs. [NICE guidelines, 2017]
5. Subtle Neuroanatomical changes not apparent until 2 years of age.

When should you repeat MRI Brain

- If there is a change in the expected clinical and developmental profile or

- If any signs for a genetic or progressive neurological disorder
- Monitoring an enlarging porencephalic cyst, (evolving hydrocephalus) or the need for further investigations such as visual assessment for hemianopia.

Remember,

- MRI will not accurately establish the timing of a hypoxic–ischaemic brain injury in a child with cerebral palsy.
- It is not always possible to identify a cause for cerebral palsy.
- 10% of young people with cerebral palsy have a normal MRI underlying metabolic and genetic etiologies should be considered and excluded before diagnosing a child with cerebral palsy (* CP Mimics)

NICE Guideline, No. 62.
National Guideline Alliance (UK). 2017

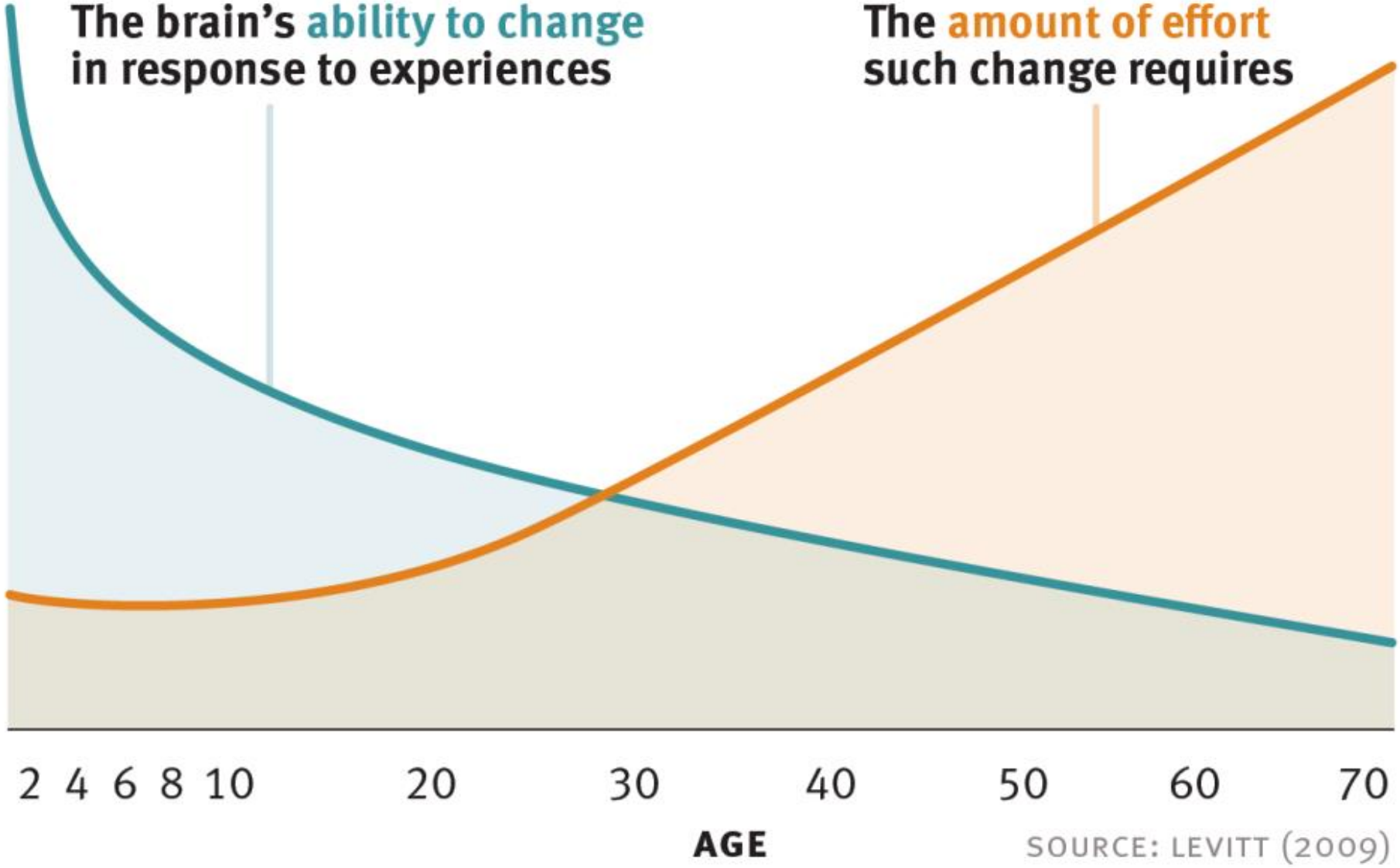
Red flags for CP mimics

- Absence of known risk factors
- Family history of a progressive neurological disorder
- Loss of already attained cognitive or developmental abilities
- No improvement in child despite months of therapy
- Delayed presentation of motor delay
- Development of unexpected focal neurological signs , only LL involvement
- MRI findings suggestive of a progressive neurological disorder
- MRI findings not in keeping with clinical signs of cerebral palsy

Early signs of CP

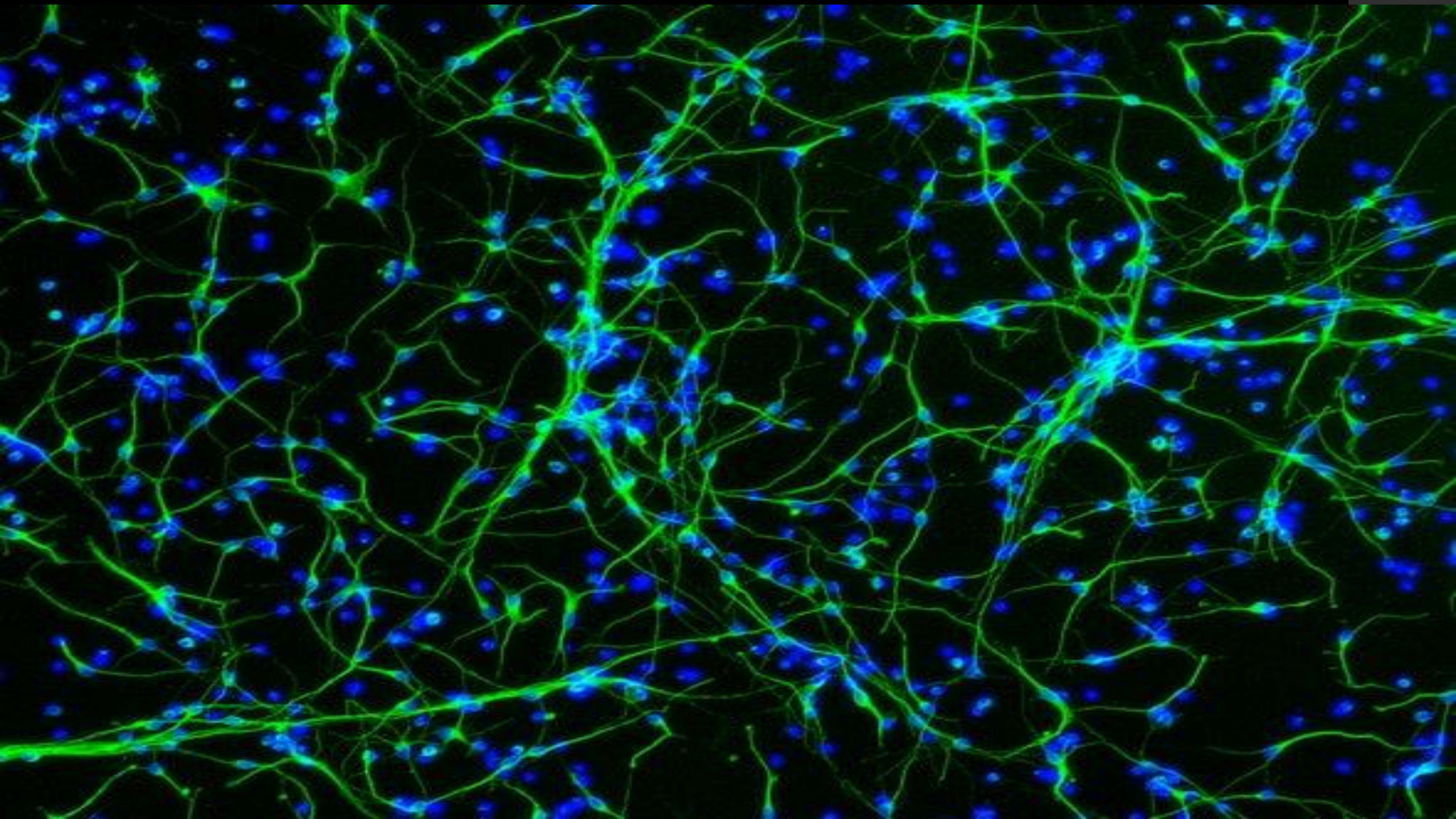
- History of gross motor developmental delay in the first year of life
- Abnormal mu…ic (often early hypoto… legs
- Hand prefere…
- Asymmetrica…
- Seems to ove…d in someone's ar…
- Legs get stiff …p
- Cortical fisting

Regular follow up with pediatrician/Dev therapist for monitoring growth and development and Early detection and Intervention!



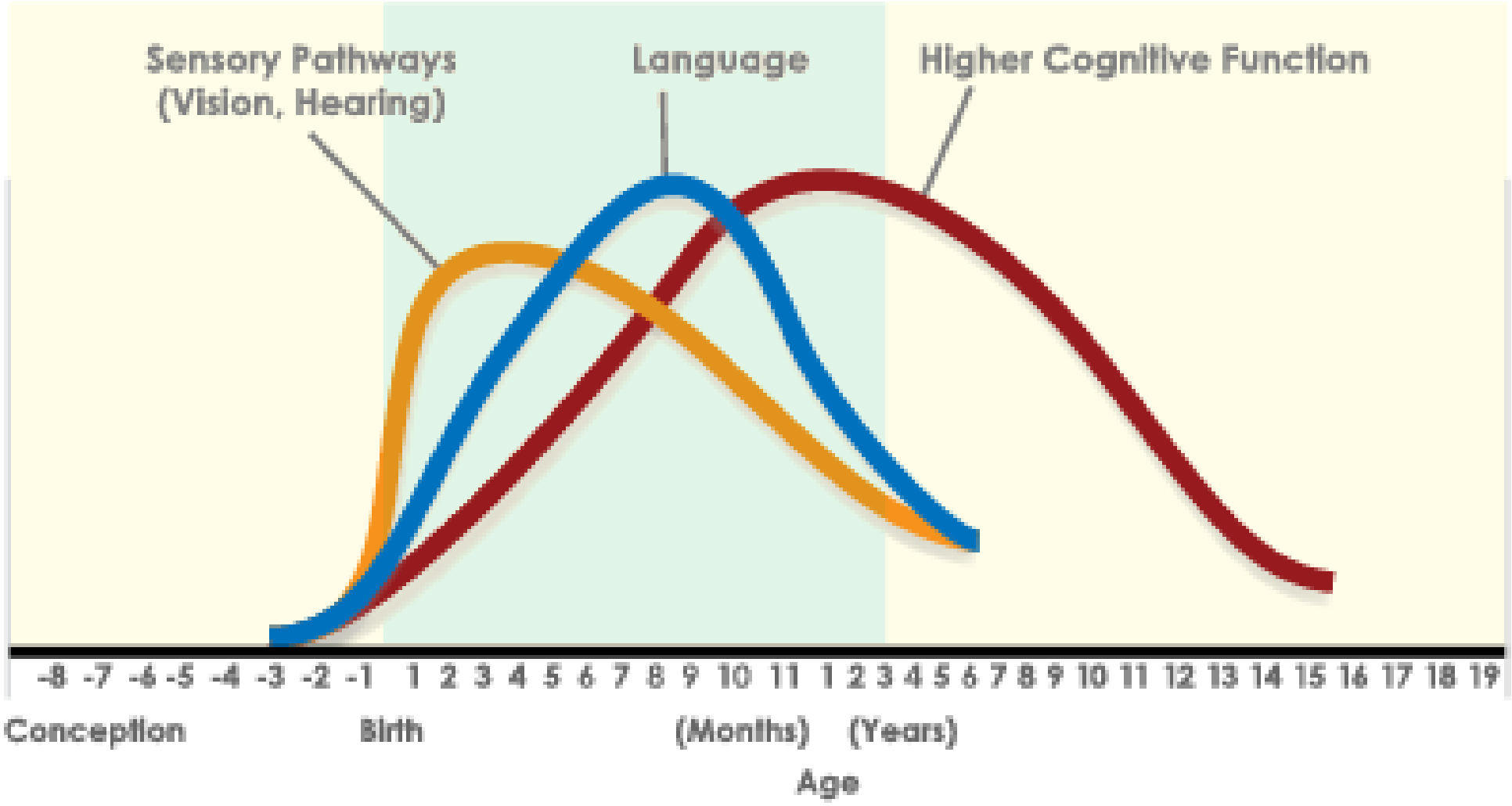
Center on the Developing Child HARVARD UNIVERSITY

www.developingchild.harvard.edu



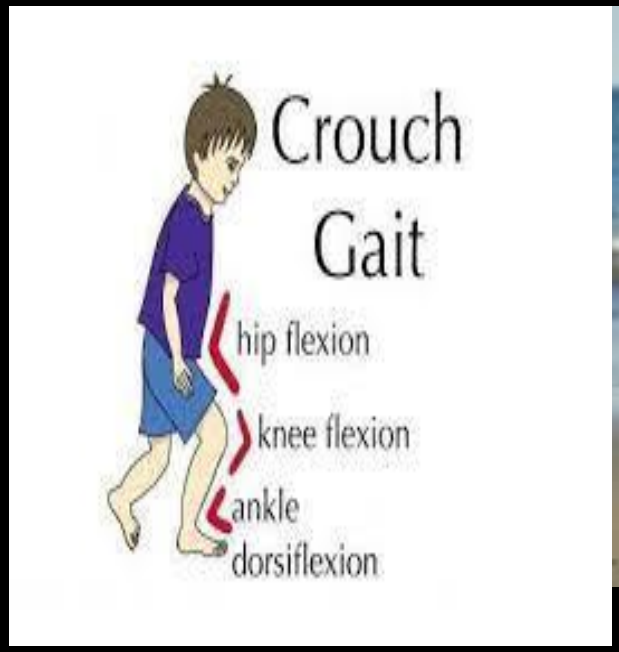
Human Brain Development

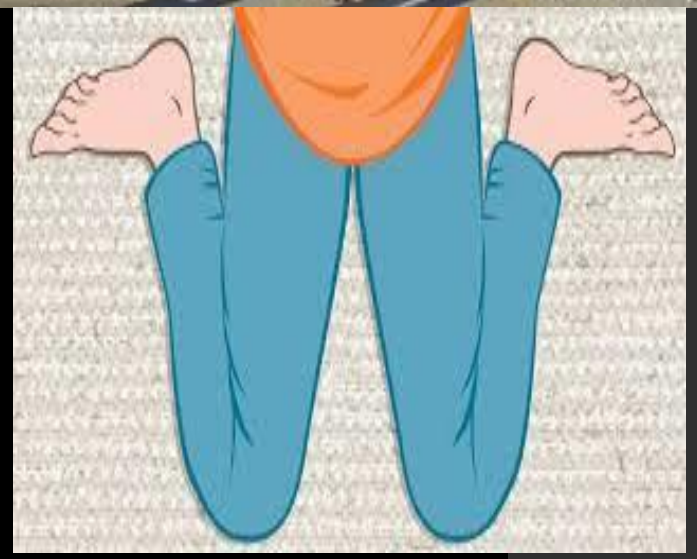
Synapse Formation Dependent on Early Experiences



Source: Nelson, C.A., in *Neurons to Neighborhoods* (2000). Shonkoff, J and Phillips, D. (Eds.)

- Hip – Excessive flexion, adduction, and femoral anteversion. Scissoring of the legs is common in spastic cerebral palsy.
- Knee – Flexion and extension with valgus or varusstress occur.
- Foot – Equinus, or toe walking, bottom shuffling, W sitting, and varus or valgus of the hindfoot is common in cerebral palsy.





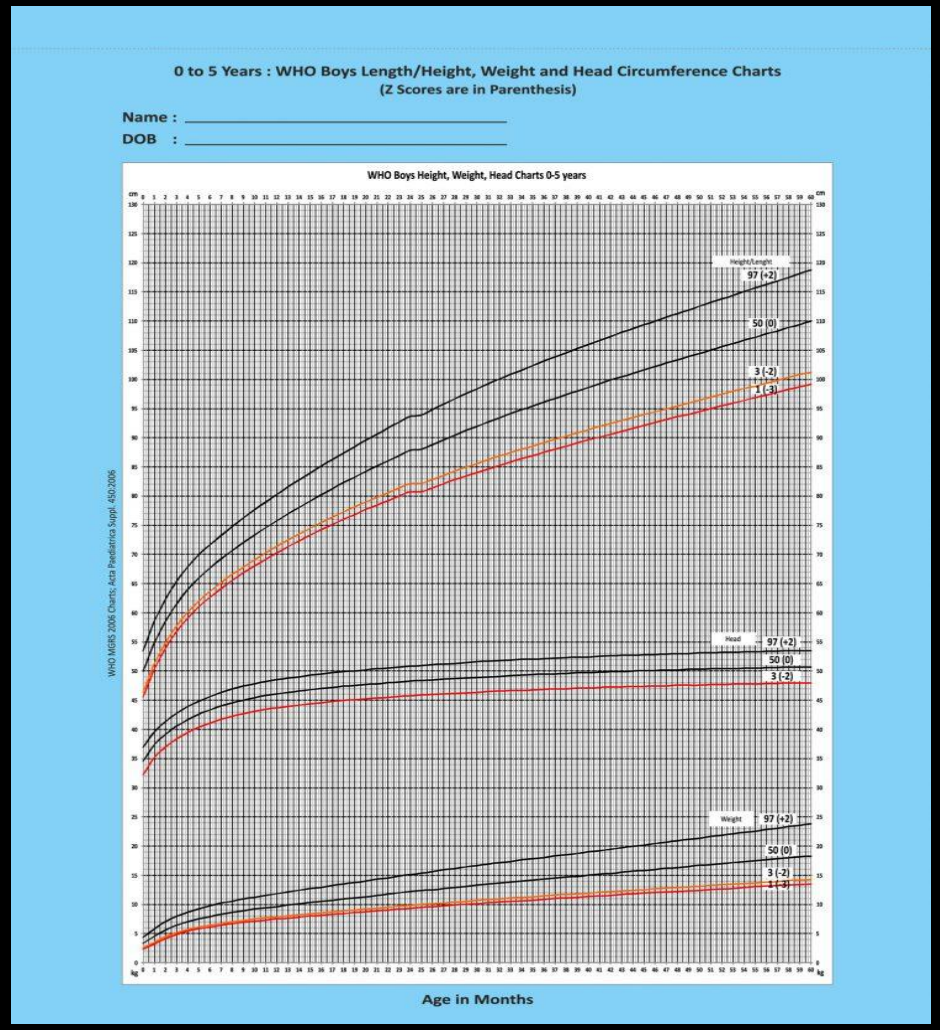
Predicting CP

- **Hammersmith*** -The HINE can assist in the early detection, diagnosis and prognosis of infants at risk of developing cerebral palsy. It can be used on infants aged between 2–24 months of age.

- Most experts will not confirm a diagnosis of CP until child is 2 yrs of age.
- Imp to understand that 50% of children previously diagnosed or suspected with CP does not fit criteria for spastic CP at 7 yrs of age

How do we monitor these high risk infants?

GROWTH CHARTS



Growth parameters

Weight

- 30 gms/ day 1
- 20 gms/day 3
- Double Bwt by
  times by 2 yrs
- Growth veloc

Length: NB 50

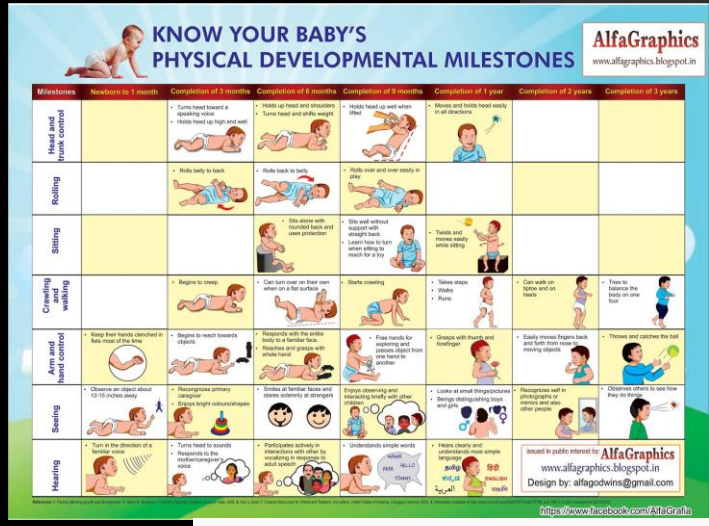
- 1st yr - 25 c
- 2nd yr - 12 c
- Puberty – 5 -6 cm /yr

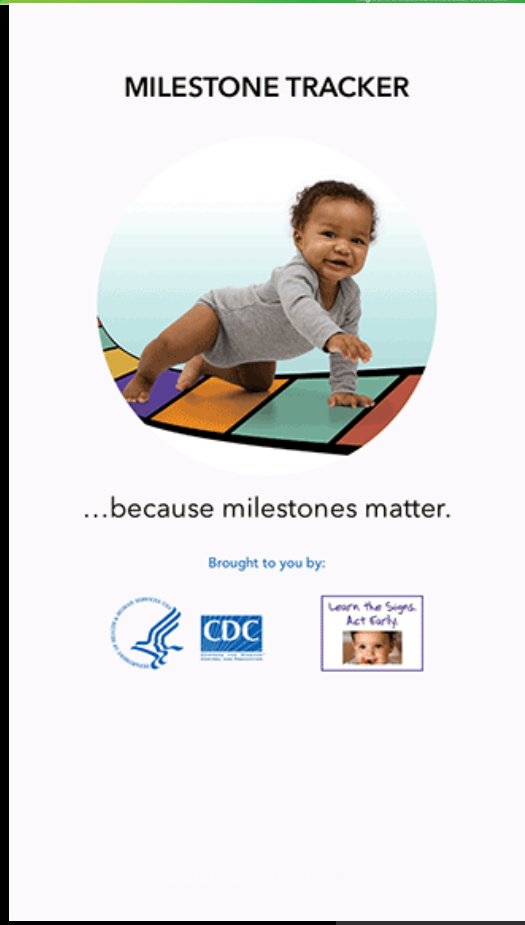
Remember to use Corrected age if the child is premature!

So If the child was born at 28 weeks (12 weeks early) and is now 6 months, corrected age will be 3 months (6 months minus 12 weeks)

Infancy (< 1 yr)

- Monitor Growth (Ht, Wt, HC) closely and keep a copy of Growth charts yourselves.
- Monitor developmental milestones in all domains,(muscles, or movements, communication, social and emotional skills like selfcare activities and relating to others, and in their thinking and playing.)
- Standardised assessment of developmental domains (DASII, BAYLEY, DAYC-2,)
- Other Standardised assessment scales :GMFCS, MACS, MTS etc.
- Nutrition, Feeding /swallowing,
- Bowel movements, Sleep pattern
- Immunisations as per chronological age
- Vitamin supplementation- Iron, Vit D, calcium
- Early recognition of seizures





< 1 year

- NSG/MRI Brain
- Newborn Metabolic screening reports, OAE/BERA, TFT
- Vision, preferably VEP / assess for CVI, ROP screen and follow up
- Hearing – BERA
- Monitor for Strabismus, refractory error
- Start Early intervention and Dev stimulation
- Make sure you have adequate family support, respite, Always ask for help. Professional counselling if you need help to cope

Early childhood

> 1 year

- Monitor all domains of de…ital therapist etc
- Visual surveillance
- Standardised movt and t…
- Follow up with Physical n…

> 18 mo:

- Evaluate speech and lan…
- ASD screen at 18 mo an…

3- 4 years

- Visual surveillance
- Cognition and social ada…
- AT devices
- School readiness assessment

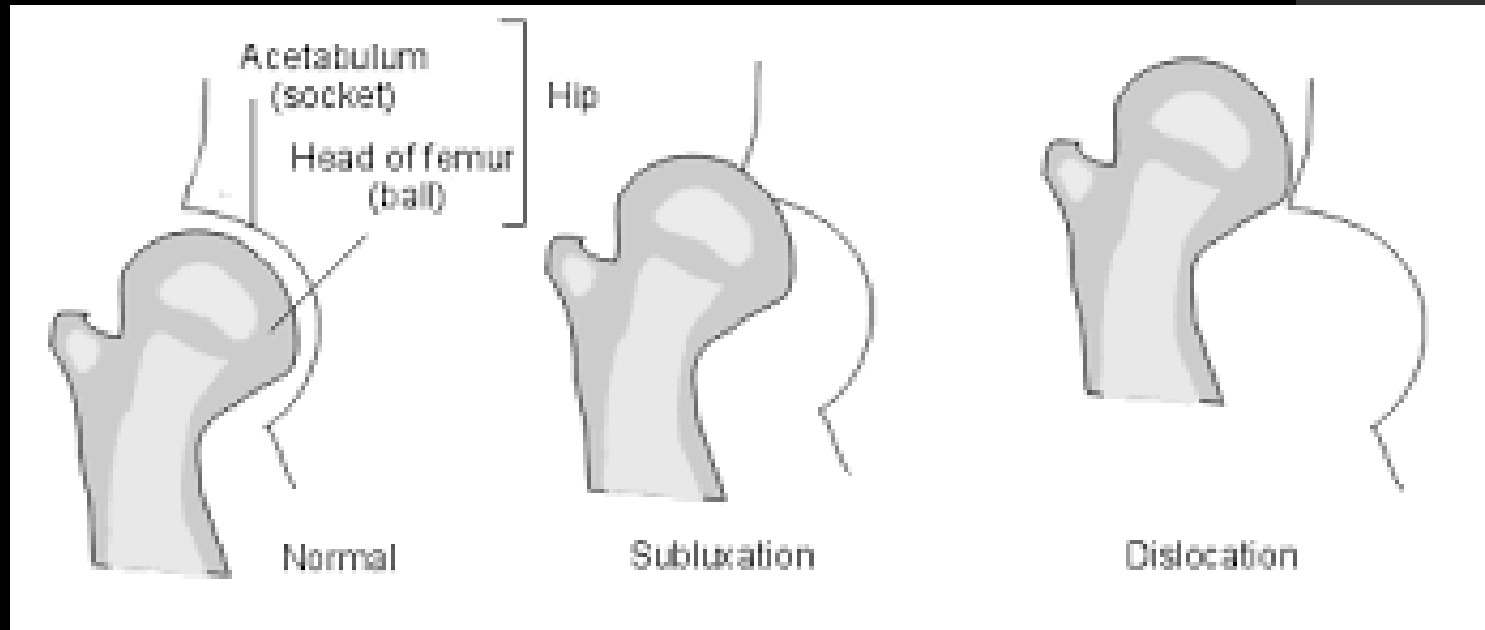
Parents must closely watch for learning problems, difficulty in attention and hyperactivity as child starts school and seek help early

30-40% may have LD

Co-morbidities

Hip Dysplasia

- 35% of children with CP have Hip dysplasia
- Pelvis X-ray - if cannot walk by 30 months of age/Hip pain
- Orthopedic consult



Low bone mineral density

- non-am
- vitamin
- drinkin
  nutritio
- low we
- history
- use of anticonvulsant medication

- **Assess dietary in**
  and vitamin D
- **Serum calcium**
- **alkaline phosp**
  vitamin D
- **urinary calciu**

- An active movement programme
- Active weight bearing
- Nutritional support and calcium and vitamin D supplementation.
- Minimise risks associated with movement and handling.

Other orthopedic

- Vit D def/Rickets, Scoliosis

Dental caries

Communication skills

- Communication difficulties -any functional level or motor subtype(> in dyskinetic or severe bilateral spastic cerebral palsy) Dysarthria most common.

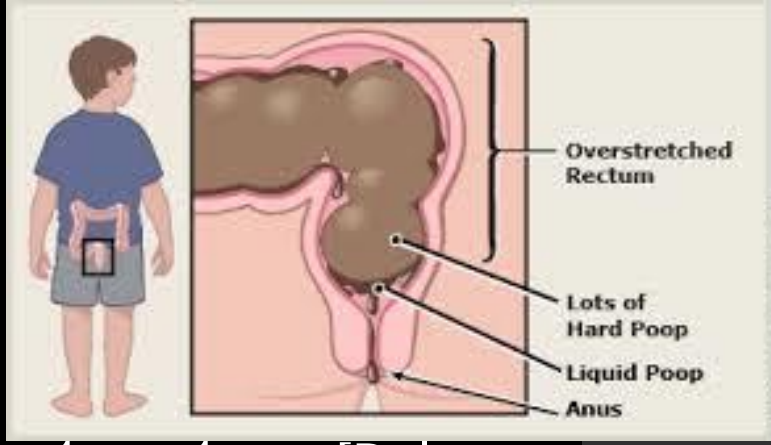
- Communication skills does not correlate with intellectual disability.
- Offer interventions to improve speech intelligibility,
- Consider augmentative and alternative communication (AAC) systems pictures (PECS), objects, symbols and signs, and speech generating devices

Feeding issues (Eating, drinking, swallowing)

- Coughing,
- Choking,
- Gagging,
- Altered breathin … or drinking •
- Recurrent chest …
- Mealtimes regul… child or young person or their parents …
- Prolonged meal …
- Need for eneral tube feeding

1. Assessment by Speech therapist/MDT trained in management of Dysphagia
2. Consider Videofluoroscopy
3. AT devices to help with feeding

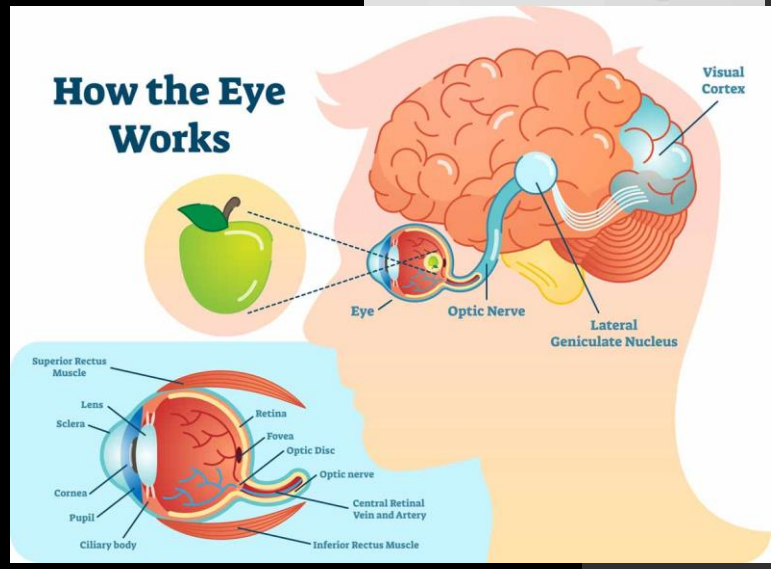
Constipation



- 74% of children with CP found to have Constipation[Del Giudice et al]
- What is constipation? What is Encopresis?
- Diet
- Toileting behavior
- Medications
- Exercises

Other co-morbidities

- **Vision Impairment** (Regularly assess- difficult to recognise in early stages. . 1 in 5 children with CP has VI CVI (cerebral Visual Impairment),



- Hearing impairment, 1 in 10 children with CP. More common in children with dyskinetic or Ataxic CP

- Intellectual disability: prevalence increases with increasing severity of motor impairment:
- — GMFCS level I or II: around 1 in 3 have an IQ below 70
- — GMFCS level III, IV or V: around 2 in 3 have an IQ below 70.

Seizures

1. Any functional level and severity but more common in dyskinetic CP

2. An EEG should be performed only to support a diagnosis of epilepsy in children and young people.
3. An EEG may be used to help determine seizure type and epilepsy syndrome in children, young people and adults in whom epilepsy is suspected. This enables them to be given the correct prognosis.

4. When a standard EEG has not contributed to diagnosis or classification, a sleep EEG/ Video EEG should be performed

Pain, Distress, Discomfort,

Musculoskeletal problems (for example, scoliosis, hip subluxation and dislocation)

Increased muscle tone (including dystonia and spasticity)

Muscle fatigue and immobility

Constipation

Gastro-oesophageal reflux disease.

Non-specific back pain

Headache

Non-specific abdominal pain

Dental pain

Dysmenorrhea.

Sensory issues, Psychological distress, Hunger, sleep disturbances

Adolescence

Address Issues of Sexuality

- The adolescent might want to — engage in sexual relationships/Masturbation. Need to discuss privacy, protection from unwanted pregnancy and sexually transmitted diseases (STDs).
- Important to talk with your child about appropriate versus inappropriate sexual behavior.
- Let him or her know that you are there to help if any situation feels uncomfortable

- Vocational training, find child's aptitude, plan transition to adulthood

Transition to adulthood

- Discuss educational placement as per child's aptitude, vocational training, adult living independently/ assisted living

- Find your child's vocation!

Personal folder for your child

Information could include:

1. Early history
2. Motor subtype and limb involvement
3. Functional abilities
4. Interventions
5. Medication
6. Comorbidities
7. Preferred methods of communication
8. Any specialist equipment that is used or needed
9. Care plans, Bracelet

Management of CP

Treatment and Therapy for

CEREBRAL PALSY

MEDICATIONS

Medications, such as the following, can mitigate CP's symptoms and side effects:

- Anticholeric meds
- Anticonvulsants
- Antidepressants
- Anti-inflammatory meds
- Muscle relaxants

SURGERY

Surgeries, such as the following, may improve side effects and overall health:

- Baclofen insertion
- Gastroenterology
- Hearing correction
- Orthopedic
- Pulmonary
- Vision
- SDR

EQUIPMENT

Medical equipment can improve function and outcome

- Baclofen pumps
- Feeding tubes
- Hearing devices
- Vagus-nerve stimulators
- Breathing aids
- Vision-related devices

ALTERNATIVE

Complementary & alternative therapies include:

- Animal-assisted therapy
- Nutrition
- Yoga
- Adaptive sports
- Acupuncture
- Massage therapy
- Bodywork
- Others

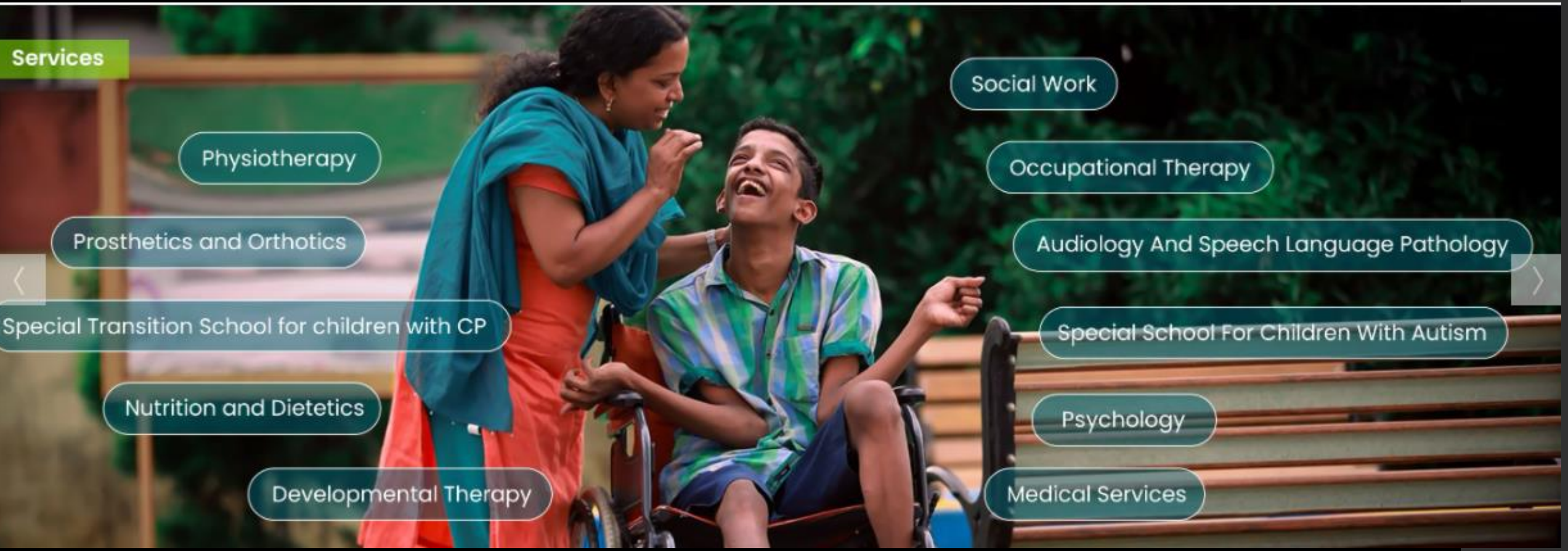
THERAPY

Therapies for CP include:

- Physical
- Occupational
- Speech-language
- Recreational
- Alternative
- Behavioral
- Play
- Music & art

Reiter & Walsh, PC
abclawcenters.com

Multidisciplinary team



Know your team!

- **Pediatricians** are generalists who manage and coordinate the treatment plan, recognize and treat specific physical and emotional issues and recommend specialists and liase with all other specialists.
- **Physiatrist** : Rehabilitation specialist involved in many aspects of care, including, spasticity management, plan therapies, bracing, casting, prescribe Ats, administering botulinum toxin injections, surgeries etc.
- **Pediatric Neurologist:** ruling out other neurologic disorders and treatment of seizures
- **Geneticist:**
- **Ped orthopaedics** - to help correct any structural deformities and for the surgical management of hip dislocation, scoliosis, and spasticity (eg, tenotomy, a tendon-lengthening procedure
- **Orthotics** To correct and/or prevent deformity.. Splints, braces and casts may be used to assist children with high or low muscle tone. Encourages mobility balance.
- Visual **(Ophthalmology)** and hearing (**ENT**) specialist services

- **Physiotherapists**: improving independent motor function. Reduce pain and need for meds, surgery .
- **Occupational therapists:** Fine motor skills, ADL skills, sensory integration therapies , independent living
- **Developmental therapists:** monitors development and help stimulate all aspects of development
- **Speech and Audiology therapists**: Speech, voice, communication needs, swallowing assessement and tx. Hearing assessment, need for Hearing aids, Auditory verbal therapy after a hearing aid/cochlear implant
- **Psychologists:** behavioral difficulties, psychological needs
- **Social workers:** coordinates care, finds financial and other resources in the community and supports family in various social and personal needs.
- Special Educators: trained in unique ways of teaching children with special needs

Self care for parents of children with CP

- Maternal depression 1-3 mo postnatally, anxiety, chronic grief etc common among care givers

- Must have life beyond doctor visits and therapies, make time to have fun, music, dance and expose him/her to your community, church/temple, social functions, take day trips with your child.

- Allow yourself to experience life and provide opportunities for your child too
- Be your child's advocate!

Encourage independence in your child!

hambisela

instead of always feeding her yourself

look for ways to help her begin to feed herself.

HINTS FOR HELPING YOUR CHILD IN HER DEVELOPMENT:

- Help your child advance slowly, at her own speed, in small steps.
- If we try to go too fast because of her age, she can become discouraged by failure.
- Be prepared to try an activity, but also be prepared to admit that that particular activity may not work for your child at that time.
- Some of the activities she may NEVER be able to do. And some of them she may only be able to do with assistance.
- BUT GIVE IT A GO!!!!!

Medications

- **Tone management (reduce spasticity and prevent contractures)**
  - Baclofen oral, intrathecal baclofen pump
  - Botulinum toxin for localised or segmental spasticity in UL or LL
  - Diazepam for gen spasticity

Salivary control (for drooling)
- Trihexyphenidyl hydrochloride

Seizures
- AEDs
- KD diet

GERD
Constipation
Incontinence
Sleep issues, behavior issues
Other physical illnesses

Other treatments

1. **Serial Casting**
2. Surgery

Neurosurgery

Dorsal rhizotomy for velocity dep spasticity.

Intrathecal baclofen pump (better outcomes than oral)

Orthopedic

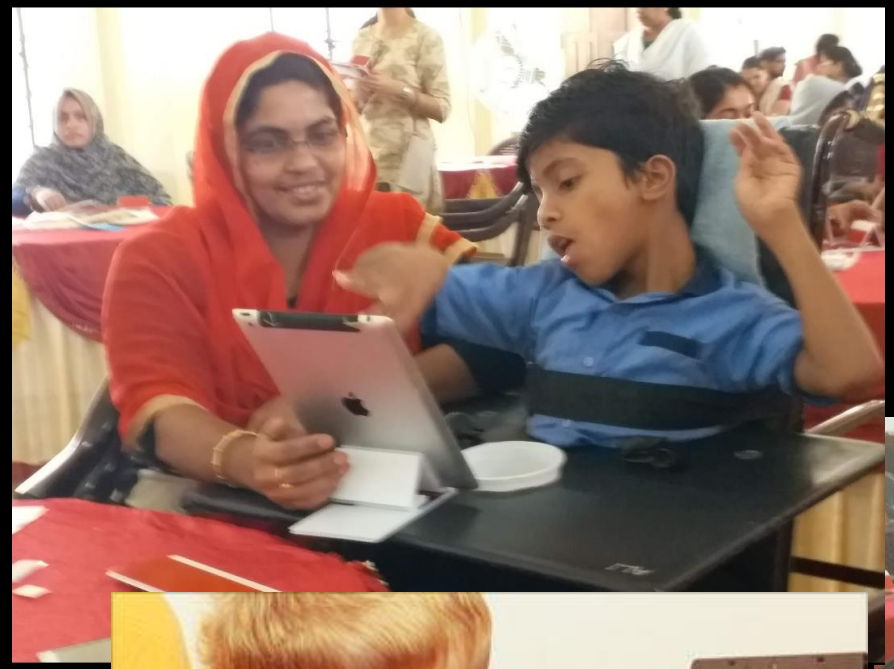
Scoliosis and hip dislocation common conditions requiring surgery.

Tendon lengthening or transfer can decrease spastic muscle imbalance and deforming forces, and osteotomy can realign limbs, including the femoral neck, tibia, and calcaneus.

Assistive Technologies (AT)

- Just as some plants need a stick to help them to grow up straight, so your child may need assistive devices like a buggy or a wheelchair or a standing frame to help her to be in a good position so that she can learn to use her muscles and help them to grow and develop well.

- Speech generating devices produce electronic speech for children with cerebral palsy who have difficulty speaking. Also known as voice output communication aids (VOCAs),
- GAZE technology (uses eye tracking)



Other complementary/Alternative therapies

- Ayurvedic
- Acupuncture
- Homeopathic
- Hyperbaric oxygen
- Stem cell therapies
-

Social care – for families

1. Disability certificate
2. Be aware about resources available and access to financial, respite care .Beneftis, insurance schemes, allowances
3. Be aware about modifications available in schools for children with CP
4. Accessibility in different public areas, availability of assistive equipments, particularly wheelchairs and hoists ・ transport ・ toileting and changing facilities
5. Effective communication between team members

Management of CP

- It is NOT merely correcting their physical disabilities.
- The primary aim is to address social and emotional aspects of living a more fulfilling life by allowing more participation, inclusiveness in society and limit activity restriction

- Primary aim to provide the child and their families a comfortable life and to make them as much productive as possible.

Achievers with CP

- Dr. Syam Prasad, PhD

Assistant professor, Department of economics
Central university of Kerala Periya, Kasargod

Impossible to I'M POSSIBLE!

- Judge Nikhil Prasad, Pune

Instead of worrying about what you cannot control, shift your energy to what you can create."!

What more can we do?

- Comprehensive early detection and intervention and rehabilitative Services till 3 yrs for all children

- Services in schools including inclusive education, therapies and psychosocial support, including help with transition to adulthood, independent living, vocational training.

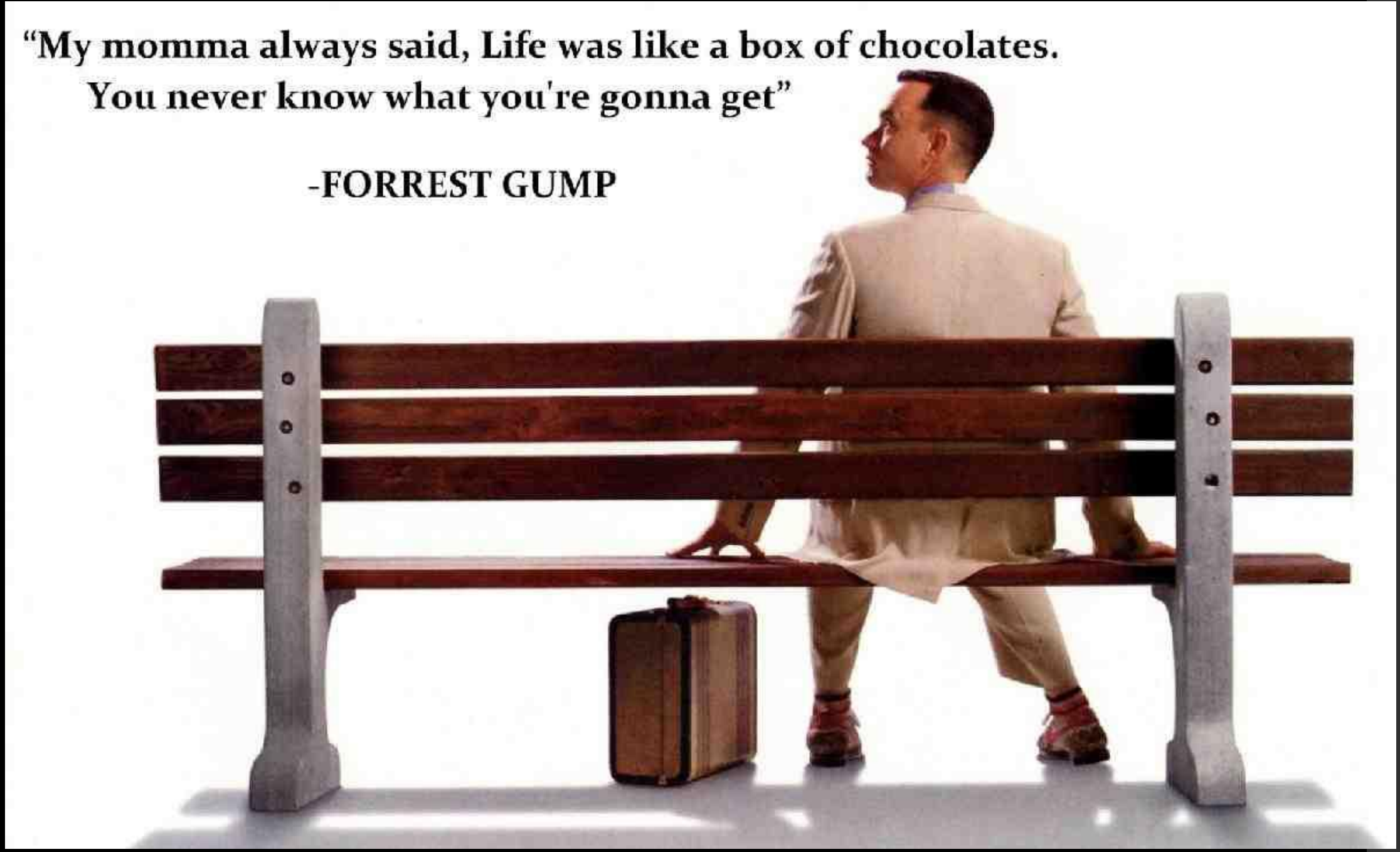
- Active Support groups that can make your voice heard together and advocate for our children's rights

Forrest Gump

Peranmbu
https://www.youtube.com/watch?v=LI3HvaUi9D4

"My momma always said, Life was like a box of chocolates.
You never know what you're gonna get"

-FORREST GUMP



Thank you!