




**Cerebral Palsy Care in
Maine; Why your CP
patients don't have to travel
to Boston anymore!!!**

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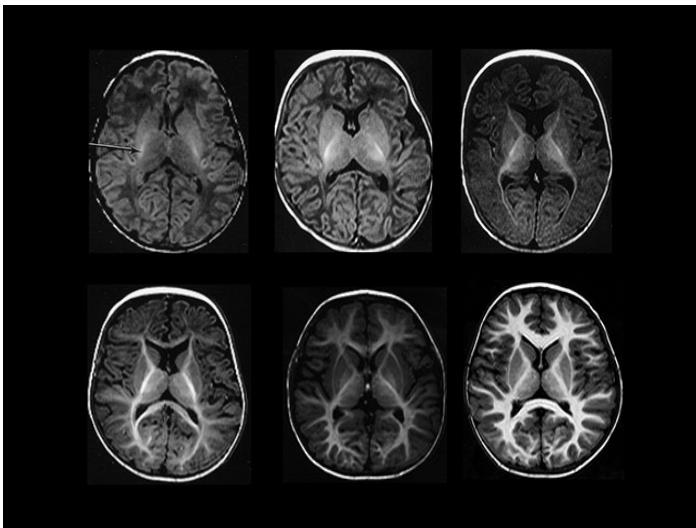
Cancer | Cardiology & Heart Surgery | Geriatrics | Gynecology
Nephrology | Orthopedics | Pulmonology | Urology

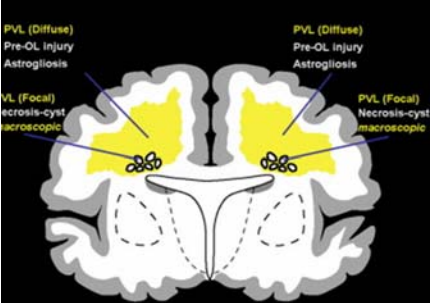
Objectives

- Preterm birth associated causes of cerebral palsy
 - Periventricular leukomalacia
 - Intraventricular hemorrhage
- Term Birth associated causes of cerebral palsy
 - Hypoxic ischemic encephalopathy
- Review classification systems of cerebral palsy
- Review treatments for cerebral palsy

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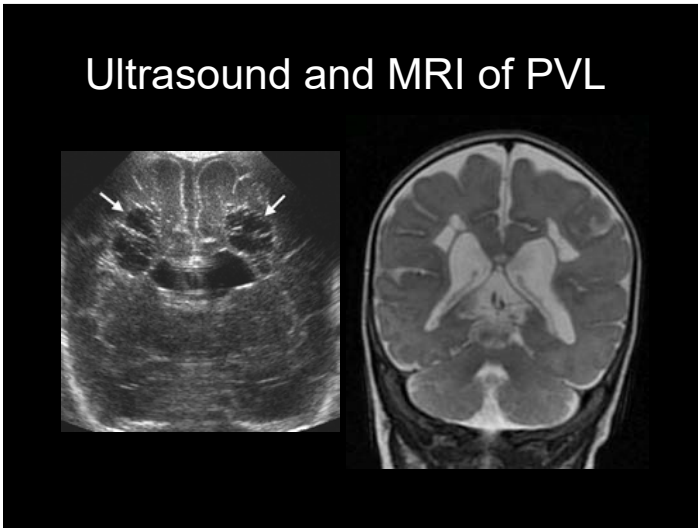


Periventricular Leukomalacia (PVL)



- OCCURS IN PREMATURE INFANTS BORN UNDER 32 WEEKS
- MATERNAL INFECTION
- HYPOXIA
- 4 GRADES WITH GRADE 4 BEING THE CYSTIC TYPE

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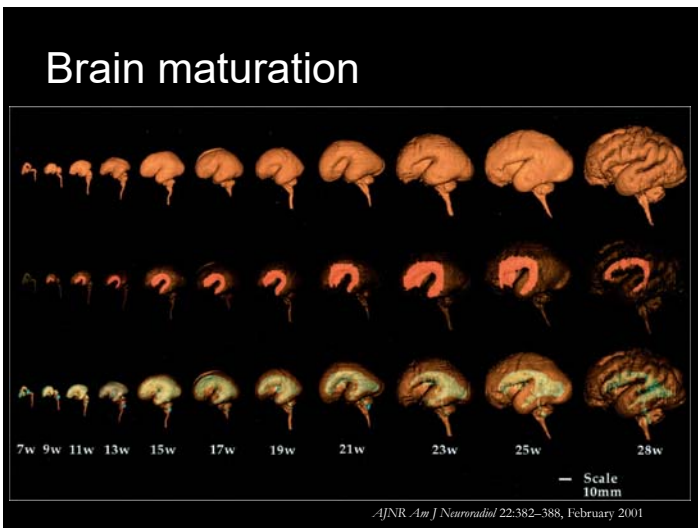


Outcomes from PVL

- More than 50% of infants with PVL develop cerebral palsy intellectual impairment or visual disturbances

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Intraventricular Hemorrhage (IVH)

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Outcomes from IVH

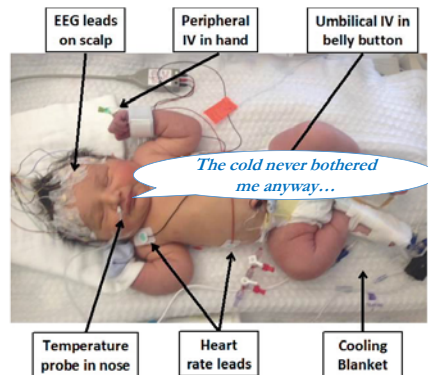
- Mental retardation (IQ<70) occurs in 20% of grade I-II hemorrhage and 70% of grade III-IV
- Special services are required in 45% of the grade I-II group and 92% of the grade III-IV group
- Higher grade hemorrhages predict increased risk of post-hemorrhagic ventricular dilatation (PHVD)
- Percentages of PHVD:
 - 25% will have progressive ventricular dilatation requiring neurosurgical intervention

Hypoxic Ischemic Encephalopathy

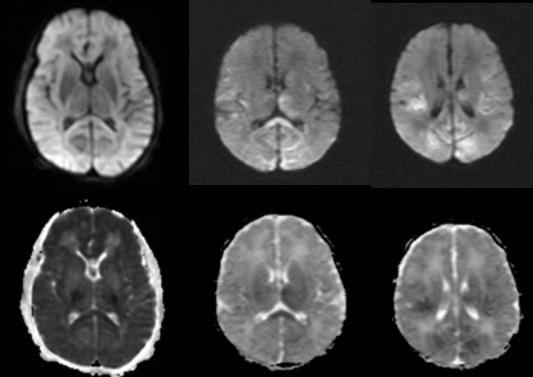
- 1-7 per 1000 births are affected by hypoxic ischemic encephalopathy and 15-20% of affected newborns sustain permanent neurodevelopmental disability.
- Acute asphyxia leads to **primary energy failure** via increased neurotransmitter release, excessive production of free radicals, increased intracellular calcium and increased pro-apoptotic mediators.
- **Secondary energy failure** occurs 6-15 hours after the initial insult and the severity of this secondary injury is highly correlated with survival and degree of neurodevelopmental disability.
- Therapeutic hypothermia reduces the incidence of death and disability in full term infants with HIE by preserving cerebral energy metabolism and reducing cytotoxic edema.


Therapeutic hypothermia

- 33.5°C FOR 72 HOURS
- 12 HOUR RE-WARMING
- CONTINUOUS EEG
- MRI ON DAY OF LIFE 4 OR 5




Imaging Patterns in HIE






Introducing the Cerebral Palsy Clinic at Maine Medical Partners Pediatric Neurology

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Cerebral Palsy

- CP describes a group of permanent disorders of the development of movement and posture that cause activity limitations that are attributed to nonprogressive disturbances that occurred in the developing fetal or infant brain. The motor disorders of CP are often accompanied by disturbances of sensation, perception, cognition, communication, and behavior and by epilepsy and secondary musculoskeletal problems.
- About two to three children out of every 1,000 have cerebral palsy
- Around 8,000 to 10,000 babies and infants are diagnosed per year with cerebral palsy
- Maine estimate of 500-600 children with cerebral palsy throughout the state (CDC estimates lifetime cost of 1.3 million per lifetime)

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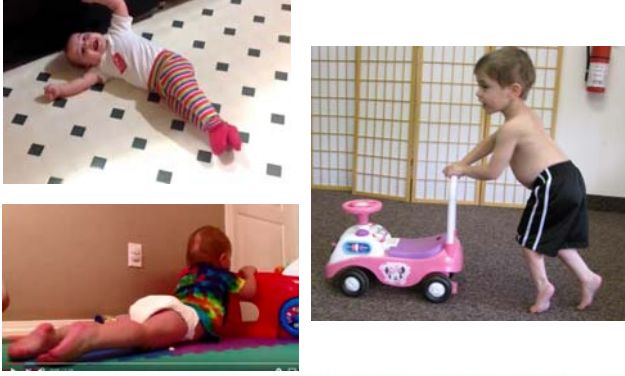
Exam Findings: red flags for upper extremities



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Exam Findings: red flags for lower extremities




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Normal versus Abnormal


What Every Parent Should Know	Typical Speech	Typical Play	Typical Physical	What to Watch For in Physical
<p>3 months</p> <p>Early Milestones in the First Year</p> <p>Responds to sounds</p> <p>Starts babbling</p> <p>Reaches for objects</p> <p>Grabs things</p> <p>Rolls over</p> <p>Starts to sit up</p> <p>Starts to crawl</p> <p>Starts to walk</p> <p>Starts to talk</p>	<p>Starts to babble</p> <p>Starts to say "mama" and "dada"</p> <p>Starts to use simple words</p> <p>Starts to use simple sentences</p> <p>Starts to understand simple instructions</p>	<p>Starts to play with blocks</p> <p>Starts to play with toys</p> <p>Starts to play with dolls</p> <p>Starts to play with cars</p> <p>Starts to play with puzzles</p>	<p>Starts to sit up</p> <p>Starts to crawl</p> <p>Starts to walk</p> <p>Starts to run</p> <p>Starts to jump</p> <p>Starts to climb</p> <p>Starts to play with blocks</p> <p>Starts to play with toys</p> <p>Starts to play with dolls</p> <p>Starts to play with cars</p> <p>Starts to play with puzzles</p>	<p>Starts to walk</p> <p>Starts to run</p> <p>Starts to jump</p> <p>Starts to climb</p> <p>Starts to play with blocks</p> <p>Starts to play with toys</p> <p>Starts to play with dolls</p> <p>Starts to play with cars</p> <p>Starts to play with puzzles</p>
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<https://pathways.org/wp-content/uploads/2016/03/assure-brochure-english-2016.pdf>

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Old Classification System

- **Mild** - Mild cerebral palsy means a child can move without assistance; his or her daily activities are not limited.
- **Moderate** - Moderate cerebral palsy means a child will need braces, medications, and adaptive technology to accomplish daily activities.
- **Severe** - Severe cerebral palsy means a child will require a wheelchair and will have significant challenges in accomplishing daily activities.

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Gross Motor Classification System

- **GMFCS Level I**- walks without limitations.
- **GMFCS Level II**- walks with limitations; may require use of mobility devices when first learning to walk, usually prior to age 4; and may rely on wheeled mobility equipment when outside of home for traveling long distances.
- **GMFCS Level III**- walks with adaptive equipment assistance. Requires hand-held mobility assistance to walk indoors, while utilizing wheeled mobility outdoors, in the community and at school; can sit on own or with limited external support; and has some independence in standing transfers.
- **GMFCS Level IV**- self-mobility with use of powered mobility assistance. Usually supported when sitting; self-mobility is limited; and likely to be transported in manual wheelchair or powered mobility.
- **GMFCS Level V**- severe head and trunk control limitations. Requires extensive use of assisted technology and physical assistance; and transported in a manual wheelchair, unless self-mobility can be achieved by learning to operate a powered wheelchair.

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Treatments for Cerebral Palsy

- Physical, occupational and speech therapy
 - Host of other therapies (hippo, aquatic etc)
 - Equipment
- Oral medications
 - Baclofen, tizanidine, diazepam
- Botulinum toxin
 - Injections every 3-4 months
- Surgery
 - Baclofen pump, orthopedic tendon transfers etc.

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Therapy, Orthotics, Equipment...oh my!

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Medication Options

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Comorbidities: Scoliosis and hip dislocation

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LEND & Cerebral Palsy clinic

Maine to Offer Leadership Training to Specialists in CP and Autism Care Using \$2.2M Grant
 JULY 2016 BY DANIELA SERRAJO, PHD PH NEWS


- Cerebral palsy (spasticity)
- Seizures
- Developmental delay
- Shunts (NSGY)
- Chronic Lung disease
- Aspiration
- Tracheostomy
- G-tube
- Constipation
- Nutrition/feeding team
- Orthopedic/Physiatry
- contractures
- Scoliosis
- Hip dislocations
- Psychology/Social work
- PT/OT/speech
- Orthotist

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CP clinic becomes a medical home


- Providers who are regularly seen include pediatric neurology, orthopedics, physical therapy and orthotist
 - FY 2017: implement pediatric gastroenterology and pulmonology, social work, palliative care (case specific)
 - FY 2017 wheel chair evaluation (fitting)
- Clinic is coordinated by a nurse practitioner who coordinates clinic visits and procedures such as Botulinum toxin injections under anesthesia
- Aim is to develop this as a pediatric subspecialty patient centered medical home with direct and accessible pediatric RN support

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Thank you!!!

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