

# The Hidden Disabilities of the Forgotten Premmies

*Motor & cognitive function in children & adults born just preterm*



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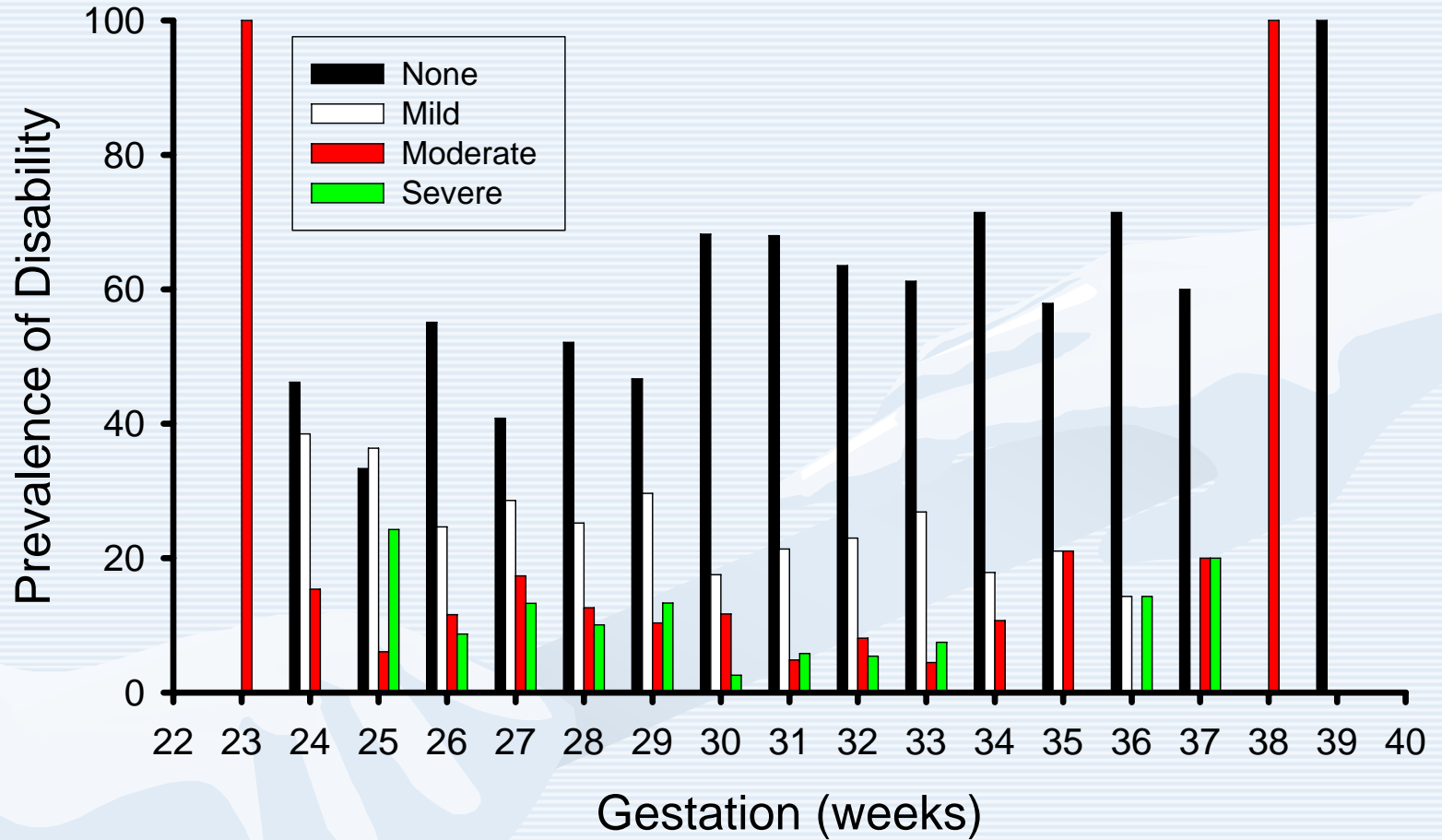
# Preterm births in Australia - 2004

- 2004: 257,205 live births of which 8.2% (21,000 babies) were born preterm (<37 weeks completed gestation).
- 14.3% of babies of Aboriginal and Torres Strait Islanders were preterm.
- 0.9% of all births (200 babies) were born after 20 - 27 weeks completed gestation (includes 3 babies born <20 weeks)



- 0.8% (2095 babies) 28 - 31 weeks
- 6.5% (16,620 babies) 32 - 36 weeks

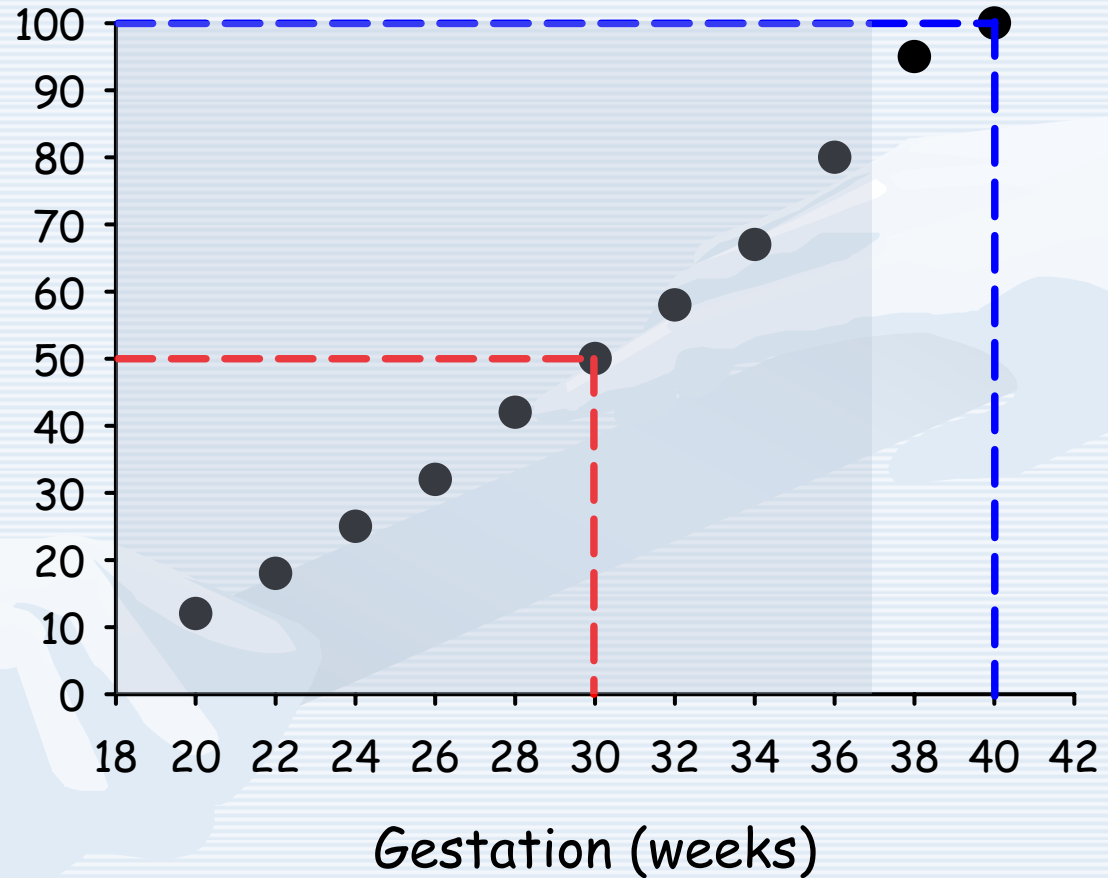
# Prevalence and severity of functional disability by gestational age



# Rapid brain development in the last trimester of pregnancy

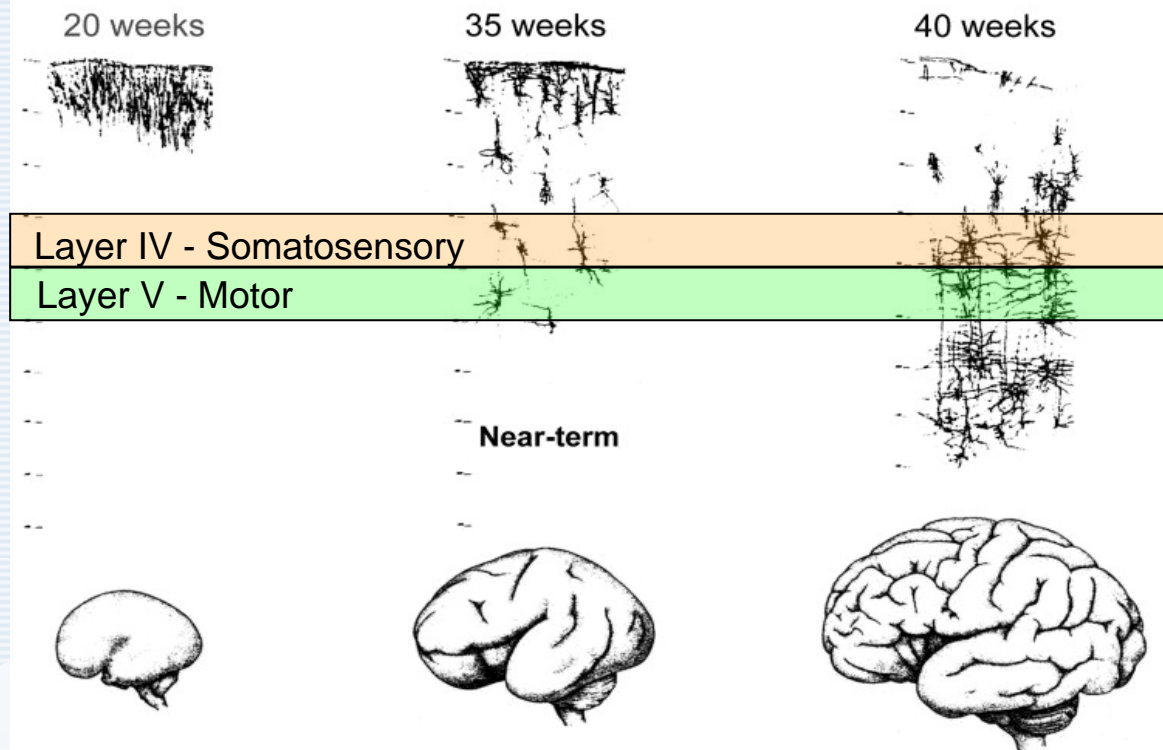
## Human Brain Growth

Brain Weight  
(% Full-term)



# Rapid brain development in the last trimester of pregnancy

## Development of the Human Cerebral Cortex



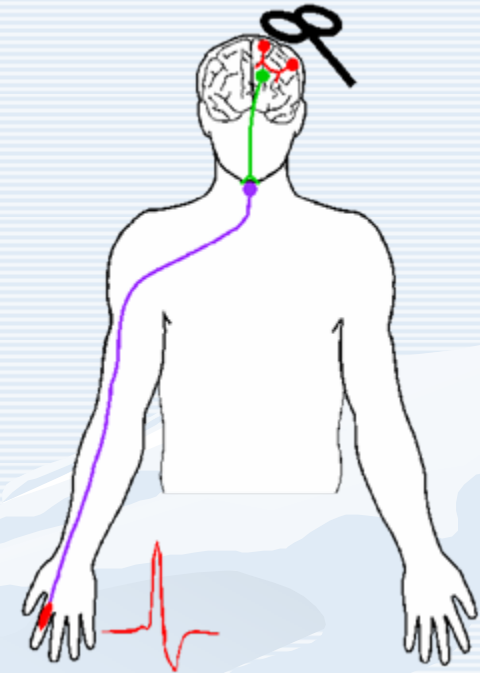
Layer IV records and relays information about sensory input to the brain from the periphery.

Layer V is where the descending motor tracts from the cortex to the spine originate.

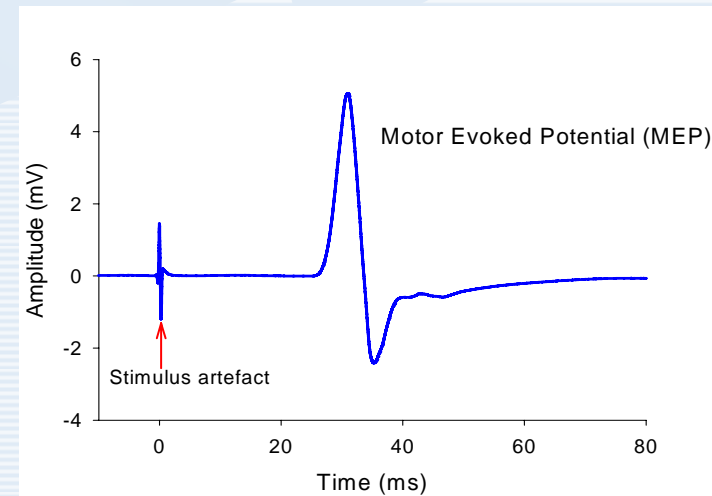
*(Adapted from Kinney 2006)*



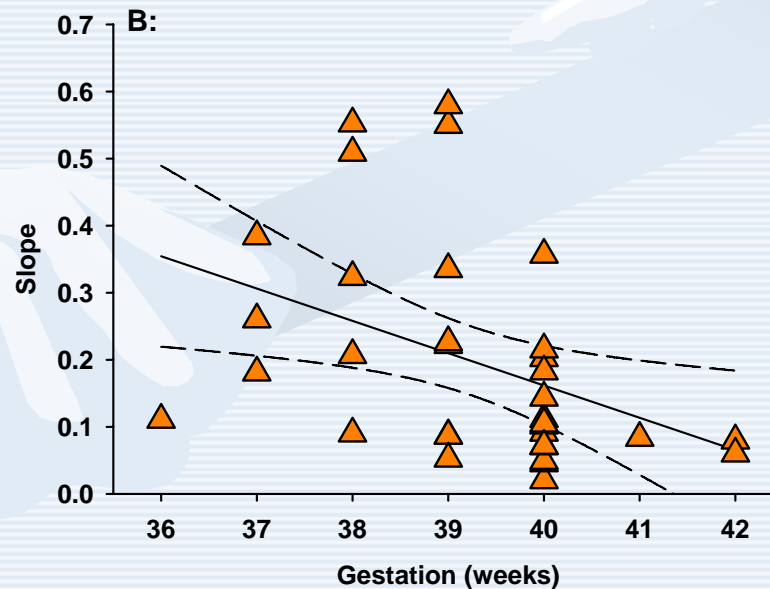
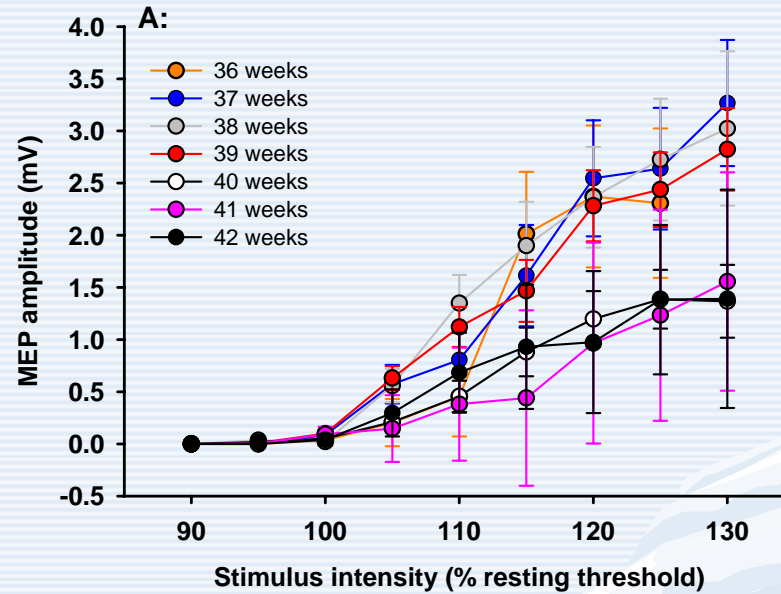
# Transcranial magnetic brain stimulation



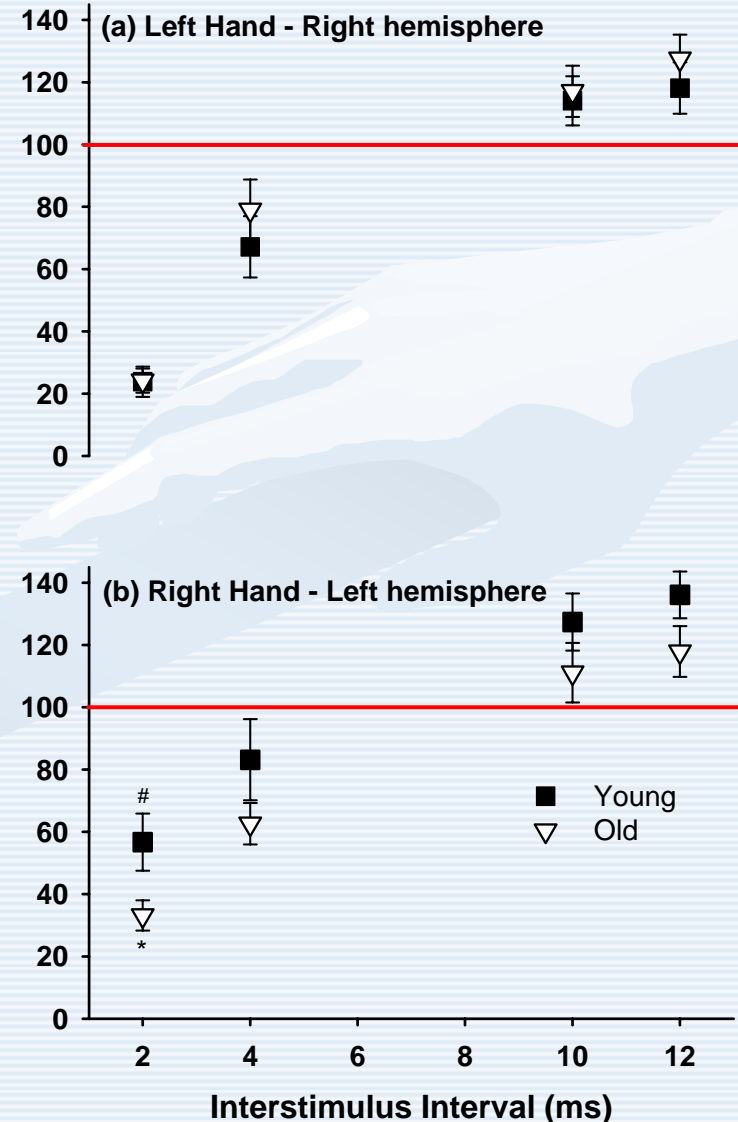
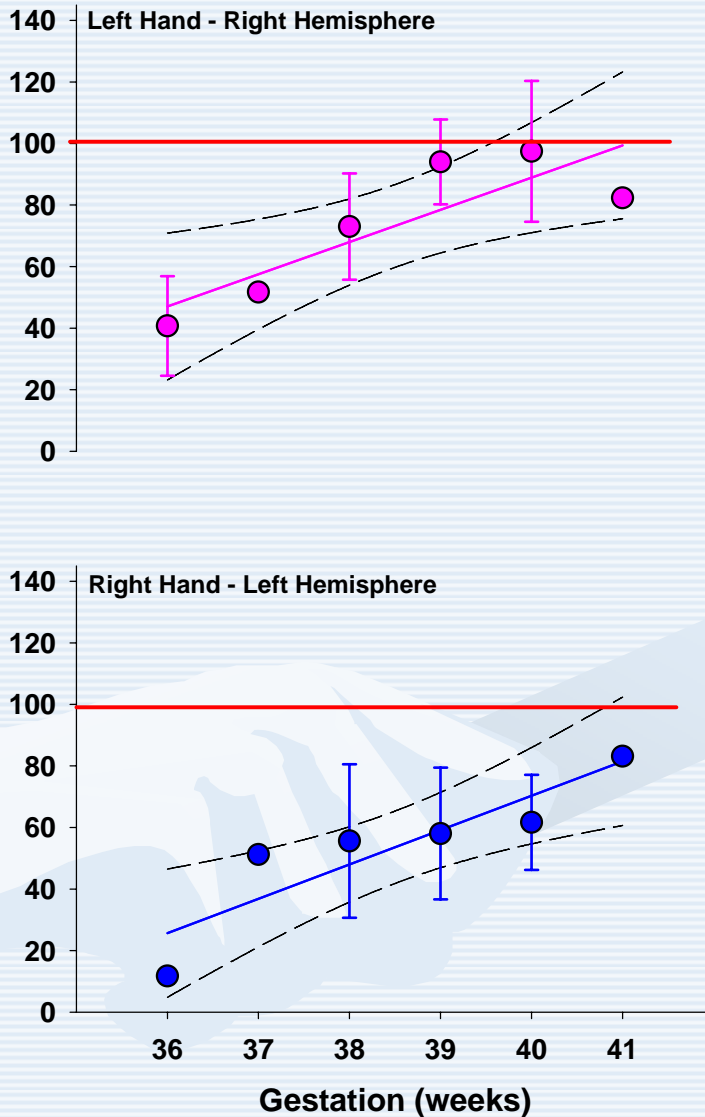
- The pathway from the brain to the muscles
- The connections between neurons within the cortex
- Connections between the motor cortex and other brain areas
- Connections between the two brain hemispheres



# Adelaide Family Heart Study Cohort



# Modest shortening of gestation is associated with increased intracortical inhibition



# The Hidden Disability of Prematurity

- Up to 50% of preterm children without cerebral palsy will have subtle motor difficulties & minor neurological signs at school age. (Bracewell & Marlow 2002).
- Significantly affect their motor & cognitive development, educational achievement, & social adjustment.
- "The hidden disability of prematurity" (Whitfield et al. 1997)
- Underlying physiology is not known

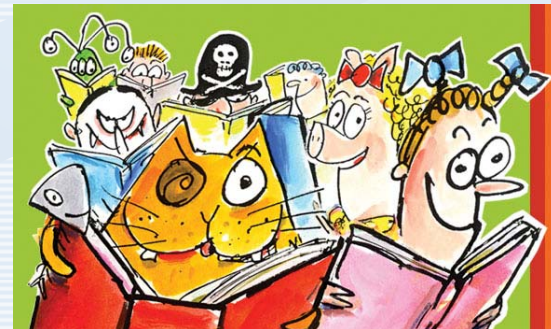


# Motor dysfunction predicts cognitive dysfunction

- Motor dysfunction predicts reading, learning & behavioural dysfunction:

- ~20% in children born 2000-2499 grams
- 35% in children born <1500 grams
- 51% in children born <1250grams

- Minor motor dysfunction in preterm children at 2 & 6 years of age is a strong predictor of learning problems (particularly reading) at 8 & 12 years of age.



- Longitudinal studies: impairments tend not improve and some children who show no signs of impairment at eg. 9 years clearly have them at 12 years (Luning et al. 1992).

# PREMOCODE Study (PREterm MOtor & COgnitive DEvelopment)

- Cohort size = 1250 children all born at QVH/WCH and now aged 8-12 years
- Gestation range: 24 - 37 weeks
- 150 preterm children + 150 matched controls
- Corticospinal motor function
- Movement ABC: age appropriate motor skill development.
- Cognitive function - executive, memory, reading & learning.
- Socioeconomic and home environment
- Neonatal clinical history
- **Does the motor and cognitive dysfunction associated with preterm birth have a common underlying physiological mechanism? What is it? If we can identify it early enough can we ameliorate its later consequences.**



# Acknowledgments



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