

**Early essential fatty acid status and later cognitive development of children**

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**Early ePUFA status and later cognitive development of children**

- ❖ Essential polyunsaturated fatty acids (ePUFA), cognition, and brain function
- ❖ Early ePUFA status may not be optimal and differs considerably between healthy neonates
- ❖ Some aspects of cognition and behavior of children are associated with their early DHA status
- ❖ Summary

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**EFA and LCPUFA (ePUFA)**

- Essential fatty acids (EFA) and their longer-chain, more-unsaturated derivatives (LCPUFA), serve vital functions in the human body
- These fatty acids cannot (EFA) or hardly (LCPUFA) be produced in the human body
- Therefore, their adequate dietary intake is essential for optimal health

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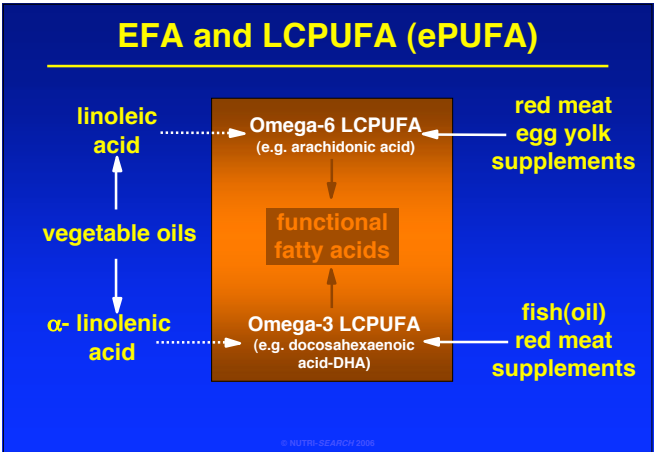
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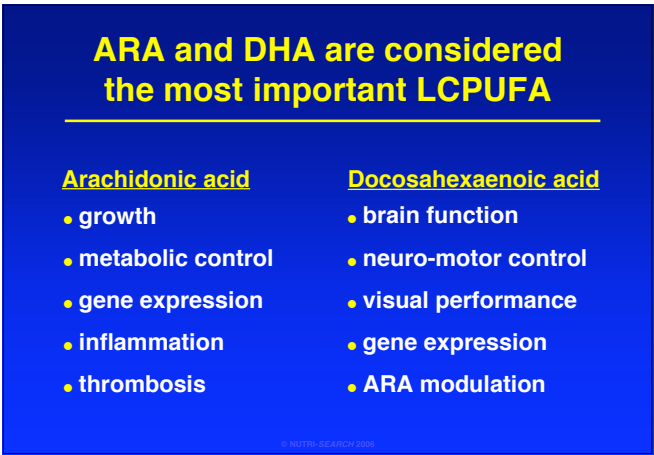
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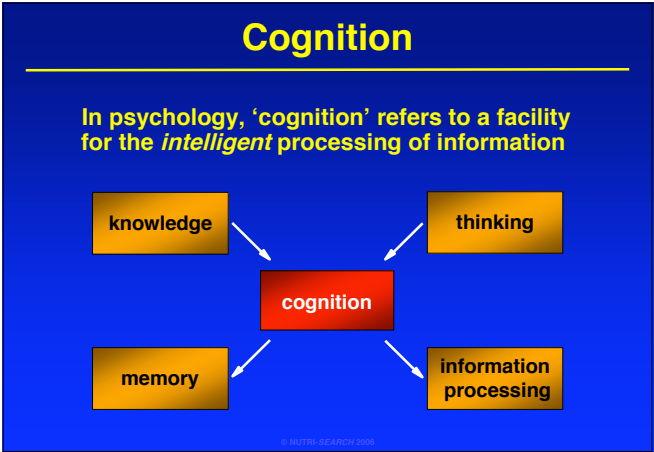
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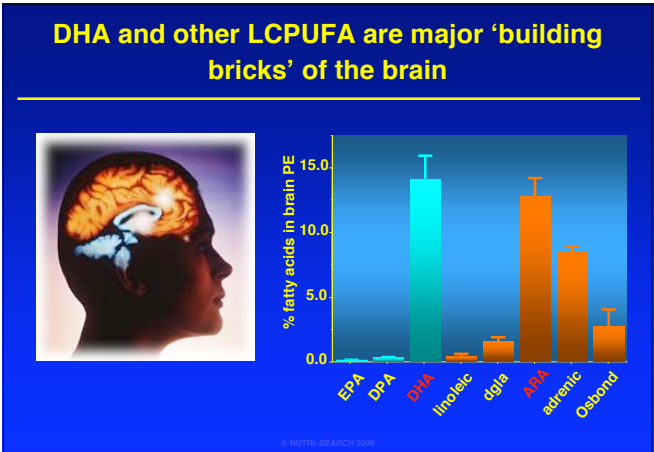
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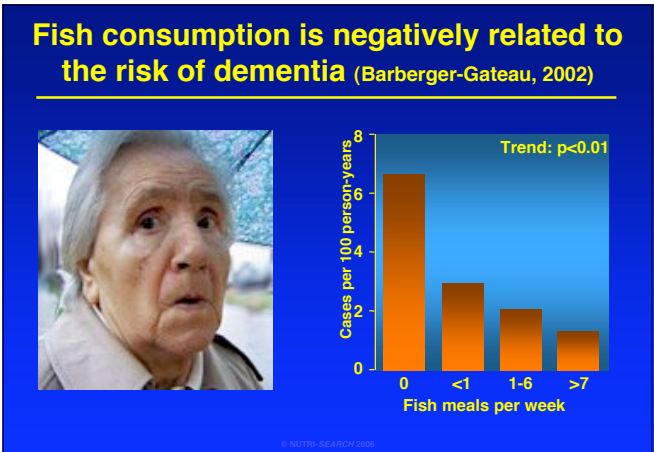
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- Various mental disorders are associated with lower amounts of (mainly omega-3) LCPUFA**
- Depression
  - Stress and aggression
  - Attention Deficit/Hyperactivity Disorder (ADHD)
  - Dyslexia
  - Dyspraxia
  - Schizophrenia
  - Autistic Spectrum Disorders
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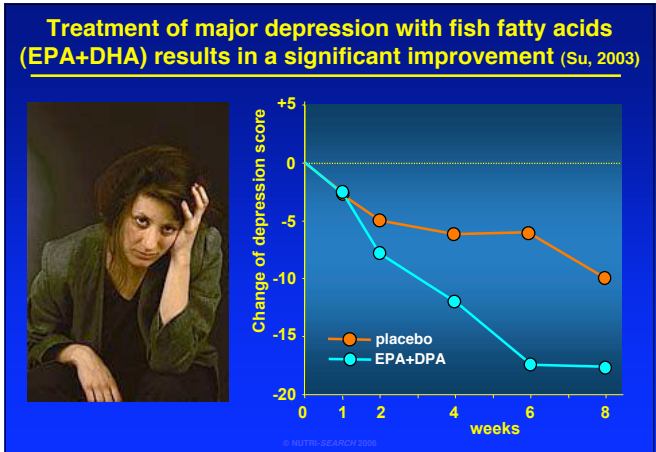
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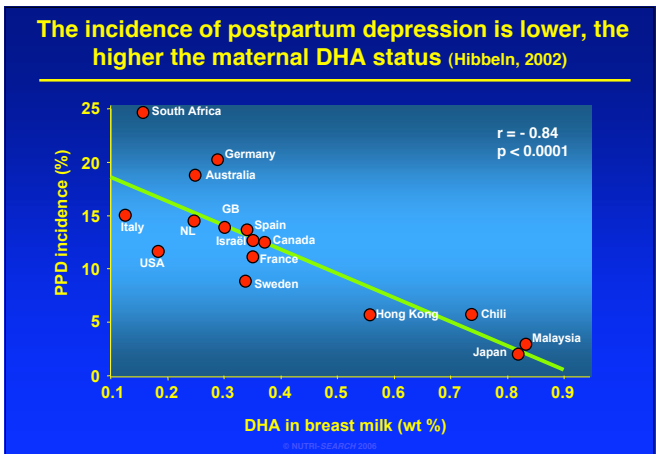
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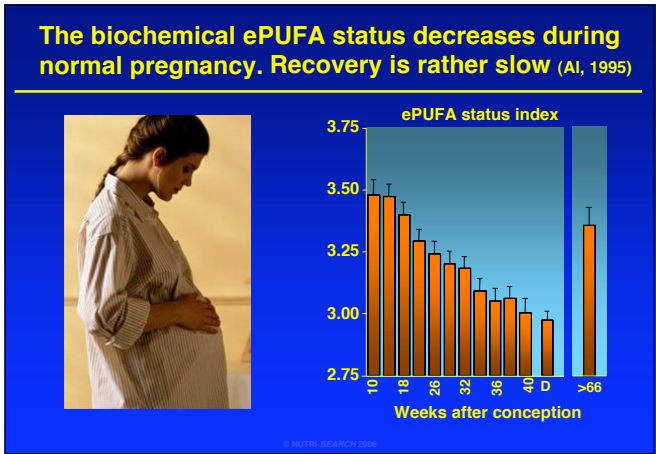
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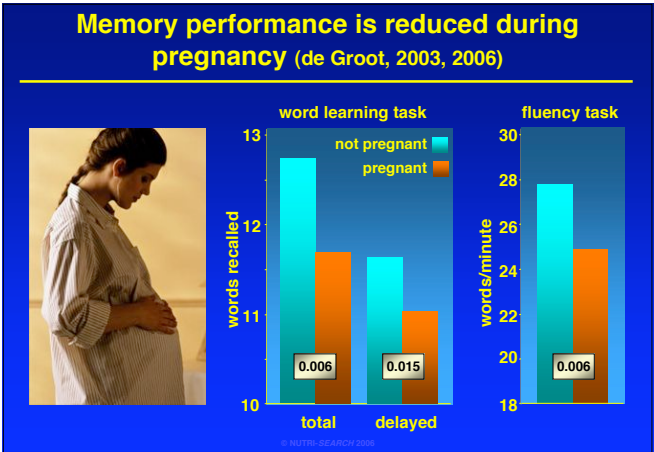
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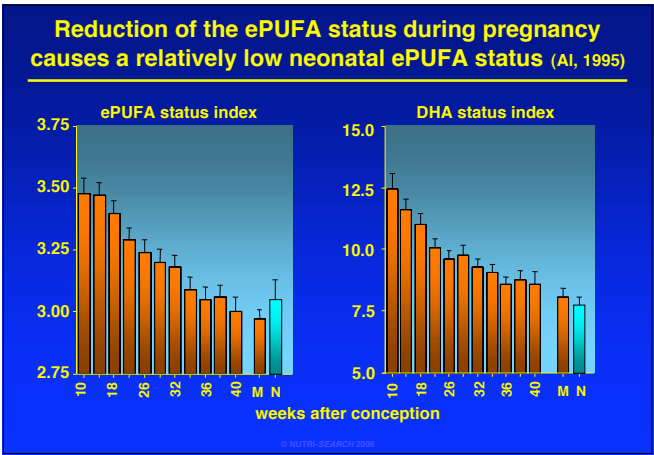
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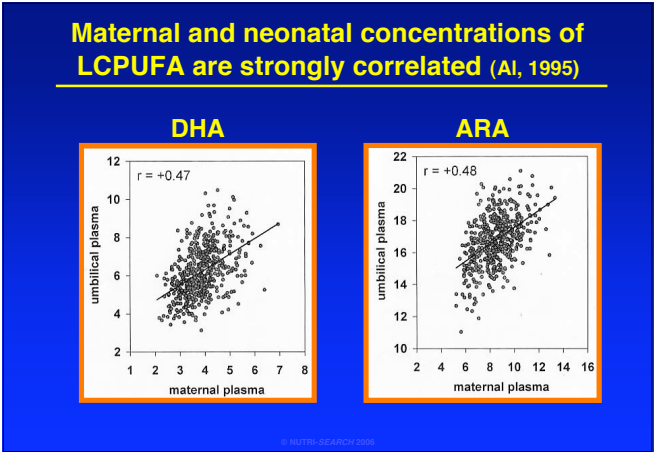
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### Early ‘programming’ of brain function by perinatal LCPUFA availability?



- Brain development mainly takes place during late gestation and early extra-uterine life
- LCPUFA are important ‘building bricks’ of the brain
- The LCPUFA status at birth is highly variable
  - ❖ ARA: 11-20%
  - ❖ DHA: 3-10%
- Does this difference in perinatal LCPUFA availability affect later brain function and child behavior?

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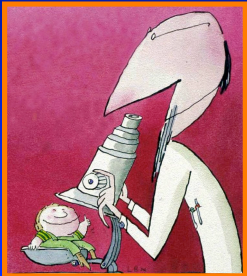
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### The Maastricht Essential Fatty Acid Birth (MEFAB) cohort

To investigate whether the perinatal availability of ePUFA (as indicated by their concentrations in umbilical phospholipids) is associated with later mental and physical development



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### Population of follow-up study

- 306 children born healthy and at term; 170 boys, 136 girls
- 144 breast-fed (mean duration 5 months)
- 161 formula-fed (no LCPUFAs)
- Age at follow-up: 7 - 8 years
- LCPUFA status at birth (% of total FA in plasma PL)

Fatty acid	Mean	SD	Min	Max
AA	16.64	1.58	11.04	20.20
DHA	6.14	1.38	3.12	10.10



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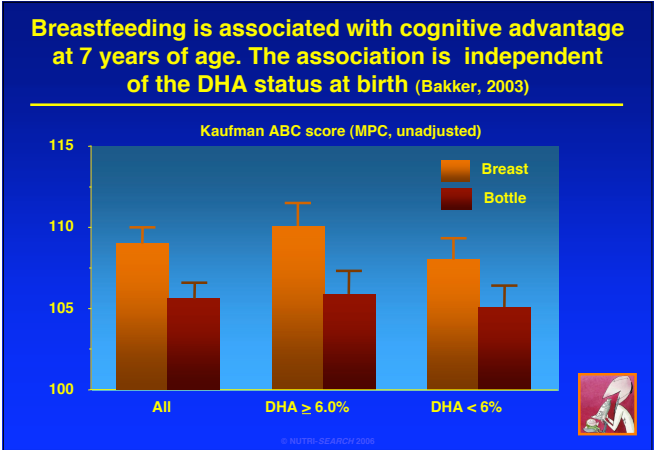
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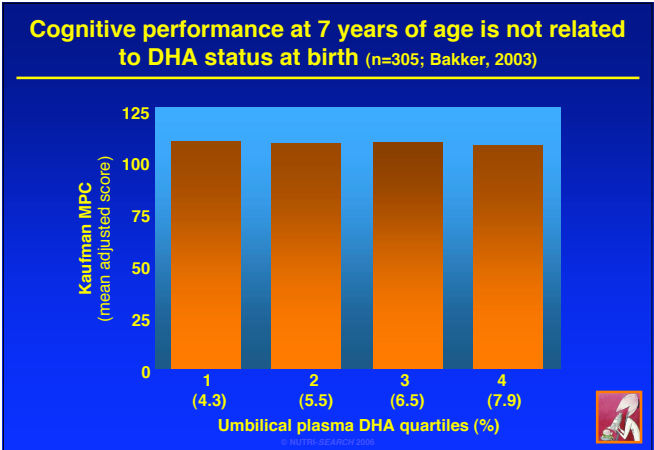
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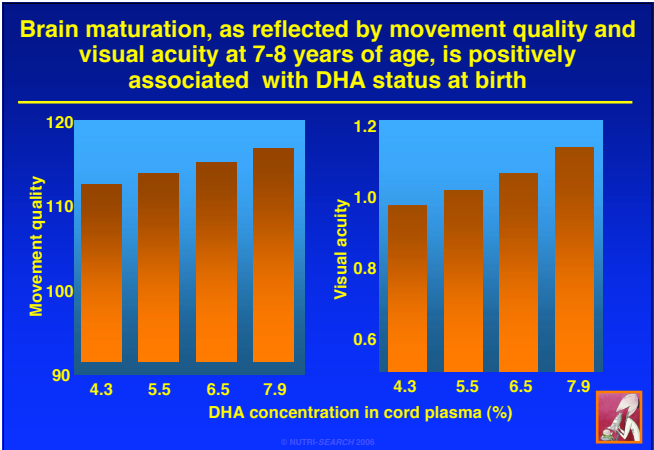
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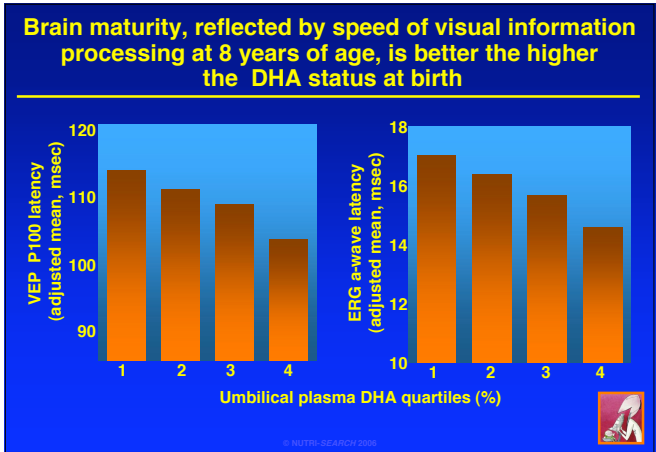
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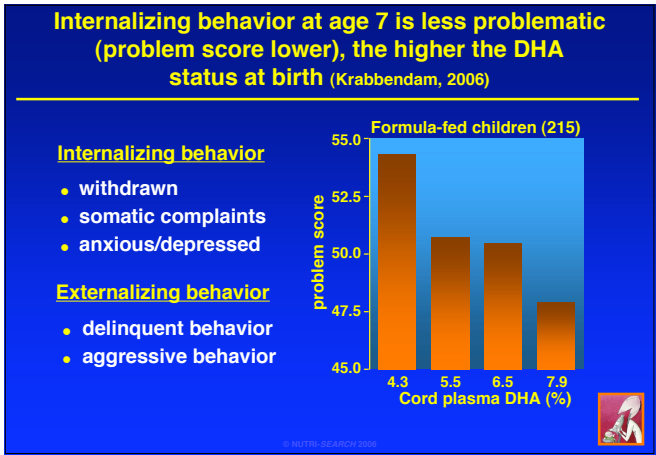
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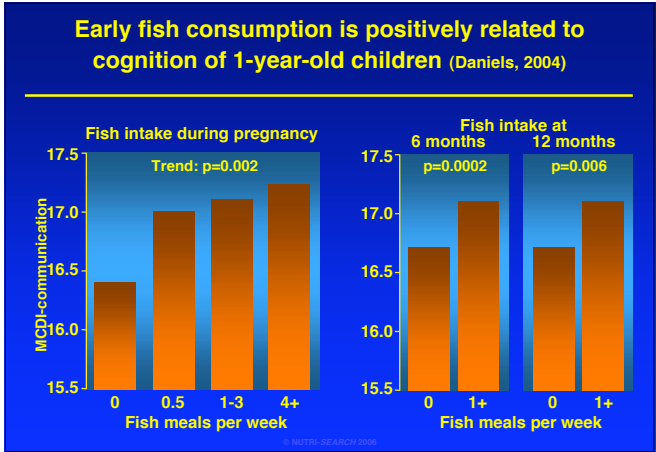
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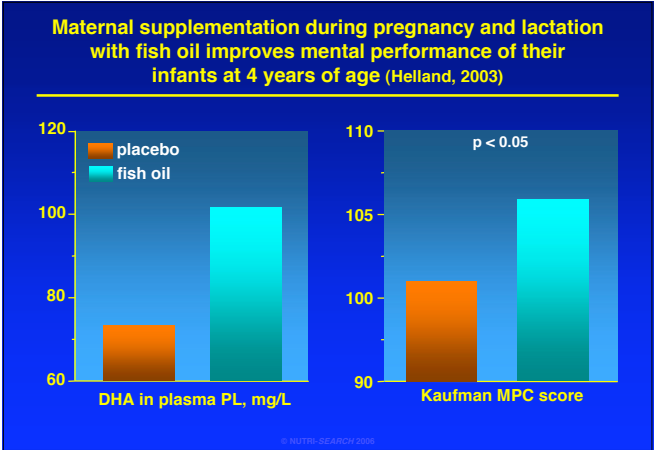
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**Summary**

- ❖ Certain essential polyunsaturated fatty acids, the LCPUFA, are structural and functional brain components
- ❖ The increased LCPUFA requirement of women during pregnancy and lactation is not adequately met by their dietary intake
- ❖ The LCPUFA status of neonates is determined by that of their mothers and may not be optimal
- ❖ Fetal DHA availability of healthy term infants is positively correlated with certain aspects of brain function and behavior at 7 to 8 years of life

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**The recommended intakes of EFA and LCPUFA are highly variable**

Recommendations mainly based on:

- breast milk fatty acid composition
- functional benefits (visual function and brain development) of LCPUFA-supplemented formula
- intake of clinically healthy adults

Age (months)	1	6	12	adults
Linoleic acid (g/day)	0.9-5.9	2.0-12.6	2.6-16.6	15-20
α-linolenic acid (g/day)	0.2-0.6	0.4-1.4	0.6-1.9	1.5-2.5
AA (mg/day)	30-50	60-120	80-160	-
EPA + DHA (mg/day)	20-70	40-140	55-200	200-1000
omega-3/6 ratio		0.10-0.20		0.10-0.20

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