

# Seafood Child Development and Maternal Depression

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**Healthy Mothers Healthy Babies Coalition  
Webinar**

This presentation does not represent any policy or position of the US Federal Government. It is solely the scientific opinion of the presenter.

# Essential Fats: Metabolism and Dietary Sources

## Omega-6



18:2n-6 linoleic acid,  
LA

Soy bean oil  
Safflower oil  
Corn oil



20:4n-6, arachidonic acid  
AA

Meat,  
Organs



22:5n-6      DPA n-6

Series 2  
Prostaglandins  
Thromboxanes  
Series 4  
Leukotrienes

Series 3  
Prostaglandins  
Thromboxanes  
Series 5  
Leukotrienes

immune - metabolic - developmental  
responses

## Omega-3



18:3n-3 alfa-linolenic acid,  
ALA

Flax  
~ Canola  
Leaf plants



20:5n-3, eicosapentaenoic acid,  
EPA

Seafood  
Breast milk  
(DHA)

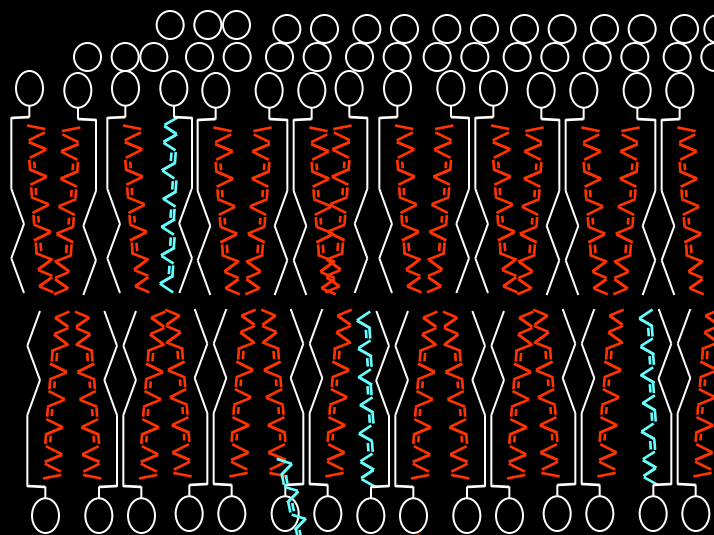


22:6n-3, docosahexaenoic acid,  
DHA  
(brain, retina, testis)

- Competition -

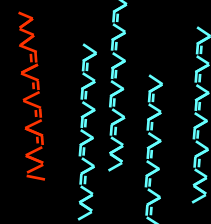
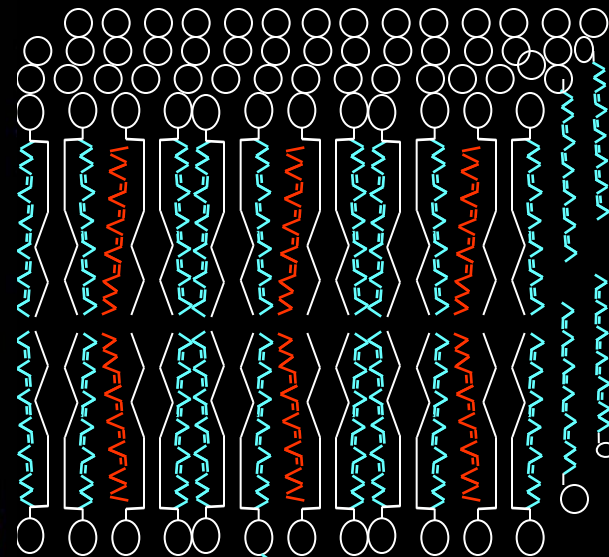
FADS 1-2

# U.S. Diet



PLA<sub>2</sub>

# Japanese Diet



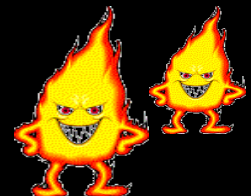
COX 1-2

~~Aspirin  
Other drugs  
>\$ 10 Billion~~

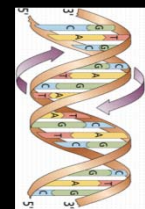
~~COX-2~~

PGE<sub>2</sub>

TXA<sub>2</sub>



Thrombosis

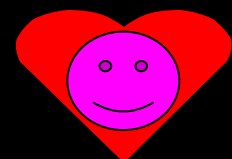


Gene Expression

PGE<sub>3</sub>



TXA<sub>3</sub>



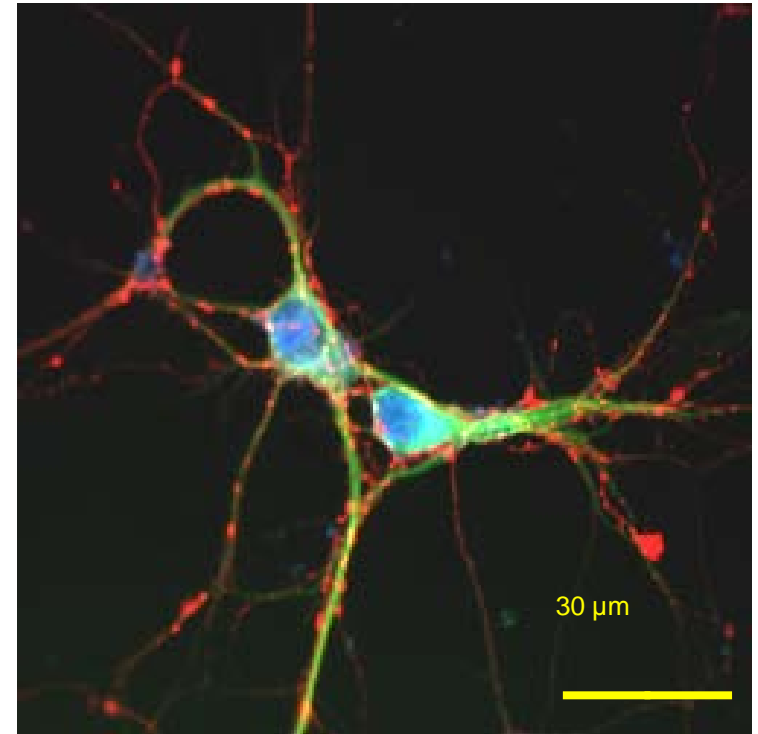
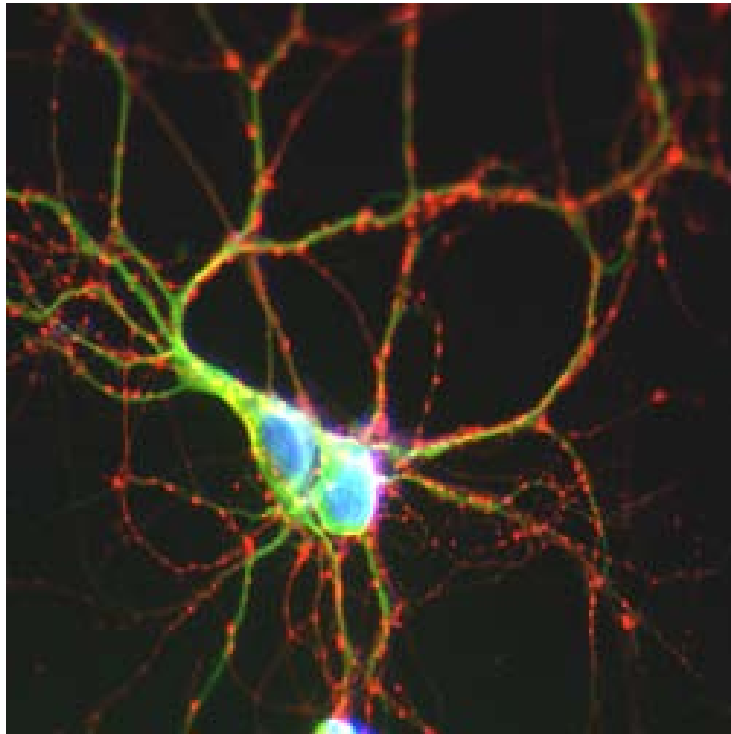
↓SREP1

↓ Triglycerides

# DHA dietary deficiency impairs synapse development

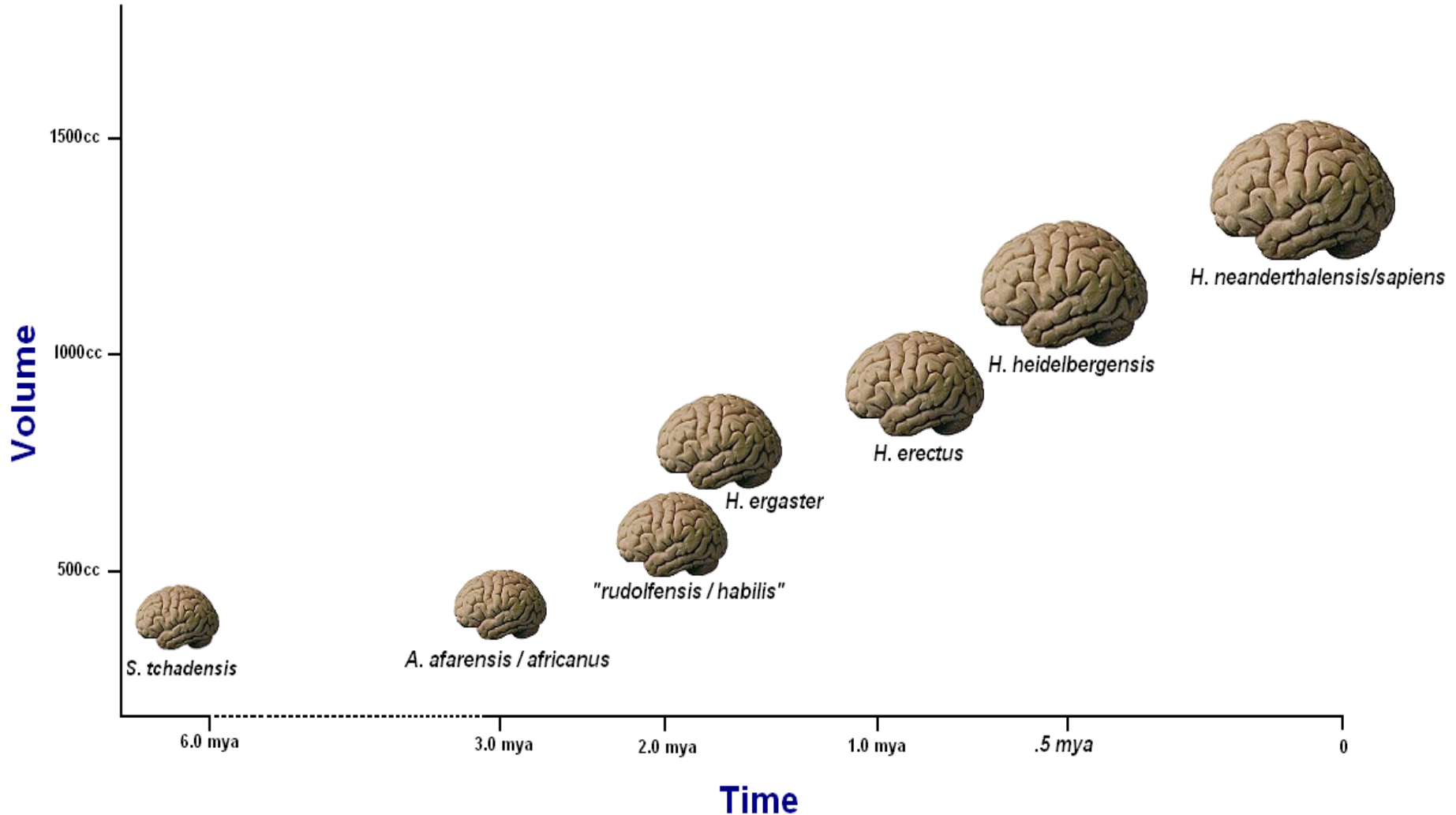
	Adequate	Deficient
Hippocampal Fatty Acids	DHA $6.6 \pm 0.7\%$ DPAn-6 $0.4 \pm 0.1\%$	$0.5 \pm 0.1\%$ $4.7 \pm 0.1\%$

Synapses in Hippocampal Neurons

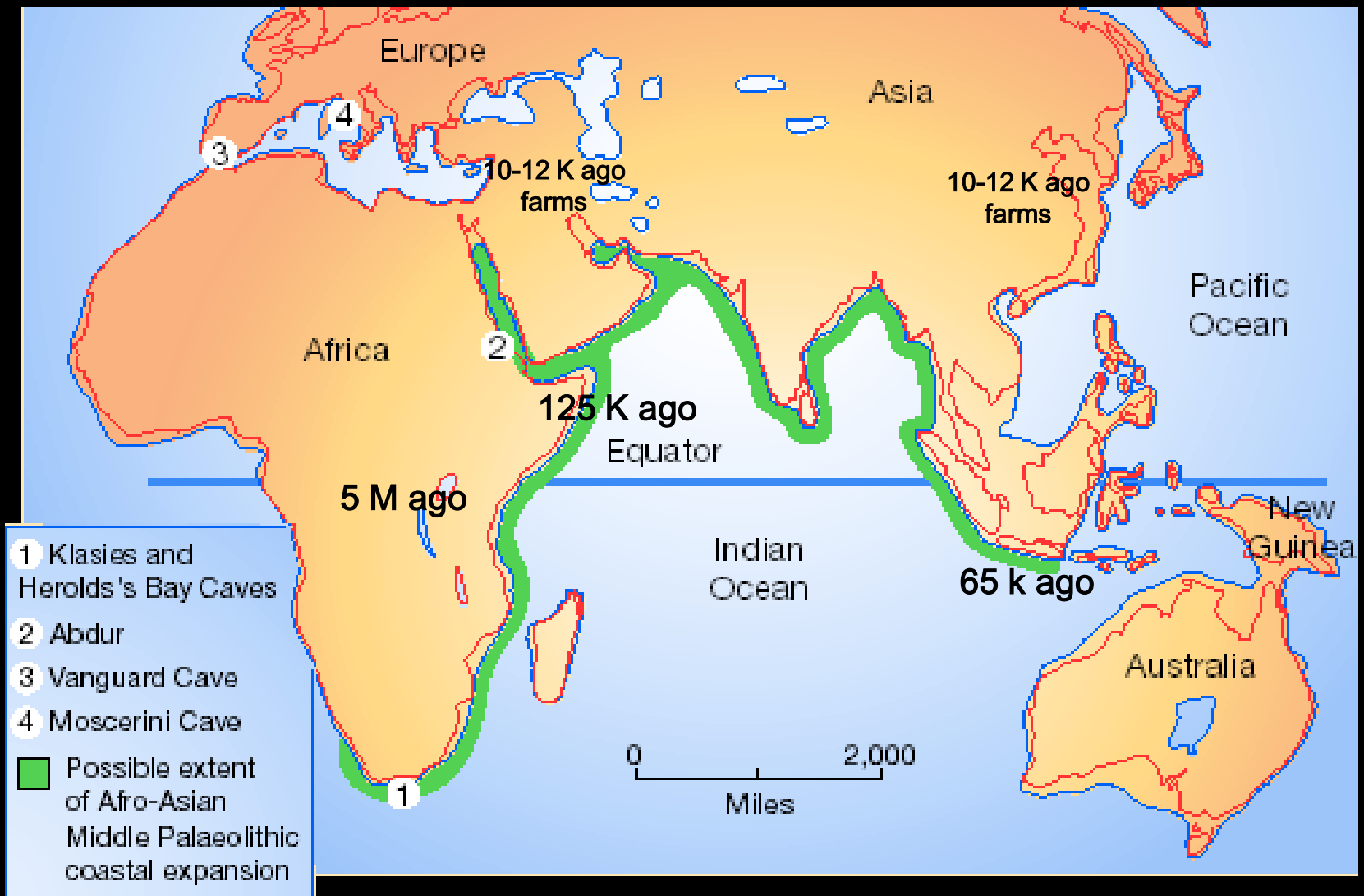


Mother mice fed adequate of deficient diets, embryo neurons harvested day 18

# Evolution and homonid brain size



# Route of humans out of Africa about 65,000 y ago





U.S. Department of Health and Human Services  
and  
U.S. Environmental Protection Agency



## ***What You Need to Know About Mercury in Fish and Shellfish***

**2004 EPA and FDA Advice For:  
Women Who Might Become Pregnant, Women Who are Pregnant  
Nursing Mothers and Young Children**

### **Advice**

**Limit consumption to no more than 340 gm/w  
of commercial species.**

**~ Avoid 4 species completely ~**

Fish and shellfish are an important part of a healthy diet.

...So, women and young children should include fish or shellfish in their diets due to the many **nutritional benefits**.

However, nearly all fish and shellfish contain traces of mercury.

...The **risks from mercury** in fish and shellfish depend on the amount of fish and shellfish eaten and the levels of mercury in the fish and shellfish.

March 2004 EPA-823-R-04-005

# They're being poisoned.



Your kids are being poisoned by  
deadly mercury from power plants.

**President Bush: Protect America's Children,  
Not Power Company Profits!**



Any benefits for children  
when mothers eat more seafood?

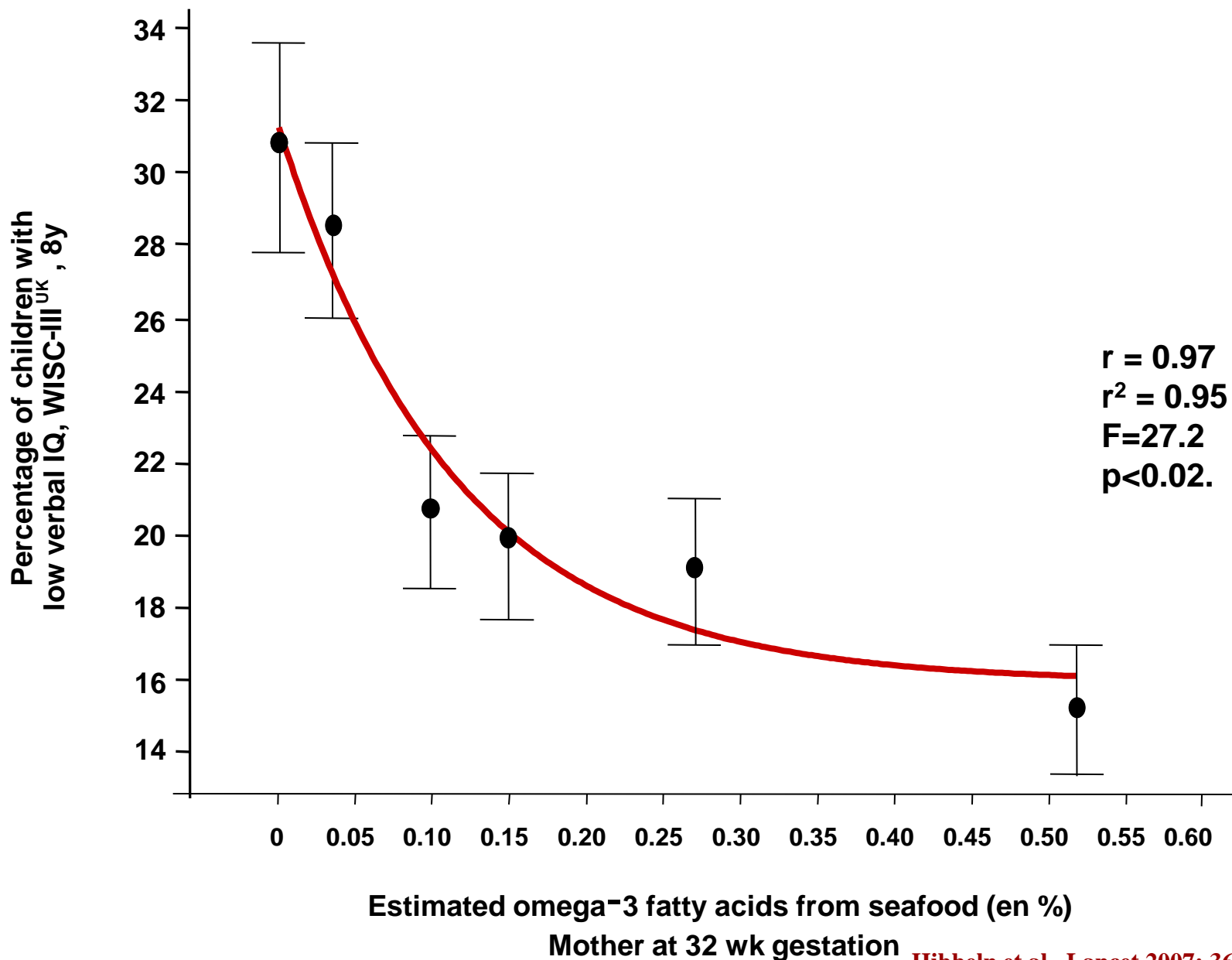


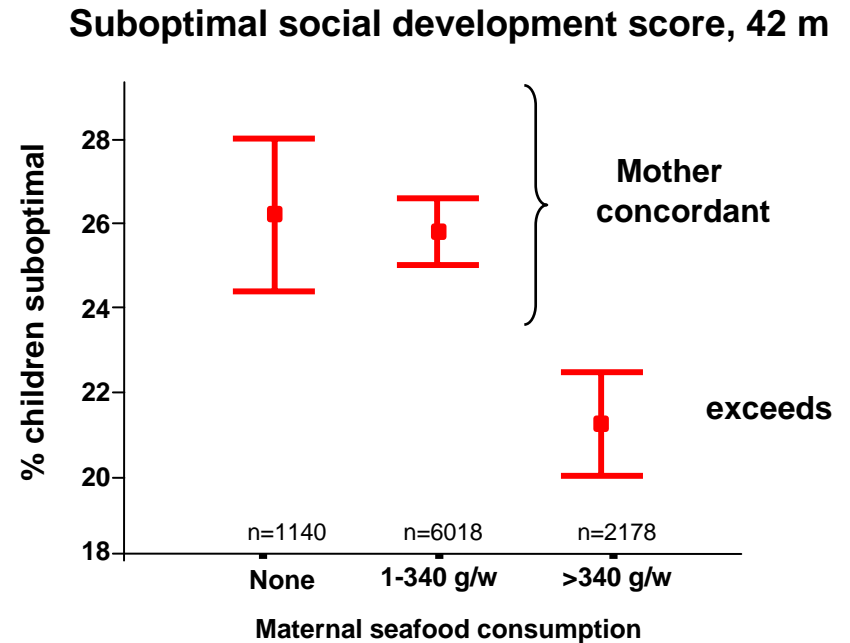
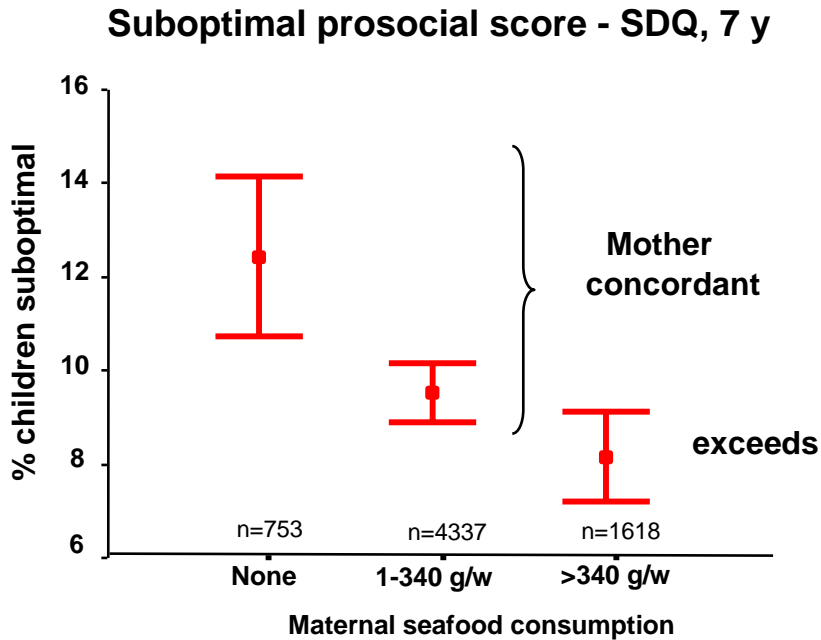
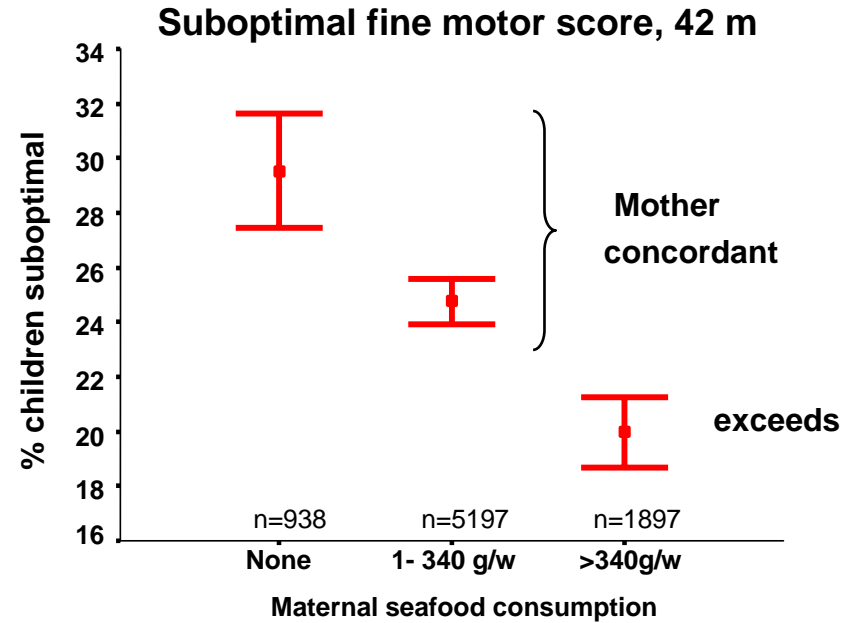
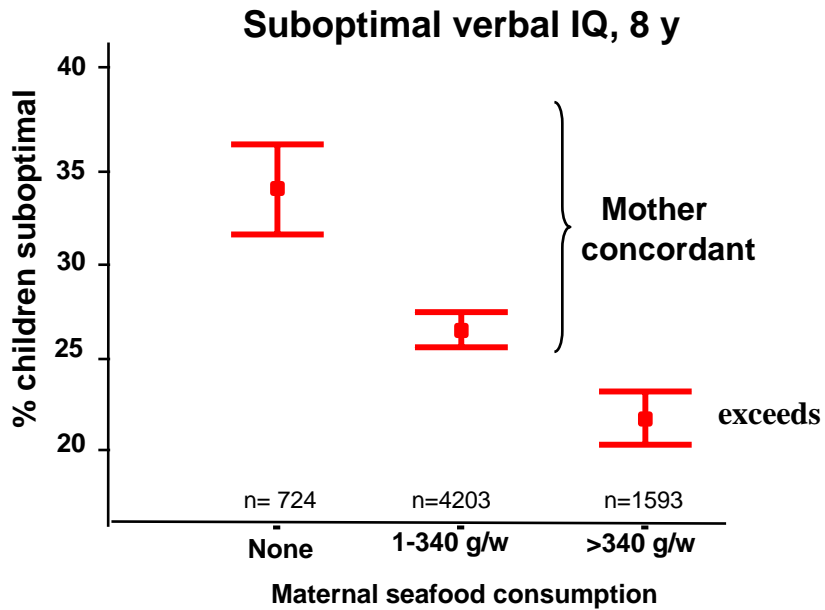
# Avon Longitudinal Study of Parents and Children (ALSPAC)

- Recruited 14,541 pregnant mothers.
- The largest and most complete longitudinal study in the world.
- Enrollment included every pregnancy between April 1<sup>st</sup> 1991 and December 31<sup>st</sup> 1992 in Avon (Southwest of London, UK)
- Children are now between 16.5 and 19 years of age
- Prof. Jean Golding, Ph.D.
- ALSPAC study group



# Low maternal omega-3 consumption from seafood and suboptimal verbal IQ among their children

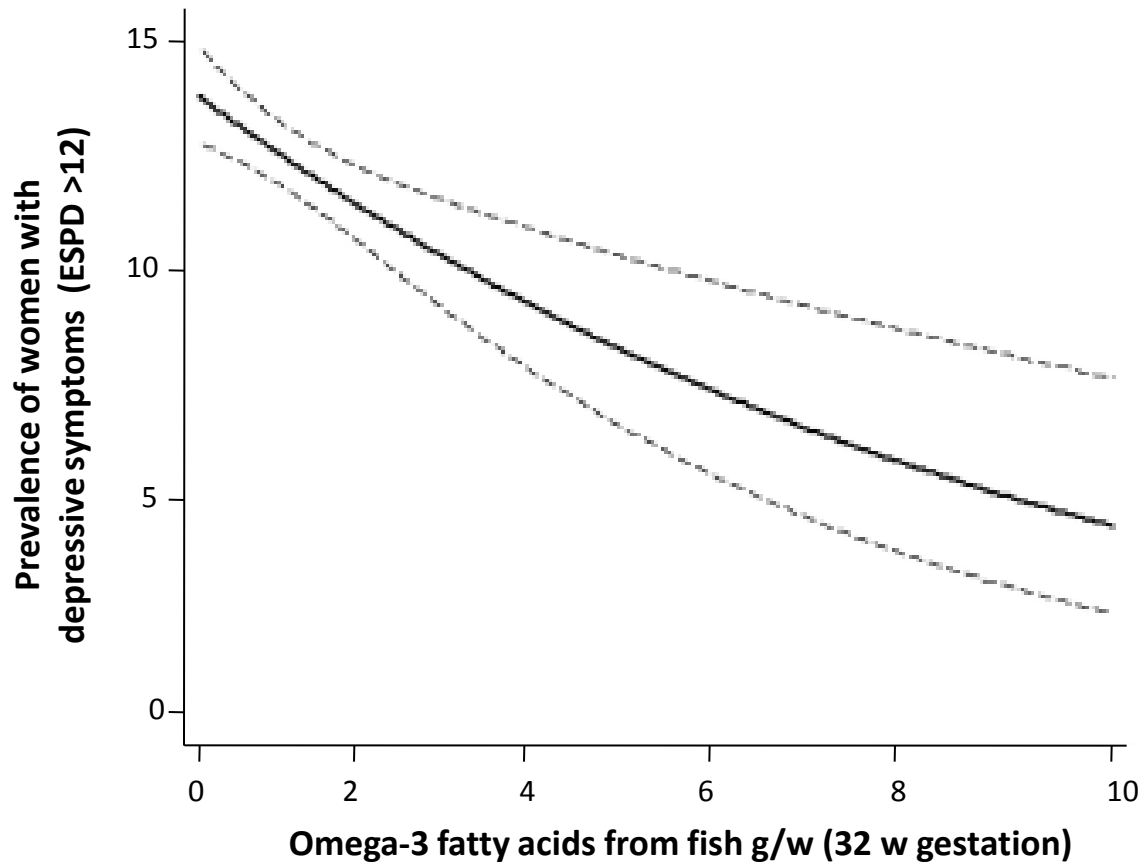




## ALSPAC Summary

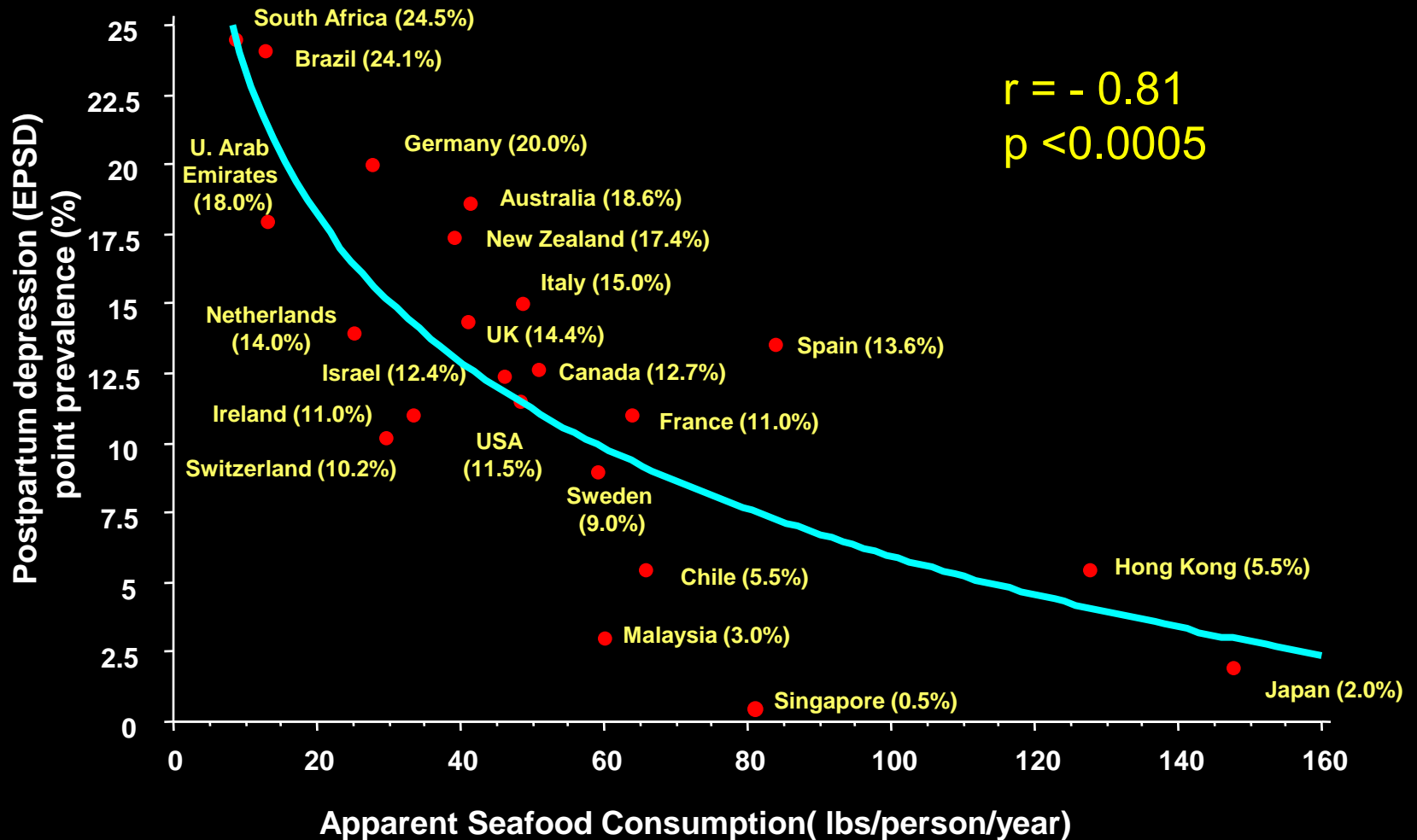
1. Maternal limitation of seafood consumption to  $<340\text{g/w}$  during pregnancy did not protect children from adverse outcomes.
2. In contrast, this observational study showed beneficial effects on child development when maternal seafood intakes exceeded  $340\text{ g/w}$ , with no upper limit of benefit.
3. These findings were robust after adjustment for multiple potential confounders.
4. These data indicate that advice for mothers to limit seafood intake during pregnancy is detrimental.

# Depressive symptoms during pregnancy and omega-3 intake from seafood.

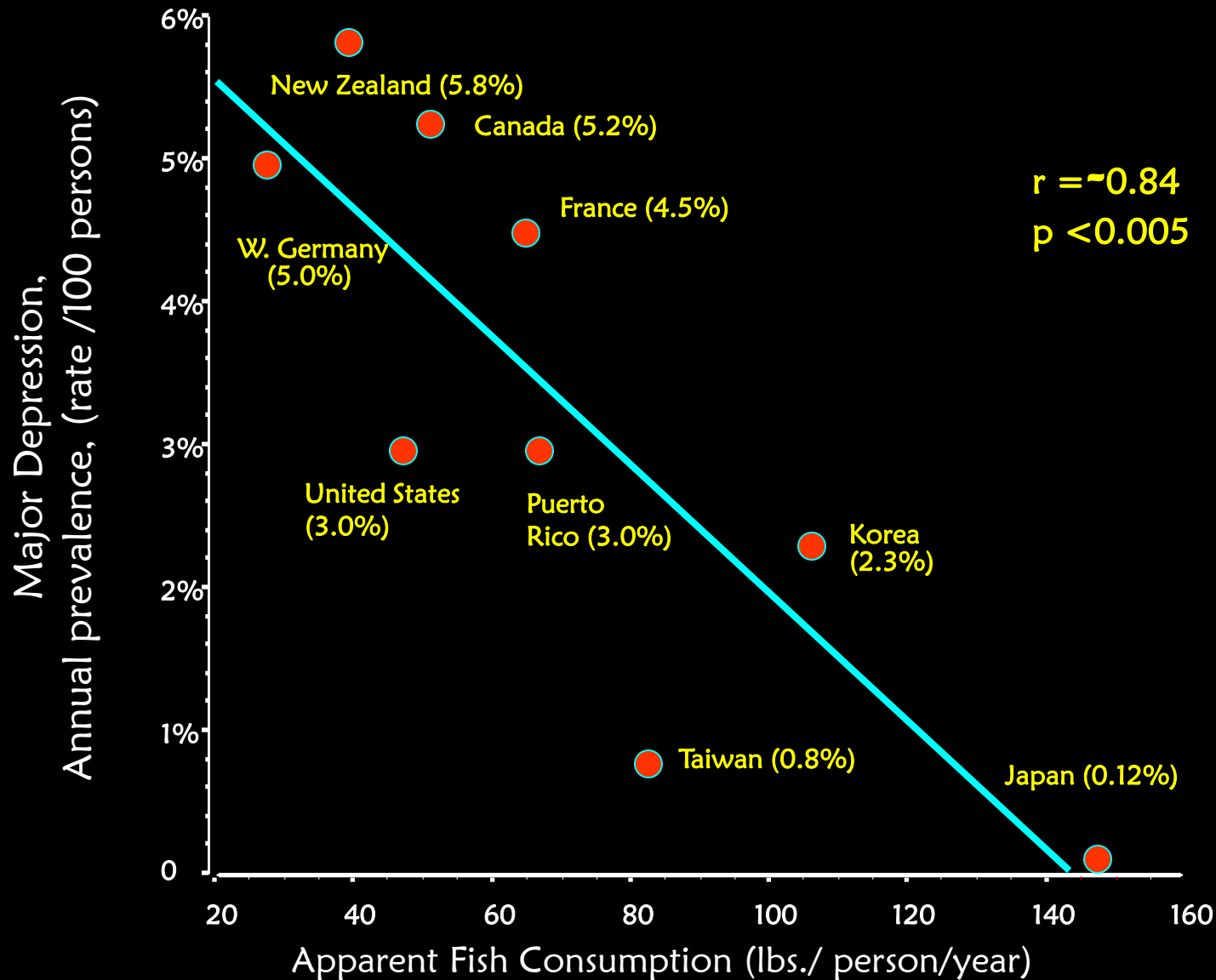


Omega-3 Intake (g/wk)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	
None	1.97 (1.63–2.38)	1.54 (1.25–1.89)	
0.1–0.4	1.64 (1.37–1.96)	1.37 (1.13–1.66)	
0.4–1.5	1.31 (1.13–1.52)	1.20 (1.03–1.41)	
>1.5	1.00	1.00	
<i>P for trend</i>	<i>0.0001</i>	<i>0.0001</i>	<i>n = 9,960</i>

# - Postpartum Depression - Seafood Consumption Predicts Lower Prevalence Rates



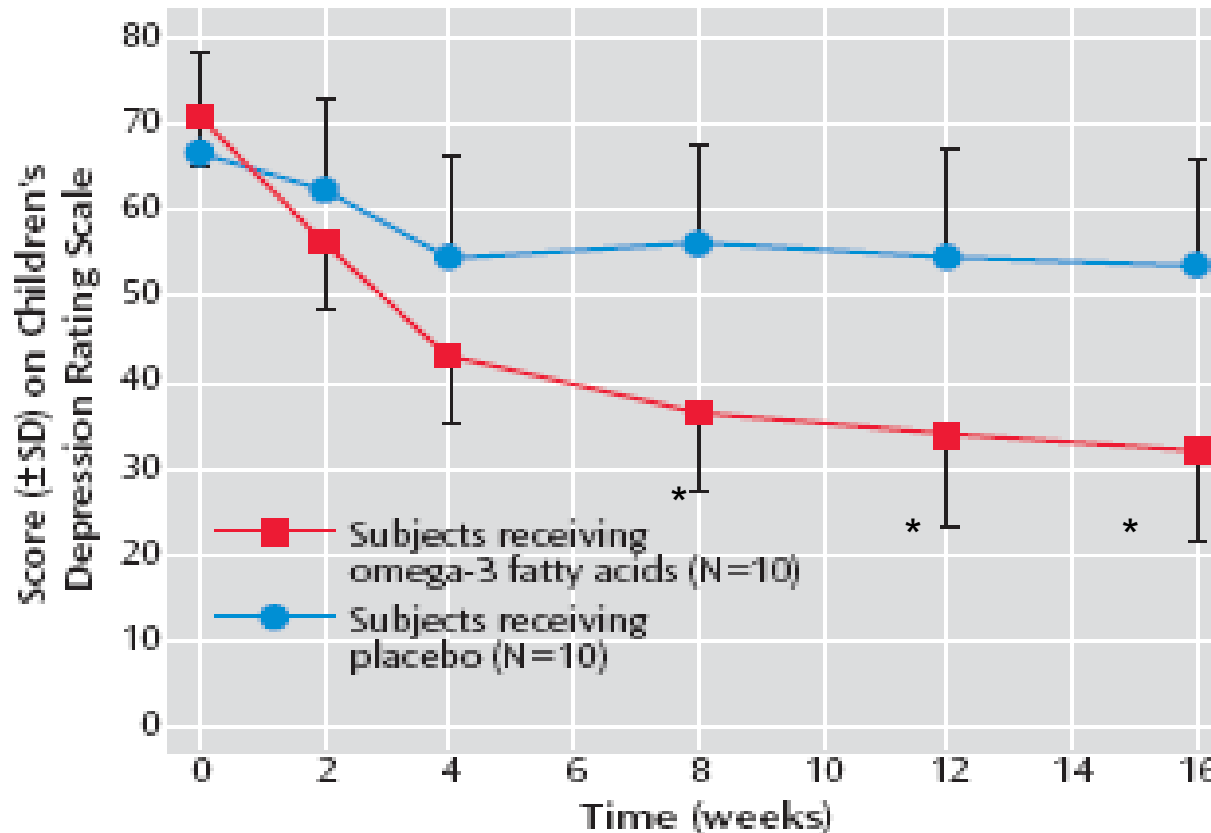
# Fish Consumption and Major Depression Annual Prevalence by Country





# Omega-3 treatment of childhood depression: a controlled, double-blind pilot study.

FIGURE 1. CDRS During 16 Weeks of Omega-3 or Placebo Treatment<sup>a</sup>



Age range= 8-12.5  
Monotherapy

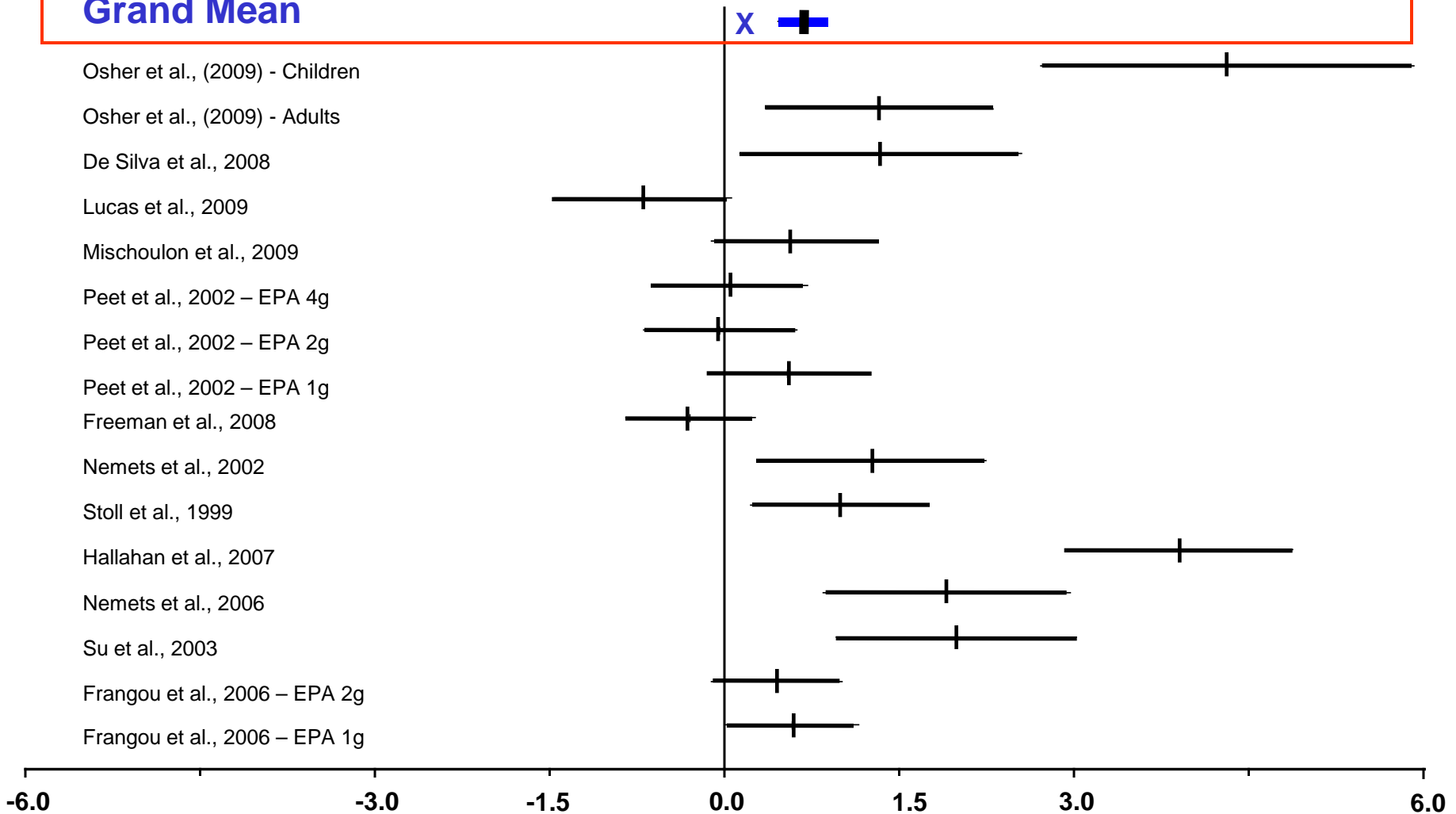
400 mg/d EPA  
+ 200 mg/d DHA  
vs. Safflower placebo

\*p<0.05

# EPA all RCT studies



## Grand Mean



Effect size = E++ 1.02, 95% CI 0.44 – 1.60

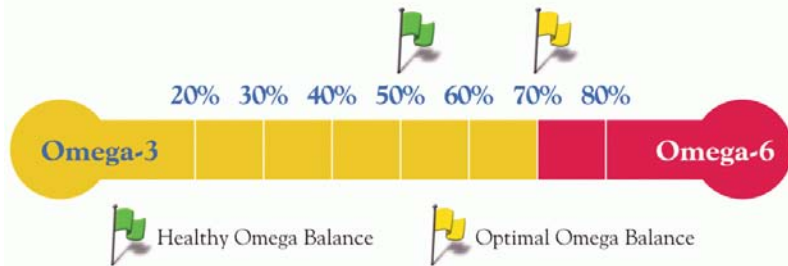
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Hallahan , Davis and Hibbeln Unpublished

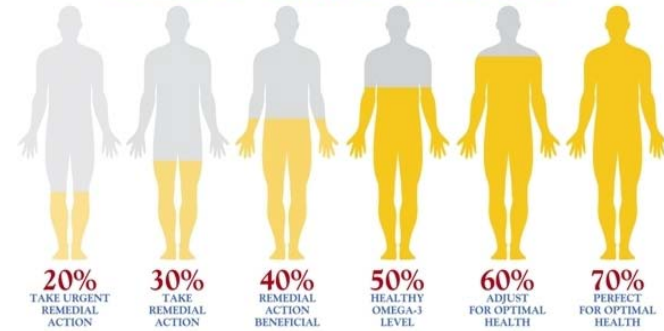
# Blood tests for omega-3 status

[www.idealomegatest.com/](http://www.idealomegatest.com/)

The Ideal Omega Balance (%) – an optimal score



## Levels of Omega-3 in the body



[www.genesmart.com](http://www.genesmart.com)

[www.metametrix.com/test-menu/profiles/fatty-acids/fatty-acids-bloodspot](http://www.metametrix.com/test-menu/profiles/fatty-acids/fatty-acids-bloodspot)

[www.omega-3-index.com](http://www.omega-3-index.com)

# How to count capsules to get 2 gm/d of EPA+DHA

Total oils in capsule	EPA	DHA	EPA+DHA / capsule	# of capsules needed
1,000 mg Unconcentrated \$ (cod liver oil)	120 mg	180 mg	300 mg	=2,100 mg <b>7 caps</b>
1,000 mg molecularly distilled \$\$	200 mg	300 mg	500 mg	=2,000 mg <b>4 caps</b>
1,100 mg highly purified \$\$\$	600 mg	400 mg	1,000 mg	=2,000 mg <b>2 caps</b>

**efaeducation.nih.gov**

## **KIM-2 Program**

**Enter your diet and  
See the omega-3 content of your body**

**FABresearch.org**

**Food and Behavior Research U.K.  
Parent Public and Scholarly information**

**www.omega3learning.purdue.edu**

**Emerging**

**www.fatsoflife.com**

**Abundant information-well edited**