Prognosis of Lobar Intracerebral Haemorrhage in Relation to Circulating marine Omega-3 Fatty Acids at Admission

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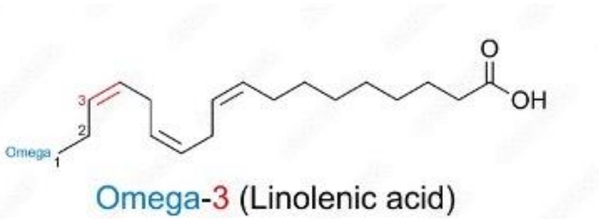
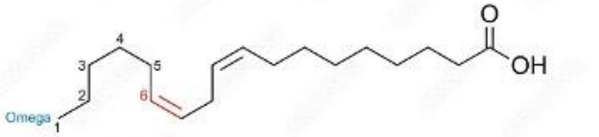
Polyunsaturated fatty acids (PUFA)

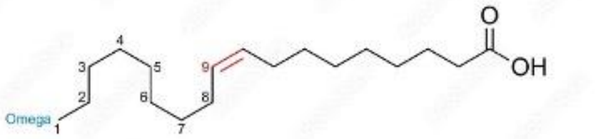
1. Have **> one double bond** between their carbons.
2. Are **essential fatty acids** that must be **obtained** from the **diet**.
3. Are **classified** according to the **position** of the **double bond** closest to the end of them



Omega-3 (Linolenic acid)



Omega-6 (Linoleic acid)



Omega-9 (Oleic acid)

Functions

Omega 3
Omega 6

→

Eicosanoids

Prostaglandins
Thromboxanes
Leukotriens

Cellular mediators in:

- Vasoconstriction/vasodilation
- Inflammation
- Coagulation/platelet aggregation
- Immune System
- CNS

1. INTRODUCTION

Anti-inflammatory
Anti-aggregant
Cholesterol/ TAG lowering
Regulates TA

Proinflammatory
Proaggregant

Omega 3

Alpha-linolenic acid – ALA
Eicosapentaenoic acid – EPA
Docosahexaenoic acid – DHA

Vegetable origin: vegetable oils, sunflower or pumpkin seeds, nuts, avocado.

Marine origin: Blue or cold-water fish (sardine, salmon, tuna,...), or shellfish.

Omega 6

Linoleic acid – LA
Arachidonic acid – AA
Gamma linolenic acid - GLA

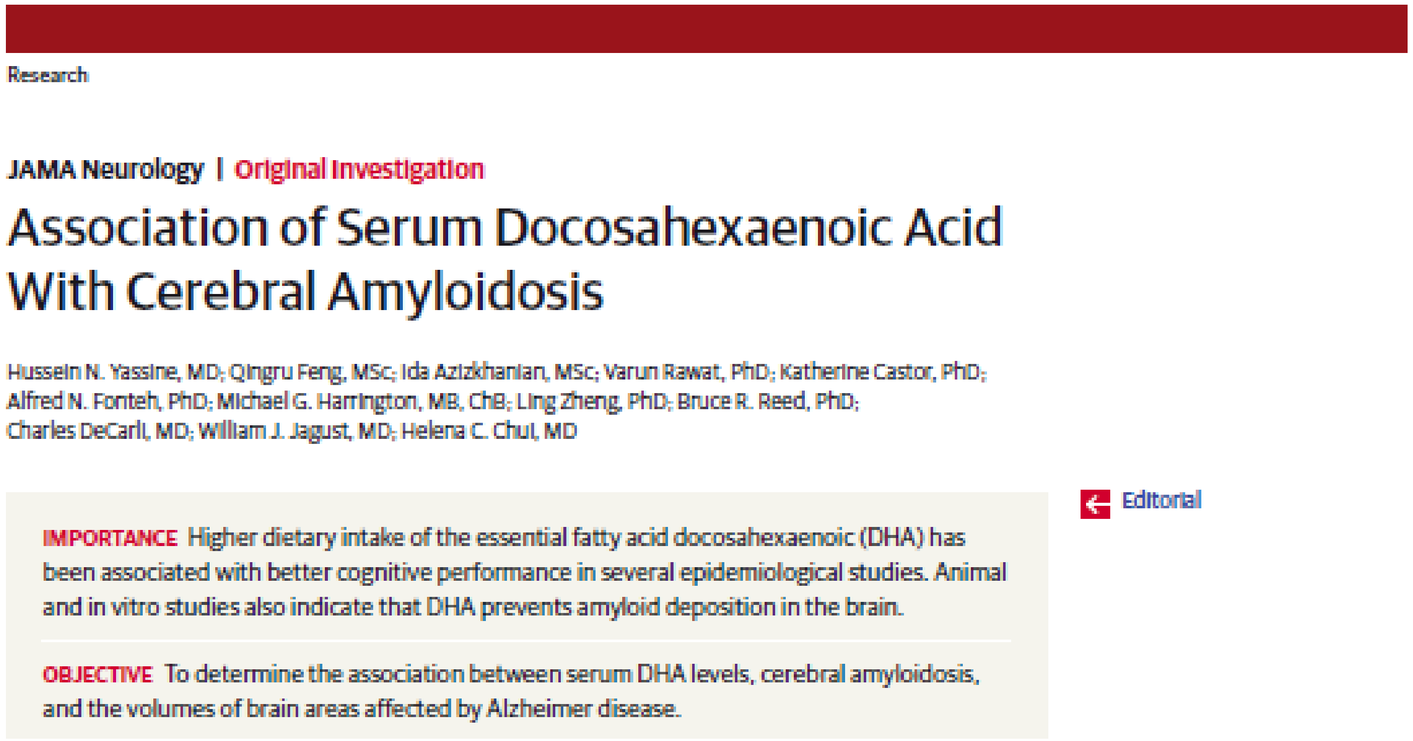
Vegetable oils (sunflower), eggs, cereals, animal fat, dairy...

The **ratio** between **omega-3/omega-6** in our diet influences **cardiovascular risk**:

→ **++ Omega 3:** Low incidence of CV disease.

→ **++ Omega 6:** High incidence of CV disease.

1. INTRODUCTION



Research

JAMA Neurology | Original Investigation

Association of Serum Docosahexaenoic Acid With Cerebral Amyloidosis

Hussein N. Yassine, MD; Qingru Feng, MSc; Ida Azizkhanian, MSc; Varun Rawat, PhD; Katherine Castor, PhD; Alfred N. Fonteh, PhD; Michael G. Harrington, MB, ChB; Ling Zheng, PhD; Bruce R. Reed, PhD; Charles DeCarli, MD; William J. Jagust, MD; Helena C. Chui, MD

Editorial

IMPORTANCE Higher dietary intake of the essential fatty acid docosahexaenoic (DHA) has been associated with better cognitive performance in several epidemiological studies. Animal and in vitro studies also indicate that DHA prevents amyloid deposition in the brain.

OBJECTIVE To determine the association between serum DHA levels, cerebral amyloidosis, and the volumes of brain areas affected by Alzheimer disease.

A) Amyloid deposition mediated by nutritional factors, including Omega-3 intake:

↓ DHA → ↑ Cerebral amyloidosis (PET-PIB).

(Yassine, et al. Association of Serum Docosahexaenoic Acid With Cerebral Amyloidosis, JAMA Neurology 2016).

2. HYPOTHESIS

Hypothesis

- Brain **amyloid beta** deposition could be mediated by levels of **omega-3 fatty acids** (n-3 PUFA) with an **inverse relation.**
- A **lower brain load** of amyloid beta could imply **less damage** once the **lobar ICH** occurs**.**
- Our hypothesis is that patients with **higher levels** of **n-3 PUFAs** at admission could have a **better prognosis** once they develop a **lobar ICH.**

3. METHODS

Retrospective and observational study of **58 patients** with **spontaneous lobar ICH**.

% of marine omega-3 acids **EPA i DHA** was determined in serum phospholipids **with gas chromatography**.

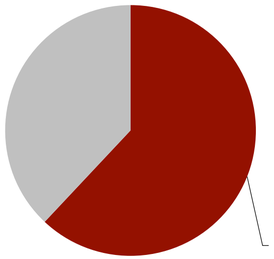
Clinical and **radiological** data were collected:

- In-hospital and 90-day mortality
- Haemorrhage growth >33% and/or 6 ml at 24-72 hours
- Early neurological deterioration
- mRS at 90 days

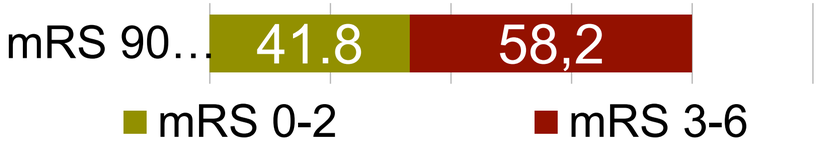
A **bivariate descriptive analysis** + univariate and multivariate **logistic regression** models was performed.

4. RESULTS

n = 58



Mean age 76.5 [68-83] yo
Haematoma volume 24.6 [9.25-45.2] cc
Haematoma growth: 41,1%.
In-hospital mortality: 24.1%.
Mortality after 90 days: 31.2%.



Omega 3 (%)

EPA - 0,53% [0.38;0.88]
DHA - 2,09% [1.55;2.90]

4. RESULTS

Multivariate logistic regression model
(adjusted for age, volume of ICH and NIHSS)

↓

In-hospital mortality (14/58)

DHA levels → **OR 0.32**; 95% CI 0.1-0.76; **p=0.029**

EPA + **DHA** levels → **OR 0.43**; 95% CI 0.17; 0.82; **p=0.031**

↑↑ DHA
↑↑ EPA + DHA → ↓↓ In-hospital mortality

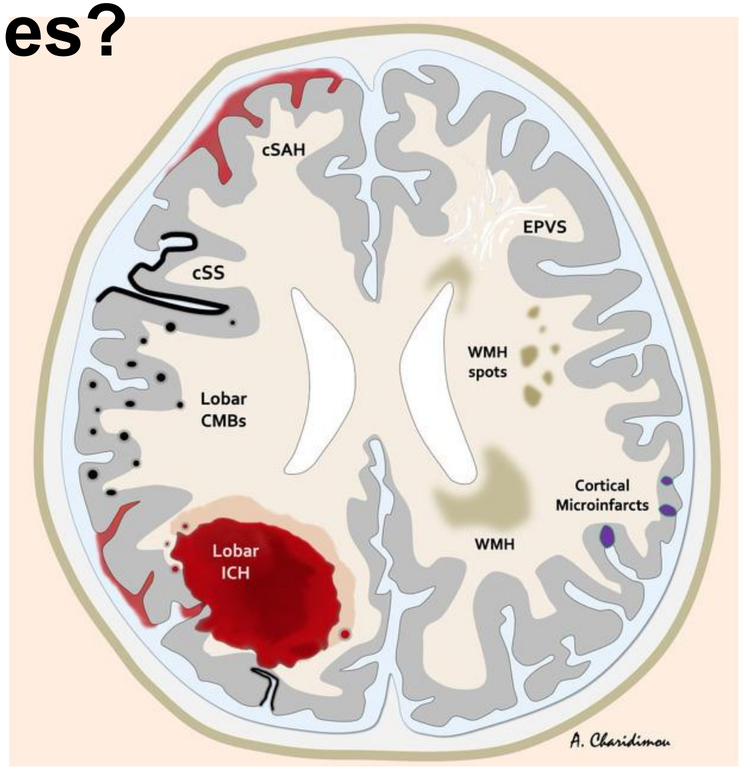
Early neurological deterioration (16/58)

DHA levels → **OR 0.28**, **p = 0.032**
EPA + **DHA** levels → **OR 0.45**, **p = 0.032**

↑↑ DHA and EPA+ DHA → ↓↓ Early neurological deterioration

5. DISCUSSION

Protective effect of omegas in lobar hemorrhages?



Cognitively healthy homozygous APO E4 patients

↓

Self-reported DHA intake

↓

A trend towards an inverse association between DHA intake and CMB prevalence (non-significant)

(Sala-Vila, et al. DHA intake relates to better cerebrovascular and neurodegeneration neuroimaging phenotypes.

Am J Clin Nutr 2021).

5. DISCUSSION

Protective effect of omegas in lobar hemorrhages?

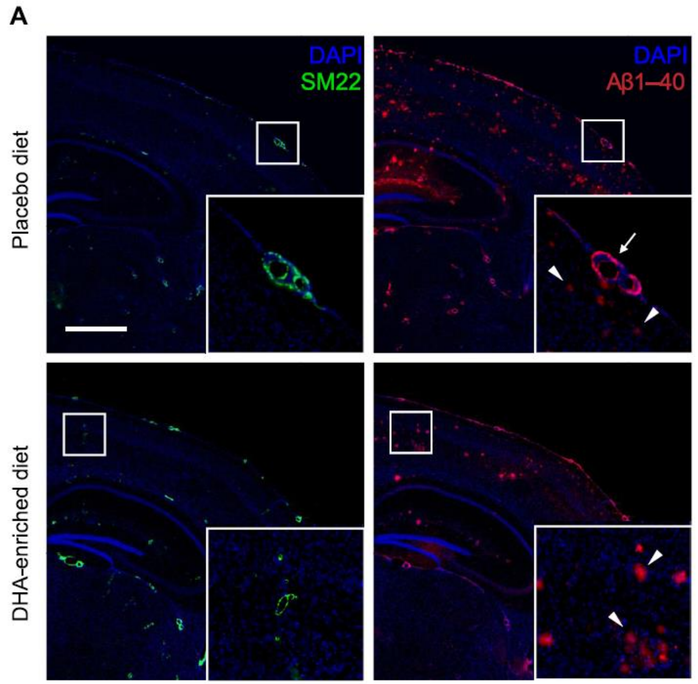
Mouse models of AD with CAA lesions

↓

Diet rich in DHA

↓

↓ Vascular amyloid beta burden and extent of hemorrhagic foci.



(Hur, et al. Cerebrovascular b-amyloid deposition and associated microhemorrhages in a Tg2576 Alzheimer mouse model are reduced with a DHA-enriched diet THE FASEB JOURNAL, 2018).

5. CONCLUSIONS

Omega-3 consumption prevents the development of **ischemic cardiovascular diseases**, through its **anti-inflammatory** and **anti-aggregant** effects. They could also mediate in brain **amiloyd beta accumulation**, preventing it.

Higher levels of the **omega-3 DHA** and the **sum of EPA and DHA** in our study were associated with **lower in-hospital mortality** and **early neurological deterioration** in patients with **lobar hemorrhage**. This association could be explained by a **protective effect of omega-3** in the development of **CAA**, favoring a better prognosis.

This opens the door to **future research** into the **role of omega-3** in cerebral hemorrhage.

THANK YOU VERY MUCH!

Hospital del Mar Research Institute Barcelona

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