Fish Oil (Omega 3) May Be Good For The Heart But Bad For AAA Development: Why This Is So

Jes S. Lindholt
Professor in Vascular Surgery, DMSci, Ph.D.
Odense University Hospital, Denmark
On behalf of
Katrine L. Kristensen, Elena Burillo, Diego Martinez-Lopez, Carlos Calvo, Emilio Ros, José L. Martin-Ventura, Alex Sala-Vila

Disclosures
Speaker name:
Jes S. Lindholt
I have the following potential conflicts of interest to report:
Consulting
Employment in industry
Shareholder in a healthcare company
Owner of a healthcare company
Other(s)
X I do not have any potential conflict of interest

Background

• Main mechanisms of AAA are inflammation, proteolysis and oxidative stress.

• Oxidative stress and particularly inflammation are inhibited by the fish-derived omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

Hypothesis

• This prompted the notion that dietary omega-3 might protect against AAA.


• Such hypothesis was confirmed in experimental models (angiotensin II-infused Apolipoprotein E-knockout mice [2-4])


Lack of human data

Material

• Baseline sampled RCB from 498 AAA patients and 199 controls from the population-based Danish ultrasound-screening trial VIVA

• Median follow-up of 4.85 y

• 141 patients had repair (AAA ≥55 mm) within five years.

Methods

• Although the fatty acid profile of adipose tissue is the best surrogate of long-term fat intake, circulating fatty acids are a convenient and accepted alternative (6).
• The turnover of red blood cells (RBC) (120-day lifespan) makes RBCs suitable for objective assessment of omega-3 fatty acid status (7).

Methods II

• Gas-chromatography:
  - Omega-3 eicosapentaenoic acid (EPA)
  - Omega-3-docosahexaenoic acid (DHA)
  - Omega-3 index (EPA+DHA)
  - Arachidonic acid (AA).
• The association of their upper tertiles with:
  1. the risk of having an AAA
  2. the need for later AAA repair

Results: EPA, DHA and Omega-3-index

• Mean omega-3 index = 7.6% (participants were high consumers of omega-3).
• Only 4.9% < 4.0% (Threshold for high CVD risk)
• No significant associations were found for Omega-3 index, EPA or DHA with risk of AAA or need for AAA repair

Results: Arachidonic acid (AA)

- the bad proinflammatory fatty oil

Results: Arachidonic acid (AA)

- Need for later preventive repair

Variable | Odds Ratio (95% CI) | P |
---|---|---|
Upper tertile of AA | 1.31 (1.02 to 1.68) | 0.032 |
Smoking | 4.11 (2.83 to 6.66) | <0.001 |
Hypertension | 1.08 (0.70 to 1.61) | 0.533 |
Anticoagulants | 2.06 (1.81 to 4.81) | <0.001 |
Omeprazole | 1.10 (0.75 to 1.60) | 0.315 |
PAD | 9.33 (3.59 to 24.2) | <0.001 |
BMI | 1.04 (1.03 to 1.16) | 0.0051 |
Diatolic BP | 1.08 (1.03 to 1.10) | 0.003 |
Constant | 0.00 | <0.001 |

AA in AAA vs Controls:

15.90% ± 2.58 vs 15.06% ± 2.33, P <0.001

Variable | Hazard Ratio (95% CI) | P |
---|---|---|
Upper tertile of AA | 1.54 (1.127 to 2.114) | 0.007 |
Smoking | 1.097 (0.797 to 1.510) | 0.395 |
Hypertension | 1.57 (1.117 to 2.207) | 0.009 |
Antiplatelet | 0.799 (0.550 to 1.160) | 0.554 |
Statins | 1.166 (0.805 to 1.689) | 0.290 |
PAD | 0.821 (0.547 to 1.234) | 0.238 |
BMI | 0.973 (0.930 to 1.017) | 0.152 |
Diabetes | 0.959 (0.554 to 1.658) | 0.611 |
Beta blocker | 0.730 (0.494 to 1.079) | 0.506 |
Hs-CRP | 1.000 (0.985 to 1.014) | 0.661 |
Aortic size | 1.087 (1.076 to 1.097) | <0.001 |

Conclusions

• Surprisingly, omega-3-fatty acids didn’t influence the risk of AAA or need for AAA repair.
• In contrast, arachidonic acid increased the risk of having an AAA and need for AAA repair.