

## *Health News from 3Care Therapeutics*

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### NASA Examines Omega-3 for Bone Health During Space Flight

Omega-3 fatty acids have been linked to a wide-range of health benefits, including reduced risk of cardiovascular disease and certain cancers, healthy infant development, joint health, and improved behaviour and mood.

According to findings published in the Journal of Bone and Mineral Research, new research from NASA suggests that omega-3 may protect against bone loss during space flight. Researchers from Universities Space Research Association in Houston Led by Dr Sara Zwart looked at levels of a protein called NF-kappaB that is linked to a range of functions, including bone resorption, muscle wastage, and immune health. Data showed that NF-kappaB levels were higher in astronauts following periods of spaceflight. However, astronauts who reported higher intakes of fish, and therefore the omega-3s they contain, had lower levels of bone loss after spaceflight. These observations were supported by cell studies, said the researchers, which showed that omega-3 decreases the activation of NF-kappaB.

“We now have evidence that NF-kappaB is activated after short-duration spaceflight, and therefore inhibition of NF-kappaB activation could have many beneficial downstream effects to counteract the negative effects of spaceflight on bone, muscle, and immune function,” wrote the researchers. “Beyond muscle, bone, and immune function, the role of n-3 fatty acids in cancer prevention is currently being investigated in animal models of spaceflight radiation effects, with positive results. “Thus, there is a good possibility that something as simple as a menu change to increase fish intake might serve as a countermeasure to help mitigate risks related to bone, muscle, immune function, and potentially even radiation,” they added.

Dr. Zwart and her co-workers measured the expression of the gene that codes for NF-kappaB before and after 12-16 days on a Shuttle for 7 males and 3 females astronauts. Data showed that NF-kappaB levels increased by almost 500 per cent following short-term spaceflight.

Additional data from astronauts on longer spaceflights and stays on the Russian Mir space station were also studied. Their dietary intakes were assessed using food frequency questionnaires, and they underwent bone exams. Increased fish intakes were associated with reduced bone loss during weightlessness, said the researchers. Similar results were observed for people with extended periods of bed-rest, they added.

Dr Zwart and her co-workers called to intervention studies with dietary sources of omega-3 fatty acids to elucidate the mechanism behind the apparent bone benefits, as well as to study effects of muscle and antioxidant defences. “These data will have significant implications for future space exploration, and could benefit the general population,” they concluded.

Source: Journal of Bone and Mineral Research

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“Capacity of Omega-3 Fatty Acids or Eicosapentaenoic Acid to Counteract Weightlessness-Induced Bone Loss by Inhibiting NF-κB Activation: From Cells to Bed Rest to Astronauts”

Authors: S.R. Zwart, D. Pierson, S. Mehta, S. Gonda, S.M. Smith

## Omega-3-Rich Meals Have Blood Vessel Benefits

Increased intakes of omega-3 fatty acids may improve blood vessel health following a meal, according to a new study from the UK.

Arteries were found to be less stiff following consumption of a fatty meal supplemented with 4.7 grams of omega-3, according to findings published in *Clinical Nutrition*. "As individuals spend the majority of the day in a postprandial state, it could be predicted that these transient improvements in arterial stiffness would have beneficial effects on long term vascular health and cardiovascular risk," wrote the researchers, led by Julie Lovegrove.

The heart health benefits of consuming oily fish, and the omega-3 fatty acids they contain, are well-documented, being first reported in the early 1970s by Jorn Dyerberg and his co-workers in *The Lancet* and *The American Journal of Clinical Nutrition*. To date, the polyunsaturated fatty acids have been linked to improvements in blood lipid levels, a reduced tendency of thrombosis, blood pressure and heart rate improvements, and improved vascular function.

Dr Lovegrove and her co-workers recruited 12 healthy men and 13 healthy women and randomly fed them either a control or an omega-3 rich meal on two occasions. Results showed that consumption of omega-3 reversed the increases in arterial stiffness observed after the control meal, with the effects more pronounced in men than women.

The levels of nonesterified fatty acids (NEFA) was also observed to be significantly lower following the omega-3-rich meal, which could be due to increased production of the vasodilator nitric oxide (NO), said the researchers. Previous studies have reported that fish oil may improve the bioavailability of nitric oxide (NO) in walls of blood vessels, while high NEFA levels may reduce nitric oxide production.

"These data indicate that acute long chain omega-3 polyunsaturated fatty acid-rich meal consumption can improve postprandial arterial stiffness. This has important implications for the beneficial properties of long chain omega-3 polyunsaturated fatty acids and cardiovascular risk reduction," stated the researchers. "Further investigation with larger sample sizes matching subjects by gender and age would be required to determine the key factors contributing to postprandial responsiveness of arterial stiffness to a LC n [1]3 PUFA-rich meal for both measures of arterial stiffness," they concluded the researchers.

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"Long chain omega-3 PUFA-rich meal reduced postprandial measures of arterial stiffness"

Authors: M.F.-F. Chong, S. Lockyer, C.J. Saunders, J.A. Lovegrove

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