



## Research and Innovation Communications

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### Could a Diet High in Fish and Flax Help Prevent Broken Hips?

#### *Study Shows Omega-3 Fatty Acids in Blood Linked to Postmenopausal Bone Health*

COLUMBUS, Ohio – Higher levels of omega-3 fatty acids in the blood may reduce the risk for hip fractures in postmenopausal women, recent research suggests.

Scientists analyzed red blood cell samples from women with and without a history of having a broken hip. The study showed that higher levels of omega-3 fatty acids from both plant and fish sources in those blood cells were associated with a lower likelihood of having fractured a hip.

In addition to [omega-3s](#), the researchers looked at [omega-6 fatty acids](#), which are generally plentiful in a Western diet. The study also showed that as the ratio of omega-6 fatty acids to omega-3s increased, so did the risk for hip fracture.

Though the study did not define the mechanisms for these relationships, the researchers hypothesized that inflammation may contribute to bone resorption, the breaking down of bone caused by the release of cells called osteoclasts.

"Inflammation is associated with an increased risk of bone loss and fractures, and omega-3 fatty acids are believed to reduce inflammation. So we asked if we would see fractures decrease in response to omega-3 intake," said [Rebecca Jackson](#), the study's senior author and a professor of [endocrinology, diabetes and metabolism](#) at The Ohio State University.

"One thing that was critically important was that we didn't use self-report of food intake, because there can be errors with that. We looked directly at the exposure of the bone cell to the fatty acids, which is at the red blood cell level," said Jackson, also associate dean for clinical research in [Ohio State's College of Medicine](#). "Red blood cell levels also give

an indication of long-term exposure to these fatty acids, which we took into account in looking for a preventive effect.”

Broken hips are the most common osteoporosis-related fractures, with an estimated 350,000 occurring annually in the United States. About 20 percent of people die in the year following a hip fracture.



Tonya Orchard

The research is published in a recent issue of the [Journal of Bone and Mineral Research](#).



Rebecca Jackson

The observational study did not measure cause and effect, so the researchers say the findings are not definitive enough to suggest that taking omega-3 supplements would prevent hip fractures in postmenopausal women.

“We don’t yet know whether omega-3 supplementation would affect results for bone health or other outcomes,” said [Tonya Orchard](#), assistant professor of [human nutrition](#) at Ohio State and first author of the study. “Though it’s premature to make a nutrition recommendation based on this work, I do think this study adds a little more strength to current recommendations to include more omega-3s in the diet in the form of fish, and suggests that plant sources of omega-3 may be just as important for preventing hip fractures in women.”

Omega-3 and omega-6 fatty acids are both polyunsaturated fatty acids and essential fatty acids, meaning they contribute to biological processes but must be consumed because the body does not produce them on its own. Previous research has suggested that while both types of fatty acids are linked to health benefits, omega-3 fatty acids have anti-inflammatory properties and omega-6 fatty acids seem to have both anti- and pro-inflammatory effects.

The researchers used blood samples and hip fracture records from the [Women’s Health Initiative](#) (WHI), a large national prospective study of postmenopausal women that enrolled participants between 1993 and 1998 and followed them for 15 years. For this new work, the sample consisted of red blood cell samples and records from 324 pairs of WHI participants, half of whom had broken their hips before Aug. 15, 2008, and the other half composed of age-matched controls who had never broken a hip.

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The analysis showed that higher levels of total omega-3 fatty acids and two other specific kinds of omega-3s alone were associated with a lower risk of hip breaks in the study sample.

***preventing hip fractures in women."***

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On the other hand, women who had the highest ratio of omega-6 to omega-3 fatty acids had nearly twice the risk of hip fractures compared to women with the lowest ratios. The current typical American diet contains between 15 and 17 times more omega-6 than omega-3, a ratio that previous research has suggested should be lowered to 4-to-1, or even 2-to-1, by increasing omega-3s, to improve overall health. The primary omega-6 fatty acid in the diet is linoleic acid, which composes about 99 percent of Americans' omega-6 intake and is found in corn, soybean, safflower and sunflower oils.

The specific omega-3 sources associated with lower risk for broken hips were ALA ([alpha-linolenic acid](#)), which comes from plant sources such as flaxseed oil and some nuts, and EPA ([eicosapentaenoic acid](#)), which is found in fatty types of fish. The other marine-sourced omega-3, DHA ([docosahexaenoic acid](#)), on its own did not have a significant link to lower hip-fracture risk, "but all three omega-3s were in the protective direction," Orchard said.

Jackson, who was a vice chair of the WHI for more than a decade, said continuing analyses of data from the WHI will dig down to the genetic influences on metabolism and absorption of nutrients, and whether such genetic differences could affect health risk factors in postmenopausal women.

This work was supported by the [Ohio State University Center for Clinical and Translational Science](#) and [National Center for Advancing Translational Sciences](#). The WHI was funded by the [National Heart, Lung and Blood Institute](#).

Co-authors include Steven Ing of the Division of Endocrinology, Diabetes and Metabolism; Bo Lu of the [Division of Biostatistics](#); and Martha Belury of the Department of Human Nutrition, all at Ohio State; as well as Karen Johnson of the [University of Tennessee Health Science Center](#) and Jean Wactawski-Wende of the [State University of New York, Buffalo](#).

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Contacts: Tonya Orchard, (614) 292-7241; [Orchard.6@osu.edu](mailto:Orchard.6@osu.edu) or Rebecca Jackson, (614) 293-4041; [Jackson.20@osu.edu](mailto:Jackson.20@osu.edu)

Written by Emily Caldwell, (614) 292-8310; [Caldwell.151@osu.edu](mailto:Caldwell.151@osu.edu)



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21 E. 11th Ave. | Columbus, OH 43210-1357 | Phone: (614) 292-8457

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