

# Common Supplements Found To Lower Circulating Inflammation Levels

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Glucosamine and chondroitin are among the most commonly used non-vitamin dietary supplements in the United States. Typically used for joint pain, these supplements are often taken together as a single pill. Previous studies have suggested that may play a role in lowering inflammation, which may in turn lower risk for lung and colorectal cancer. In order to evaluate the effect of these supplements on systemic inflammation levels, Drs. Sandi Navarro, Johanna Lampe, Emily White, and colleagues in the Public Health Sciences Division conducted a randomized crossover trial. As recently reported in *PLoS One*, the researchers found that glucosamine and chondroitin supplementation lowered C-reactive protein concentrations by 23% compared to placebo.

Chronic inflammation contributes to several diseases, including several types of cancer. One of the major components of the inflammation process is nuclear factor kappa B (NF- $\kappa$ B), a transcription factor important for the generation of cytokines, chemokines, and other factors involved in the immune response. Previous studies have suggested that glucosamine and chondroitin may help reduce inflammation by inhibiting NF- $\kappa$ B and reducing oxidative stress. To further investigate this potential relationship, the authors measured the effect of glucosamine and chondroitin supplementation on several inflammatory biomarkers. These included C-reactive protein (CRP), interleukin-6 (IL-6), the soluble tumor necrosis factor receptors I and II (sTNFR1 and sTNFR2), and two urinary metabolites.

A crossover trial design was used, where each participant was randomized to receive either the supplements or the placebo, followed by a washout period of taking nothing, and then switched to the other pill. Measurements for inflammatory biomarkers were taken at each stage. "We found that glucosamine and chondroitin lowered C-reactive protein by 23% compared to an inactive pill," said lead author Dr. Sandi Navarro. None of the other biomarkers showed a significant difference. In addition to measuring inflammatory biomarker concentrations, the researchers also evaluated changes in various plasma proteins by using a 3000-antibody microarray. "When we looked at a broad range of proteins in the blood together, we found that 'cytokine activity' was the pathway with the largest difference between the glucosamine and chondroitin intervention and the inactive pill, and was lower after glucosamine and chondroitin supplementation." Alterations seen in additional

inflammation-related pathways further suggested that these supplements may have wider-ranging effects on inflammation than just NF- $\kappa$ B inhibition.

Together, these results agree with previous evidence suggesting that these supplements have anti-inflammatory properties that may lower cancer risk. "This is the first randomized trial to evaluate the effects of glucosamine and chondroitin on inflammation in healthy adults and the first to assess potential pathways that may be affected by using a broad protein screen and pathway analyses," said Dr. Navarro. "The trial was motivated by results in the VITAL study—a large prospective cohort of 77,738 adults specifically designed to evaluate the association of supplement use and cancer. Of the 38 supplements studied, the most consistent results in terms of cancer risk reduction were for use of glucosamine and chondroitin, including a 26% reduction in lung cancer risk, a 27% reduced risk of colorectal cancer, and a 13% reduced risk in cancer mortality."

Future, larger studies will be needed to further support these findings, as well as to evaluate whether these anti-inflammatory effects are seen in a broader range of individuals. In the meantime, this study suggests that these supplements could potentially be useful for more than joint pain. Said Dr. Navarro, "these results may provide a possible biologic mechanism to support our previous findings that use of glucosamine and chondroitin is associated with reduced lung and colon cancer and overall mortality."

Other researchers from the Public Health Sciences Division contributing to this project were Drs. Junghyun Rho, Xiaoling Song, and Paul Lampe, as well as Ms. Yuzheng Zhang.

Citation:

[Navarro SL, White E, Kantor ED, Zhang Y, Rho J, Song X, Milne GL, Lampe PD, Lampe JW](#). 2015. Randomized trial of glucosamine and chondroitin supplementation on inflammation and oxidative stress biomarkers and plasma proteomics profiles in healthy humans. *PLoS One*. 10(2):e0117534.

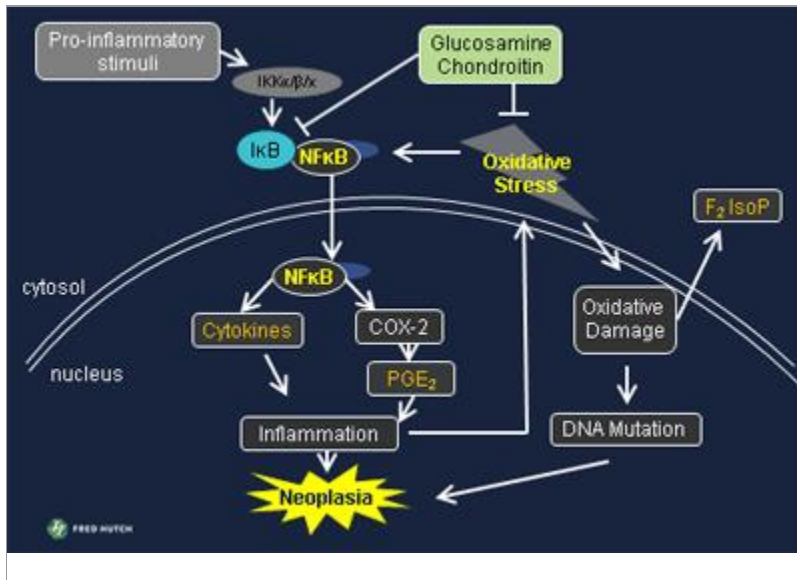


Image provided by Dr. Sandi Navarro

Hypothesized mechanism of glucosamine and chondroitin on inflammation and oxidative stress.