

Effect of saturated fatty acids and Omega-3 on the survival, growth, and progression of neoplastic cells

Volume 7 Issue 1 - 2024

Opinion

Palmitic acid is the most prevalent saturated fatty acid in the diet and is mainly found in vegetable fats such as palm oil, cottonseed oil, among others.¹ It is also found in animal fats such as milk fat, fish oils, and terrestrial animal body oils.² On the other hand, docosahexaenoic acid is found in fats from marine animals such as tuna, sardines, anchovies, and menhaden oil.¹ The consumption of fatty acids leads to metabolic disorders such as obesity, type 2 diabetes mellitus, and various types of neoplasms. These conditions result from a state of meta-inflammation, mainly due to a diet rich in saturated fatty acids.³

Conversely, a diet rich in omega-3 fatty acids is associated with a reduced risk of developing metabolic disorders, including cancer, due to the anti-inflammatory nature of this class of lipids.⁴ Saturated fatty acids stimulate pro-inflammatory responses through signaling pathways that activate the transcription factor NFκB, inducing the expression of COX-2, iNOS, and PKC, resulting in the production of prostaglandins, leukotrienes, nitric oxide, and cytokines such as TNFα, IL-1β, IL-6, and IL-8.^{3,5} They also activate NADPH oxidase, increasing the production of reactive oxygen species.³ On the other hand, omega-3 fatty acids inhibit the activation of NFκB and the production of pro-inflammatory mediators. Furthermore, their metabolism produces lipid mediators such as resolvins and protectins, which inhibit pro-inflammatory signaling pathways and induce the production of anti-inflammatory cytokines such as IL-10.^{4,5}

Cancer is an inflammatory disease, as the activation of inflammatory signaling pathways in neoplastic cells leads to the production of mediators that contribute to tumor survival and progression.⁶ High consumption of saturated fatty acids results in an increased risk of developing colorectal carcinoma and breast cancer. This effect is related to the promotion of inflammation and increased COX-2 and PGE2 in the tumor.⁷ On the other hand, studies demonstrate protective effects of omega-3 fatty acid consumption in the early stages of carcinogenesis and in the progression of colorectal cancer, related to the anti-inflammatory action of this class of lipids.⁸ However, the direct effect of saturated fatty acids and omega-3 on neoplastic cells is not well understood, and it is necessary to characterize their actions on tumor survival, growth, and progression.

Dayanne Gomes da Silva

Researcher and scientist, Federal University of Parana, Brazil

Correspondence: Dayanne Gomes da Silva, Researcher and scientist, Federal University of Parana, Brazil, Email silvadayanegome@gmail.com

Received: February 05, 2024 | **Published:** February 20, 2024

Acknowledgments

None.

Conflicts of interest

The author declare that there are no conflicts of interest.

References

1. Gunstone Frank. Blackie Scientific Business Media, *Fatty acid and lipid chemistry Dordrecht*. 1996.
2. Berdanier Carolyn D, Lynnette A Berdanier. *Advanced nutrition: macronutrients, micronutrients, and metabolism*. 3rd Edition. Boca Raton: CRC Press, 2021. pp 641.
3. Zhou H, Urso CJ, Viren J. Saturated fatty acids in obesity-associated inflammation. *J Inflamm Res*. 2020;13:1–14.
4. Dong soon IM. Omega-3 fatty acids in anti-inflammation (pro-resolution) and GPCRs. *Prog Lipid Res*. 2012;51(3):232–237.
5. Rogero M, Calder P. Obesity, Inflammation, Toll-Like Receptor 4 and Fatty Acids. *Nutrients*. 2018;10(4):432.
6. Mantovani A, Paola A, Antonio S, et al. Cancer-related inflammation. *Nature*. 2008;454(7203):436–444.
7. Othman RA. Dietary lipids and cancer. *Libyan J Med*. 2007;2(4):180–184.
8. Yum Hye W, Hye-Kyung N, Young-Joon S. Anti-inflammatory effects of docosahexaenoic acid: Implications for its cancer chemo preventive potential. *Semin Cancer Biol*. 2016;40:141–159.