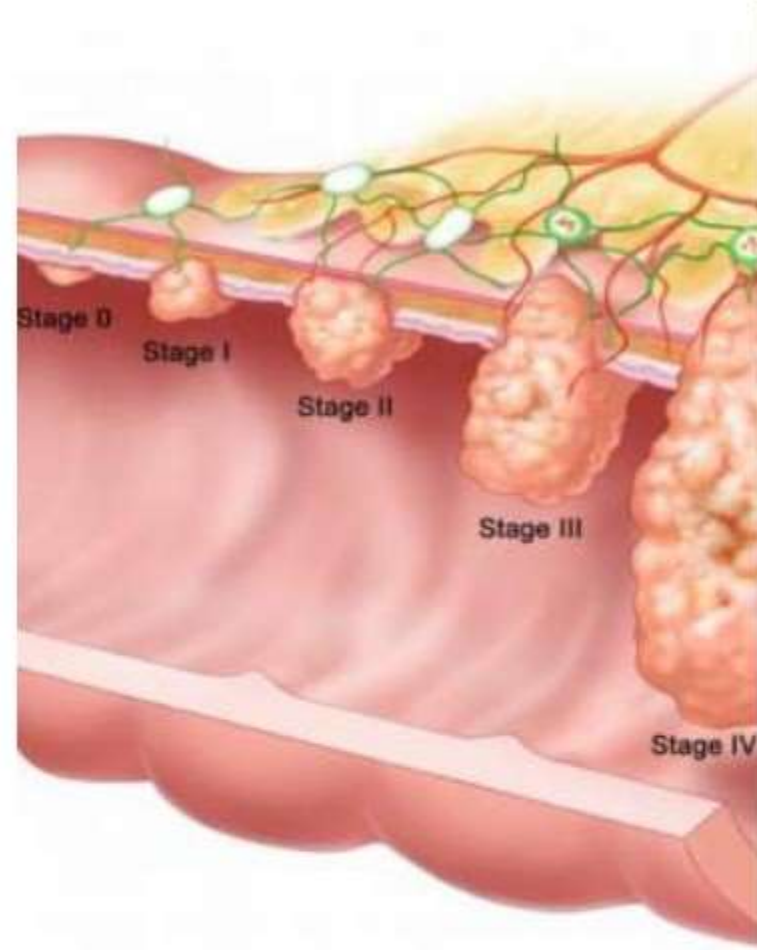


# Induction of Apoptosis by the Medium-Chain Length Fatty Acid Lauric Acid in Colon Cancer Cells due to Induction of Oxidative Stress



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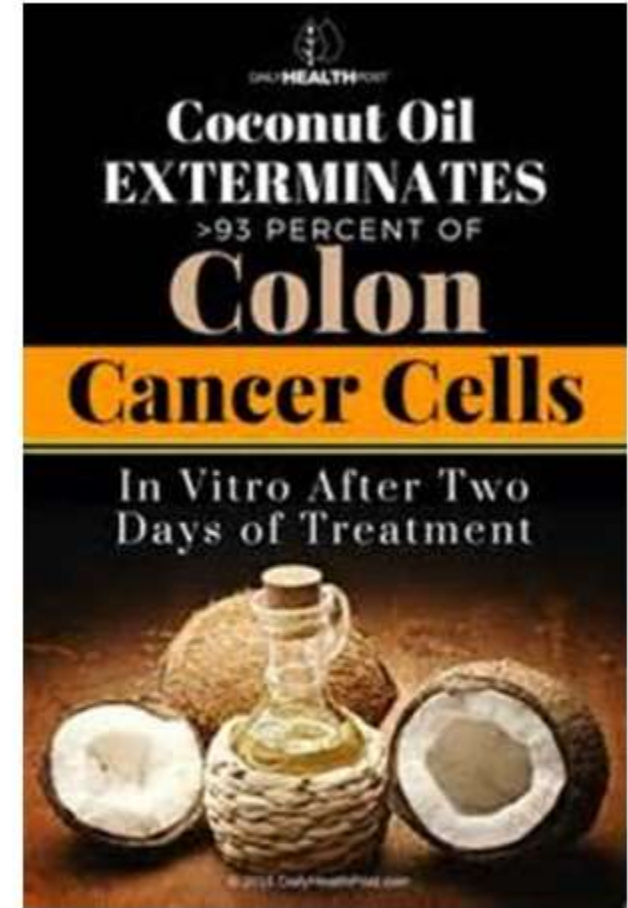
[https://www.researchgate.net/publication/259394526\\_Induction\\_of\\_Apoptosis\\_by\\_the\\_Medium-Chain\\_Length\\_Fatty\\_Acid\\_Lauric\\_Acid\\_in\\_Colon\\_Cancer\\_Cells\\_due\\_to\\_Induction\\_of\\_Oxidative\\_Stress](https://www.researchgate.net/publication/259394526_Induction_of_Apoptosis_by_the_Medium-Chain_Length_Fatty_Acid_Lauric_Acid_in_Colon_Cancer_Cells_due_to_Induction_of_Oxidative_Stress)

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## Induction of Apoptosis by the Medium-Chain Length Fatty Acid Lauric Acid in Colon Cancer Cells due to Induction of Oxidative Stress

Background: Fatty acids are classified as short-chain (SCFA), medium-chain (MCFA) or long-chain and hold promise as adjunctive chemotherapeutic agents for the treatment of colorectal cancer. The antineoplastic potential of MCFA remains underexplored; accordingly, we compared the MCFA lauric acid (C12:0) to the SCFA butyrate (C4:0) in terms of their capacity to induce apoptosis, modify glutathione (GSH) levels, generate reactive oxygen species (ROS), and modify phases of the cell cycle in Caco-2 and IEC-6 intestinal cell lines. Methods: Caco-2 and IEC-6 cells were treated with lauric acid, butyrate, or vehicle controls. Apoptosis, ROS, and cell cycle analysis were determined by flow cytometry. GSH availability was assessed by enzymology. Results: Lauric acid induced apoptosis in Caco-2 ( $p < 0.05$ ) and IEC-6 cells ( $p < 0.05$ ) compared to butyrate. In Caco-2 cells, lauric acid reduced GSH availability and generated ROS compared to butyrate ( $p < 0.05$ ). Lauric acid reduced Caco-2 and IEC-6 cells in G0/G1 and arrested cells in the S and G2/M phases. Lauric acid induced apoptosis in IEC-6 cells compared to butyrate ( $p < 0.05$ ). Butyrate protected IEC-6 cells from ROS-induced damage, whereas lauric acid induced high levels of ROS compared to butyrate. Conclusion: Compared to butyrate, lauric acid displayed preferential antineoplastic properties, including induction of apoptosis in a CRC cell line.

[https://www.researchgate.net/publication/259394526\\_Induction\\_of\\_Apoptosis\\_by\\_the\\_Medium-Chain\\_Length\\_Fatty\\_Acid\\_Lauric\\_Acid\\_in\\_Colon\\_Cancer\\_Cells\\_due\\_to\\_Induction\\_of\\_Oxidative\\_Stress](https://www.researchgate.net/publication/259394526_Induction_of_Apoptosis_by_the_Medium-Chain_Length_Fatty_Acid_Lauric_Acid_in_Colon_Cancer_Cells_due_to_Induction_of_Oxidative_Stress)



## Fatty Acids Composition of Virgin Coconut Oil

Coconut oil that is primarily saturated and contains medium chain fatty acids is definitely one of the good fats. Its 92% saturated fat content raises concern over the adverse effects it may cause on one's health. Recent discoveries however prove that coconut oil has a 62% concentration of Medium Chain Fatty acids (MCFAs). This is coconut oil's unique characteristic that is not present in other saturated fat. It may even be healthier than most saturated oils. Unsaturated fat have a high concentration of long chain fatty acids unlike MCFAs which are easily absorbed by the body as it require less energy and fewer enzymes, thereby improving digestion.

Short and medium chain fatty acids are transported directly to the liver where they are immediately converted to energy. Modern researches also discovered that MCFA can prevent and heal a lot of sickness because of its antimicrobial properties. Aside from its ability to improve the immune system, MCFA also aids in the absorption and retention of magnesium, calcium and some amino acids.

Beneficial MCFAs that are present in virgin coconut oil include Caproic Acid, Caprylic Acid, Capric Acid and Lauric Acid and Myristic Acid. Consuming MCFAs has shown no negative toxicological or pharmacological side effects. Virgin coconut oil and human breast milk are the richest source of medium chain fatty acids. Below is a table of the fatty acid composition of virgin coconut oil (ND means non-detectable). <http://www.thevirgincoconutoil.com/articleitem.php?articleid=163>

<i>Common Name Composition Percentage (%)</i>	<i>Composition</i>	<i>Percentage (%)</i>
Caproic acid	C 6:0	ND - 0.7
Caprylic acid	C 8:0	4.6 - 10.0
Capric acid	C 10:0	5.0 - 8.0
Lauric acid	C 12:0	45.1 - 53.2
Myristic acid	C 14:0	16.8 - 21
Palmitic acid	C 16:0	7.5 - 10.2
Palmitoleic acid	C 16:1	ND
Stearic acid	C 18:0	2.0 - 4.0
Oleic acid	C 18:1	5.0 - 10.0
Linoleic acid	C 18:2	1.0 - 2.5
Linolenic acid	C 18:3	ND - 0.2
	C 24:	ND

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