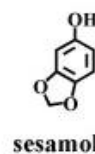
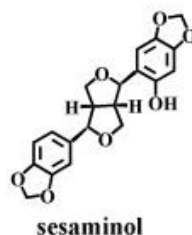
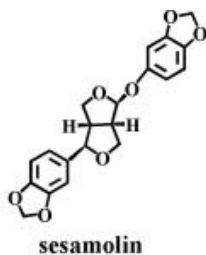
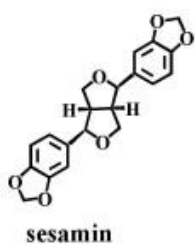


營養資訊分享

芝麻木酚素功效

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芝麻最早種植於 4000 年前，是最古老的產油作物之一 (Bedigian & Harlan, 1986)。芝麻在全球的年總產量約為 5,532,000 公噸，其中 50% 來自亞洲，30% 來自非洲 (Myint et al., 2020)。芝麻含有 50% 的油脂和 25% 的蛋白質，其餘是碳水化合物、水分、纖維和礦物質。大多數的芝麻木酚素 (sesame lignans)，包括芝麻素 (sesamin)、芝麻林素 (sesamolin)、芝麻酚 (sesamol) 和芝麻醇 (sesaminol) 都存在於芝麻和油中 (Moazzami & Kamal, 2006; Pathak et al., 2015)。Sesamolin 是芝麻中含量僅次於 sesamin 的木酚素，並且它的結構和 sesamin 相似 (Michailidis et al., 2019)。



一. 抗氧化

Sesamin 和 sesamolin 具有兩個亞甲二氧基橋，其潛在著 4 個功能性羥基 (OH)，使得 sesamin 和 sesamolin 清除活性氧 (reactive oxygen species, ROS) 的能力優於具有 2 個羥基的 sesamol。(Jeng & Hou, 2005)。芝麻木酚素透過調節氧化酶，如超氧化物歧化酶 (superoxide dismutase, SOD)、穀胱甘肽 (glutathione, GSH)、穀胱甘肽過氧化酶 (glutathione peroxidase, GPx) 和過氧化氫酶 (catalase, CAT) 的濃度，以及減少氧化因子，如硫代巴比妥酸反應物 (thiobarbituric acid reactive substance, TBARS) 和丙二醛 (malondialdehyde, MDA)、脂質過氧化和超氧化物的生成，來降低 ROS 和發揮其抗氧化作用 (Hadipour et al., 2023)。

二. 抗發炎

芝麻的抗發炎作用似乎是因為減少了促炎細胞激素，包含 interleukin 1 α (IL-1 α)，IL-1 β ，IL-6，和 TNF- α 。研究說明，芝麻酚和芝麻林素 (sesamol 和 sesamolin)，透過抑制 COX-2 而具有抗炎作用 (Hadipour et al., 2023)。

三. 抗高血脂

Sesamin 透過活化 peroxisome proliferator-activated receptors (PPAR) 誘導肝臟中的脂質氧化。此外，透過減少 SREBP-1 轉錄因子來降低肝臟脂肪生成酶的基因表現 (Ide et al., 2003; Majdalawieh et al., 2020)。Sesamin 還阻止了 *n*-6 脂肪酸的 delta-去飽和，抑制了 HMG-

CoA 還原酶和肝臟脂肪酸合成的表現，並減少了血漿膽固醇、三酸甘油脂和低密度脂蛋白的量。提出的機制是透過增加 ATP-binding cassette subfamily G members 5 (ABCG5)、ATP-binding cassette subfamily G members 8 (ABCG8) 的基因表現來增加肝臟中膽固醇的膽汁排泄，並透過降低脂蛋白 A4 的基因表現減少脂蛋白 B 的分泌 (Rogi et al., 2011)。芝麻似乎透過上述可能的機制對抗血脂異常 (Hadipour et al., 2023)。

四. 抗高血壓

芝麻可能顯示出更高的高血壓保護作用，因為多元不飽和脂肪酸含量高、抗氧化特性和木酚素中的 sesamin (Vennila, 2017)。Sesamin 增加了 nitrous oxide (NO) 的生合成，而 NO 是血管舒張的因素之一。此外，還提高了 SIRT3 的磷酸化，SIRT3 在降低細胞 ROS 濃度中起到關鍵作用，並最終抑制 NF- κ B、MEK-ERK1/2 和 smad2 信號路徑 (Hadipour et al., 2023)。

五. 抗血栓

研究表明，口服或動脈注射 sesamin 和 sesamol 12 週，對氮氣雷射引起的小鼠頸動脈血栓形成具有抗血栓形成作用 (Kinugasa et al., 2011)。由於多元不飽和脂肪酸含量高，芝麻油具有刺激抗凝血劑，減少血栓的潛力 (Jonnalagadda et al., 1996)。

經多篇研究證實，芝麻木酚素對人體健康有多種有益作用，包括神經保護、抑制肝腎的脂質過氧化、抑制大腸直腸癌細胞增生和誘導凋亡、調節脂質代謝、抑制黑色素生成、增強 NK 細胞裂解活性 (Kushiro et al., 2002; Michailidis et al., 2019; Rosalina and Weerapreeyakul, 2021; Wu et al., 2019)、抗高血壓作用 (Nakano et al., 2007) 和降低膽固醇 (Visavadiya & Narasimhacharya, 2008)。然而，目前對於 sesamol 的研究尚需更進一步的研究。

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