

## Anti-Atherosclerotic Activity of $\alpha$ -Pinene in High-Fat Diet-Induced Atherosclerosis Rat Model Via Hypolipemic, Antioxidant, and Anti-Inflammatory Activities

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**SUMMARY.** The aim of the present study was to determine the anti-atherosclerotic effect of  $\alpha$ -pinene against high-fat diet (HFD)-induced atherosclerotic alterations in male Wistar rats. For 28 days, HFD was utilized to cause AS. Six rats were separated into four groups. Group I was the control. Group II was composed of  $\alpha$ -pinene. Group III represents 28 days of atherosclerosis treatment with a high-fat diet. Group IV is administered a high-fat meal plus  $\alpha$ -pinene (50 mg/kg, orally). Compared to the HFD-induced AS group,  $\alpha$ -pinene dramatically improved the cardiac-related indicators and lipid profile. In addition,  $\alpha$ -pinene dramatically improved the antioxidant state and decreased the levels of inflammatory markers. The lipid-regulating genes acetyl-CoA carboxylase (ACC), sterol-regulatory-element-binding protein-c (SREBP-c), and fatty acid synthase (FAS) are dramatically downregulated by  $\alpha$ -pinene in HFD-induced AS rats. Experimental investigations indicate that  $\alpha$ -pinene can slow the progression of AS by enhancing the lipid profile, restoring antioxidant capabilities, reducing the production of proinflammatory cytokines, and regulating lipid metabolism.

**RESUMEN.** El objetivo del presente estudio fue determinar el efecto antiaterosclerótico del  $\alpha$ -pineno contra las alteraciones ateroscleróticas inducidas por una dieta rica en grasas (HFD) en ratas Wistar macho. Durante 28 días, se utilizó HFD para causar AS. Seis ratas se separaron en cuatro grupos. El grupo I fue el control. El grupo II estaba compuesto por  $\alpha$ -pineno. El grupo III representa 28 días de tratamiento de aterosclerosis con una dieta rica en grasas. Al grupo IV se le administra una comida rica en grasas más  $\alpha$ -pineno (50 mg/kg, por vía oral). En comparación con el grupo AS inducido por HFD, el  $\alpha$ -pineno mejoró drásticamente los indicadores relacionados con el corazón y el perfil de lípidos. Además, el  $\alpha$ -pineno mejoró drásticamente el estado antioxidante y disminuyó los niveles de marcadores inflamatorios. Los genes reguladores de lípidos acetil-CoA carboxilasa (ACC), la proteína-c de unión al elemento regulador de esteroides (SREBP-c) y la sintasa de ácidos grasos (FAS) están dramáticamente regulados a la baja por el  $\alpha$ -pineno en ratas AS inducidas por HFD. Las investigaciones experimentales indican que el  $\alpha$ -pineno puede retrasar la progresión de la EA al mejorar el perfil de lípidos, restaurar las capacidades antioxidantes, reducir la producción de citocinas proinflamatorias y regular el metabolismo de los lípidos.

**KEY WORDS:** atherosclerosis, high-fat diet, lipid metabolism, lipid profile,  $\alpha$ -pinene.

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