The effect of undecanones and their derivatives on tumor angiogenesis and VEGF content

J. Gibka¹, A. Wasiutyński², E. Skopińska-Różewska², A.K. Siwicki³, J. Chorostowska-Wynimko⁴, E. Sommer², M. Mazurkiewicz², M. Gliński⁵, H. Skurzak⁶, R. Wójcik³, L. Jung⁷

¹ Institute of General Food Chemistry, Technical University of Łódź, Stefanowskiego 4/10, 90-924 Łódź, Poland
² Department of Pathology, Biostructure Center, Medical University of Warsaw, Chałubińskiego 5, 02-004 Warsaw, Poland
³ Department of Microbiology and Clinical Immunology, University of Warmia and Mazury, Oczapowskiego 12, 10-719 Olsztyn, Poland
⁴ Laboratory of Molecular Diagnostics and Immunology, National Institute of Tuberculosis and Lung Diseases, Plocka 26, 01-138 Warsaw, Poland
⁵ Faculty of Chemistry, Warsaw Technical University, Noakowskiego 3, 00-664 Warsaw, Poland
⁶ Department of Immunology, Cancer Center, Roentgena 5, 02-781 Warsaw, Poland
⁷ Comprehensive Rehabilitation Center, Gąsiorowskiego 12/14, 05-510, Konstancin-Jeziorna, Poland

Abstract

The in vivo effects of some derivatives of aliphatic ketones (2-undecanone, 3-undecanone, 4-undecanone and their derivatives) on L-1 sarcoma tumor angiogenesis and VEGF content were studied in Balb/c mice. Mice that inhaled 10% solution of 3-undecanone(3-on) or 1% solution of 2-undecanone propylene acetal (Acpr2) for 3 days after tumor cells implantation, presented lower neovascular response measured by tumor-induced cutaneous angiogenesis test (TIA) and lower tumor VEGF content in 5-days tumors, than non-inhaled controls. Other substances presented various effects on tumor VEGF concentration and angiogenesis. Histological examination of lesions collected from mice inhaled Acpr2, or non-inhaled controls, revealed small diffused areas of necrosis in the former group. In both groups, slight to moderate inflammatory infiltrations were seen at the tumor’s margin. In Acpr2 group, there were less small blood vessels at tumor’s margin than in the control group.

Key words: undecan-x-ones, tumors, mice, angiogenesis, VEGF

Introduction

Aliphatic methyl ketones are products of metabolic transformation of fatty acids.

2-undecanone(methyl nonyl ketone) and its derivative undecan-2-ol, are often used as flavoring agents in cosmetics and food industries, according to decisions of FAO/WHO Expert Committee on Food Additives and the EU/Animal food regulations. 2-undecanone was granted GRAS status by FEMA (1965) and is approved by the FDA for food use (21 CFR 121.1164). The Council of Europe (1974) included methyl nonyl ketone at a level of 3 ppm in the list of artificial flavoring substances that may be added to decisions of FAO/WHO Expert Committee on Food Additives and the EU/Animal food regulations. 2-undecanone was granted GRAS status by FEMA (1965) and is approved by the FDA for food use (21 CFR 121.1164). The Council of Europe (1974) included methyl nonyl ketone at a level of 3 ppm in the list of artificial flavoring substances that may be added to

Correspondence to: E. Skopińska-Różewska ewaskop@hotmail.com