PPAR agonists identified in extracts of elderflowers (Sambucus nigra) by bioassay-guided fractionation

Christensen, Kathrine Bisgaard; Grevsen, Kai; Petersen, Rasmus Koefoed; Kristiansen, Karsten; Christensen, Lars Porskjaer

Published in:
Planta Medica

DOI:
10.1055/s-0028-1084145

Publication date:
2008

Document version
Publisher's PDF, also known as Version of record

Citation for published version (APA):

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Take down policy
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Download date: 18. feb. 2019
PPARγ agonists identified in extracts of elderflowers (Sambucus nigra) by bioassay-guided fractionation

Kathrine B. Christensen1, Kai Grevsen2, Rasmus K. Petersen3, Karsten Kristiansen4, and Lars P. Christensen5
E-mail: kathrine.bisgaard@agrsci.dk

Dept. of Food Science1 & Dept. of Horticulture3, University of Aarhus, Kirstinebjergvej 10, DK-5792 Aarslev
BioLigand2 ApS and Dept. of Biochemistry & Molecular Biology4, University of Southern Denmark,
Campusvej 55, DK-5230 Odense M
Inst. of Chem. Engineering, Biotechnology & Environmental Technology5, University of Southern Denmark,
Niels Bohr Allé 1, DK-5230 Odense M

Background

Black elder (Sambucus nigra L.) have been used traditionally to treat various diseases such as colds, influenza, inflammation, and diabetes. Most studies on the health-promoting effects of black elder have been performed on elderberries, although elderflowers also produce many potential bioactive metabolites such as flavonoids and phenolic acids. It has been found that aqueous extracts of elderflowers exhibit insulin-like and insulin-releasing actions in vitro. The bioactive metabolites were not identified and major elderflower metabolites such as quercetin-3-O-rutinoside, lupeol, and β-sitosterol did not individually stimulate insulin secretion [1].

In this study 3 kg of elderflowers (cv. Haschberg) was macerated and extracted twice overnight with methanol. The dried extract was separated by RP flash CC to give 12 fractions. Fractions B+C contained phenolic acids, primarily 3-, 4-, and 5-O-caffeoylquinic acid. Fractions D-H contained mostly the phenolics quercetin 3-O-rutinoside, kaempferol 3-O-rutinoside, isorhamnetin 3-O-rutinoside, and 1,5-di-O-caffeoylquinic acid. In fractions I+J the flavanone naringenin was the major constituent. Fractions K and L were dominated by α-linolenic acid and linoleic acid. All metabolites were purified by RP semi-preparative HPLC and identified by HPLC-DAD, LC-MS, and standard addition.

Bioactivity and perspectives

Bioassay-guided chromatographic fractionation of the elderflower extract yielded four bioactive fractions (marked with pink) and the major metabolites in these were naringenin, α-linolenic acid, and linoleic acid. Bioactivity was assessed using a PPARγ transactivation assay and results obtained are shown to the left for the four fractions I, J, K, and L. Rosiglitazone (1 μM) was used as positive control and the results are given as fold activation when DMSO is set to 1. Fatty acids are well-known activators of PPARγ, but naringenin is not and will have to be further tested to establish its potential as an anti-diabetic compound.

Large differences in the content of the active compounds and other metabolites was found among elderflower varieties. This indicates the importance of choosing the optimal elder variety in order to develop effective functional foods/herbal products for prevention/treatment of type 2 diabetes.

References: