Activity of Essential Oils and Individual Components against Acetyl- and Butyrylcholinesterase

Ilkay Orhan\textsuperscript{a,*}, Murat Kartal\textsuperscript{b}, Yüksel Kan\textsuperscript{c}, and Bilge Şener\textsuperscript{a}

\textsuperscript{a} Department of Pharmacognosy, Faculty of Pharmacy, Gazi University, 06330 Ankara, Turkey. E-mail: iorhan@gazi.edu.tr
\textsuperscript{b} Department of Pharmacognosy, Faculty of Pharmacy, Ankara University, 06100 Ankara, Turkey
\textsuperscript{c} Department of Field Crops, Faculty of Agriculture, Selcuk University, 42070 Konya, Turkey

\* Author for correspondence and reprint requests

Z. Naturforsch. 63c, 547–553 (2008); received February 18, 2008

We have tested acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) inhibitory activities of nineteen essential oils obtained from cultivated plants, namely one from \textit{Anethum graveolens} L. (organic fertilizer), two from \textit{Foeniculum vulgare} Mill. collected at fully-mature and flowering stages (organic fertilizer), two from \textit{Melissa officinalis} L. (cultivated using organic and chemical fertilizers), two from \textit{Mentha piperita} L. and \textit{M. spicata} L. (organic fertilizer), two from \textit{Lavandula officinalis} Chaix ex Villars (cultivated using organic and chemical fertilizers), two from \textit{Ocimum basilicum} L. (green and purple-leaf varieties cultivated using only organic fertilizer), four from \textit{Origanum onites} L., \textit{O. vulgare} L., \textit{O. munitiflorum} Hausskn., and \textit{O. majorana} L. (cultivated using organic fertilizer), two from \textit{Salvia sclarea} L. (organic and chemical fertilizers), one from \textit{S. officinalis} L. (organic fertilizer), and one from \textit{Satureja cuneifolia} Ten. (organic fertilizer) by a spectrophotometric method of Ellman using ELISA microplate-reader at 1 mg/ml concentration. In addition, a number of single components widely encountered in most of the essential oils \[\gamma\text{-terpinene, 4-allyl anisole, (\text{-})-carvone, dihydrocarvone, (\text{-})-phenone, cuminyl alcohol, cumol, 4-isopropyl benzaldehyde, \textit{trans}-anethole, camphene, \textit{iso}-borneol, (\text{-})-borneol, 1-bornyl acetate, 2-decanol, 2-heptanol, methyl-heptanol, farnesol, nerol, \textit{iso}-pulegol, 1,8-cineole, citral, citronellal, citronellol, geraniol, linalool, \alpha\text{-pinene, \beta\text{-pinene, piperitone, iso}-menthone, menthofuran, linalyl oxide, linalyl ester, geranyl ester, carvacrol, thymol, menthol, vanilline, and eugenol\] was also screened for the same activity in the same manner. Almost all of the essential oils showed a very high inhibitory activity (over 80\%) against both enzymes, whereas the single components were not as active as the essential oils.

\textit{Key words:} Essential Oil, Anticholinesterase, Monoterpenes, Alzheimer’s Disease