A217 A comparison of the antiviral activity of tea tree oil, citrus oil and ginger oil against *Herpes simplex* type 1

Christine Koch [a], *Jürgen Reichling* [a] *and Paul Schnitzler* [b]
[a] Institute of Pharmaceutical Biology, [b] Department of Virology, Hygiene Institut, University of Heidelberg, INF 364, 69120 Heidelberg, Germany.

Herpes simplex virus type 1 causes very common infections in man producing recurrent epidermal lesions especially in and around the oral cavity. Several drugs are available for the treatment of HSV-1 infections, such as acyclovir. Acyclovir is an extremely effective drug when it is given orally or intravenously, rather than applicated topically. In anecdotal descriptions essential oils are praised as a potent antiviral agent, but experimental data or clinical studies are very rare. In the present study, three essential oils tea tree oil (TTO), citrus oil and ginger oil were compared for their antiviral activity. First of all, we determined cytotoxicity of the different oils in a standard neutral red dye uptake assay. For RC-37 cells (African green monkey kidney) toxicity approached 50% (TC_{50}) at concentrations of 0,006% for TTO, 0,0045% for citrus oil and 0,004% for ginger oil, respectively. The antiviral activity was evaluated by a plaque reduction assay. The 50% inhibitory concentration (IC_{50}) was for TTO, citrus oil and ginger oil 0,0009%, 0,0015% and 0,0002%, respectively. In earlier studies best results were obtained when HSV-1 was treated prior to absorption (1). At maximum noncytotoxic concentrations of TTO plaque formation was reduced by 98,2%. Noncytotoxic concentrations of citrus oil and ginger oil reduced virus titers by 87,6% and 56,6%, respectively. Virus titers were reduced significantly by TTO and citrus oil, whereas ginger oil showed distinct effects but had less antiviral activity. The essential oils tested exhibited significant antiviral activities in different concentrations. Further investigations are needed to show whether the antiviral activity of selected essential oils correlate with their chemical compositions.

References: 1. Schnitzler, P. et al. (2001) Pharmazie 56: 4.

A218 Flavonol glycosides from *Thevetia peruviana* and their HIV-1 integrase (IN) inhibitory activities

S. Tewtrakul [a,b], *N. Nakamura* [b], *M. Hattori* [b], *T. Fujiwara* [c] *and T. Supavita* [a]
[a] Department of Pharmacognosy and Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Prince of Songkla University, Songkhla, Thailand. [b] Department of Metabolic Engineering, Institute of Natural Medicine, Toyama Medical and Pharmaceutical University, Toyama, Japan. [c] Shionogi Institute for Medical Science, 2-5-1, Mishima, Settsu-shi, Osaka, Japan.

Thevetia peruviana Schum. is an evergreen flowering shrub belonging to the Apocynaceae family. It grows widely throughout tropical and subtropical regions. The leaves have been reported to contain iridoid glycosides, flavonoids, triterpenes, monoterpenes and cardiac glycosides (1,2). The ethanol extract of dried leaves of this plant showed high anti-HIV-1 IN activity with IC_{50} value of 12.0 µg/ml. Of this extract, fourteen compounds were isolated, two iridoids (**1, 2**), two new flavanone glucosides (**3, 4**) and ten flavonol glycosides (**5-14**). As regards HIV-1 IN inhibitory activity, compound **9** (IC_{50} = 5 µM) exhibited the highest inhibitory activity, followed by compounds **7**, **8**, **10**, **14**, **11** and **6** with IC_{50} values of 7, 30, 31, 43, 45 and 59 µM, respectively. It was indicated that compounds containing a feruloyl or a sinapoyl group showed potent inhibitory activity against HIV-1 IN. The method to detect anti-HIV-1 IN activity is called MIA (the multiplate integration assay). This method is used to detect the incorporation of digoxigenin-labelled target DNA into long terminal repeat (LTR) donor DNA.

Acknowledgements: Department of Pharmacognosy and Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Prince of Songkla University.

References: 1. Abe, F. et al. (1995) Phytochemistry. 40, 577-581. **2.** Abe, F. et al. (1994) Phytochemistry. 37, 1429-1432.