



London, 4 September 2008
Doc. Ref. EMEA/HMPC/332366/2008

COMMITTEE ON HERBAL MEDICINAL PRODUCTS (HMPC)

LIST OF REFERENCES FOR ASSESSMENT OF:

Echinaceae pallidae radix
***Echinacea pallida* Nutt., radix**
(pale coneflower root)

The EMEA acknowledges that copies of the underlying works used to produce this monograph were provided for research only with exclusion of any commercial purpose.

Articles marked by asterisk (*) were available to the rapporteur only in the form of abstract.

Barnes J, Anderson, LA, Gibbons S, Phillipson JD (2005). Echinacea species (*Echinacea angustifolia* (DC.) Hell., *Echinacea pallida* (Nutt.) Nutt., *Echinacea purpurea* (L.) Moench): A review of their chemistry, pharmacology and clinical properties. *J Pharm Pharmacol* 57: 929-954.

Barnes J, Anderson LA, Phillipson JD (2007). *Echinacea*. In: *Herbal Medicines*, 3rd ed., Pharmaceutical Press, London, UK: 217-236.

Bauer R, Khan IA, Wagner H (1988a). TLC and HPLC Analysis of *Echinacea pallida* and *E. angustifolia* Roots. *Planta Med* 54: 426-430.

Bauer R, Jurcic K, Puhmann J, Wagner H. (1988b) Immunologische *In-vivo* und *In-vitro*-Untersuchungen mit *Echinacea*-Extrakten. *Arzneim-Forsch/Drug Res* 38: 276-281.

Bauer R, Remiger P (1989). TLC and HPLC Analysis of Alkamides in Echinacea Drugs. *Planta Med.* 1989 55: 367-371.

Beuscher N, Bodinet C, Willigmann I, Egert D (1995). Immunomodulierende Eigenschaften von Wurzelextrakten verschiedener *Echinacea*-Arten. *Z Phytother* 16: 157-166.

Binns SE, Purgina B, Bergeron C, Smith ML, Ball L, Baum BR, Arnason JT (2000). Light-mediated antifungal activity of *Echinacea* extracts. *Planta Med* 66: 241-244.

Binns SE, Hudson J, Merali S, Arnason JT (2002). Antiviral activity of characterized extracts from echinacea spp. (Heliantheae: Asteraceae) against herpes simplex virus (HSV-I). *Planta Med* 68: 780-783.

Bodinet K (1999). Immunopharmakologische Untersuchungen an einem pflanzlichen Immunomodulator [Dissertation]. Ernst-Moritz-Arndt-Universität, Greifswald, Germany.

- Bräunig B, Knick E (1993). Therapeutische Erfahrungen mit *Echinacea pallida* bei grippalen Infekten. *Naturheilpraxis* 46: 72-75.*
- Bradley P (2006). *Echinacea*. In: *British Herbal Compendium*, Vol. 2., British Herbal Medicine Association, Bournemouth, UK: 129-141.
- Cheminat A, Zawatzky R, Becker H, Brouillard R (1988). Caffeoyl conjugates from *Echinacea* species: structures and biological activity. *Phytochemistry* 27: 2787-2794.
- Chen Y, Fu T, Tao T, Yang J, Chang Y, Wang M, Kim L, Qu L, Cassady J, Scalzo R, Wang X (2005). Macrophage Activating Effects of New Alkamides from the Roots of *Echinacea* Species. *J Nat Prod* 68: 773-776.
- Chicca A, Adinolfi B, Martinotti E, Fogli S, Breschi MC, Pellati F, Benvenuti S, Nieri P (2007). Cytotoxic effects of *Echinacea* root hexanic extracts on human cancer cell lines. *J Ethnopharmacol* 110: 148-153.
- Chicca A, Pellati F, Adinolfi B, Matthias A, Massarelli I, Benvenuti S, Martinotti E, Bianucci AM, Bone K, Lehmann R, Nieri P (2008). Cytotoxic activity of polyacetylenes and polyenes isolated from roots of *Echinacea pallida*. *Br J Pharmacol* 153: 879-885.
- Classen B, Thude S, Blaschek W, Wack M, Bodinet C (2006). Immunomodulatory effects of arabinogalactan-proteins from *Baptisia* and *Echinacea*. *Phytomedicine* 13: 688-694.
- Council of Europe (2008). Pale Coneflower Root. In: *European Pharmacopoeia*, 6.0., Vol. 2, European Directorate for the Quality of Medicines, Strasbourg, France: 2602-2604.
- Dorn M, Knick E, Lewith G (1997). Placebo-controlled, double-blind study of *Echinaceae pallidae* radix in upper respiratory tract infections. *Complement Ther Med* 5: 40-42.
- European Scientific Cooperative On Phytotherapy (ESCOP) (2003). *Echinaceae pallidae* radix. In: *ESCOP Monographs*, 2nd ed., Thieme, New York, NY, USA: 126-128.
- Gallo M, Sarkar M, Au W, Pietrzak K, Comas B, Smith M, Jaeger TV, Einarson A, Koren G (2000). Pregnancy outcome following gestational exposure to *Echinacea*: a prospective controlled study. *Arch Intern Med* 160(20): 3141-3143.
- German Commission E Monograph (1999). *Echinaceae pallidae* radix. Deutscher apotheker Verlag, Stuttgart, Germany.
- Henneicke-von Zepelin H, Hentschel C, Schnitker J, Kohnen R, Köhler G, Wüstenberg P (1999). Efficacy and safety of a fixed combination phytomedicine in the treatment of the common cold (acute viral respiratory tract infection): results of a randomised, double blind, placebo controlled, multicentre study. *Curr Med Res Opin* 15: 214-227.
- Hu C, Kitts DD (2000). Studies on the antioxidant activity of *Echinacea* root extract. *J Agric Food Chem* 48: 1466-72.
- LaLone CA, Hammer KD, Wu L, Bae J, Leyva N, Liu Y, Solco AK, Kraus GA, Murphy PA, Wurtele ES, Kim OK, Seo KI, Widrechner MP, Birt DF (2007). *Echinacea* species and alkamides inhibit prostaglandin E(2) production in RAW264.7 mouse macrophage cells. *J Agric Food Chem* 55: 7314-7322.
- Liersch R, Bauer R (1993). *Echinacea*. In: *Hagers Buch der Pharmazeutischen Praxis*, 5th ed., Vol. 5: Drogen E-O, Springer-Verlag, Berlin, Germany: 1-34.

Linde K, Barret B, Bauer R, Melchart D, Woelkart K (2006). *Echinacea* for preventing and treating the common cold. Cochrane Database of Systematic Reviews, Issue 1, In: The Cochrane Library 2008, Issue 3, John Wiley & Sons, Ltd., Chichester, UK: 1-88.

Maffei Facino R, Carini M, Aldini G, Saibene L, Pietta P, Mauri P (1995). Echinacoside and caffeoyl conjugates protect collagen from free radical-induced degradation: a potential use of *Echinacea* extracts in the prevention of skin photodamage. *Planta Med* 61: 510-514.

Melchart D, Linde K., Worku F, Bauer R, Wagner H (1994). Immunomodulation with *Echinacea*. A systematic review of controlled clinical trials. *Phytomed* 1: 245-254.

Merali S, Binns S, Paulin-Levasseur M, Ficker C, Smith M, Baum B, Brovelli E, Arnason JT. (2003) Antifungal and Anti-inflammatory Activity of the Genus *Echinacea*. *Pharmaceutical Biology* 41: 412-420.

Pellati F, Benvenuti S, Magro L, Melegari M, Soragni F (2004). Analysis of phenolic compounds and radical scavenging activity of *Echinacea* spp. *J Pharm Biomed Anal* 35: 289-301.

Pellati F, Calò S, Benvenuti S, Adinolfi B, Nieri P, Melegari M (2007). Isolation and structure elucidation of cytotoxic polyacetylenes and polyenes from *Echinacea pallida*. *Phytochemistry* 67: 1359-1364.

Perri D, Dugoua JJ, Mills E, Koren G. (2006) Safety and efficacy of *Echinacea* (*Echinacea angustifolia*, *E. purpurea* and *E. pallida*) during pregnancy and lactation. *Can J Clin Pharmacol*. 13(3): 262-267.

Romiti N, Pellati F, Nieri P, Benvenuti S, Adinolfi B, Chieli E. P-Glycoprotein inhibitory activity of lipophilic constituents of *Echinacea pallida* roots in a human proximal tubular cell line. *Planta Med* 74: 264-266.

Rusu MA, Tamas M, Puica C, Roman I, Sabadas M (2005). The hepatoprotective action of ten herbal extracts in CCl₄ intoxicated liver. *Phytother Res* 19: 744-749.

Senchina DS, Wu L, Flinn GN, Konopka del N, McCoy JA, Widrechner MP, Wurtele ES, Kohut ML (2006). Year-and-a-half old, dried *Echinacea* roots retain cytokine-modulating capabilities in an in vitro human older adult model of influenza vaccination. *Planta Med* 72: 1207-1215.

Sloley BD, Urchuk LJ, Tywin C, Coutts RT, Pang PK, Shan JJ (2001). Comparison of chemical components and antioxidants capacity of different *Echinacea* species. *J Pharm Pharmacol* 53: 849-857.

Speroni E, Govoni P, Guizzardi S, Renzulli C, Guerra MC. Anti-inflammatory and cicatrizing activity of *Echinacea pallida* Nutt. root extract. *J Ethnopharmacol* 79: 265-272.

Stoll A, Renz J, Brack A (1950). Isolierung und Konstitution des Echinacosids, eines Glykosids aus den Wurzeln von *Echinacea angustifolia*. *D.C. Helv Chim Acta* 33: 1877-1893.

Thom E, Wollan T (1997). A controlled clinical study of Kanjang mixture in the treatment of uncomplicated upper respiratory tract infections. *Phytother Res* 11: 207-210.

Turner RB, Riker DK, Gangemi JD (2000). Ineffectiveness of echinacea for prevention of experimental rhinovirus colds. *Antimicrob Agents Chemother* 44: 1708-1709.

Voaden DJ, Jacobson M (1972). Tumor Inhibitors. 3. Identification and Synthesis of an Oncolytic Hydrocarbon from American Coneflower Roots. *J Med Chem* 15: 619-623.

WHO (1999). Radix echinaceae. In: WHO monographs on selected medicinal plants, Vol. 1, WHO Geneva 1999, Switzerland: 128-135.

Willuhn G (2002). Echinaceae pallidae radix. In: teedrogen und Phytofarmaka, 4th ed., Wissenschaftliche Verlagsgesellschaft, Stuttgart, Germany: 183-186.

Wolters Kluwer Health (2004). *Echinacea*. In: The Review of Natural Products, Wolters Kluwer Health, St. Luis, MO, USA.

Zhai Z, Liu Y, Wu L, Senchina DS, Wurtele ES, Murphy PA, Kohut ML, Cunnick JE (2007a). Enhancement of innate and adaptive immune functions by multiple *Echinacea* species. J Med Food 10: 423-434.

Zhai Z, Haney D, Wu L, Solco A, Murphy PA, Wurtele ES, Kohut ML, Cunnick JE (2007b). Alcohol extracts of *Echinacea* inhibit production of nitric oxide and tumor necrosis factor-alpha by macrophages *in vitro*. Food Agric Immunol 18: 221-236.