USANA Technical Bulletin

Licorice Root Powdered Extract

Technical Background

- Licorice root (*Glycyrriza glabra*) has a long history of use in Chinese medicine, where it is known as the "great harmonizer." It is frequently added to mixed botanical preparations to balance other herbs, and to promote digestion and vitality.
- Licorice root extract may be helpful for treating symptoms associated with premenstrual syndrome (PMS) and menopause. Studies have shown that the extract has estrogenic activity and may help regulate the estrogen-progesterone ratio.[1,2] Compounds in licorice root may also prevent heart disease in post-menopausal women[3] and have a growth-inhibitory effect on breast cancer cells.[4,5]
- Licorice root extract has also been studied for its anti-cancer activity,[6] anti-viral activity,[7,8] and its ability to promote the healing of gastric ulcers.[9] It may also have antioxidant, antibacterial, anti-tumor, and HIV-inhibiting activities.[10]
- Data suggests that many of the phenolic compounds isolated from licorice root may also help to protect low density lipoprotein (LDL) and red blood cells from oxidative damage.[11,12,13]
- Licorice root extract has also been shown to be beneficial for the liver. It has been used in Japan for more than twenty years as a treatment for chronic hepatitis, and studies with licorice root have shown a significant reduction of serum amino-transferase and a significant improvement in liver histology.[14,15,16]

Sources and Recommended Intake

- No Recommended Dietary Allowance (RDA) has been established for licorice root.
- Licorice root is fifty times as sweet as sugar, and it is used in many types of products as a flavoring agent. Licorice candy contains little or no licorice extract and instead derives its flavor from anise.[17]
- Licorice root is not recommended for use during pregnancy or lactation.[6]

Abstracts

Somjen D, Knoll E, Vaya J, Stern N, Tamir S. Estrogen-like activity of licorice root constituents: glabridin and glabrene, in vascular tissues in vitro and in vivo. J Steroid Biochem Mol Biol. 2004 Jul;91(3):147-55. Post-menopausal women have higher incidence of heart diseases compared to pre-menopausal women, suggesting a protective role for estrogen. The recently Women's Health Initiative (WHI) randomized controlled trial concluded that the overall heart risk exceeded benefits from use of combined estrogen and progestin as hormone replacement therapy for an average of five years among healthy postmenopausal US women. Therefore, there is an urgent need for new agents with tissue-selective activity with no deleterious effects. In the present study, we tested the effects on vascular tissues in vitro and in vivo of two natural compounds derived from licorice root: glabridin, the major

isoflavan, and glabrene, an isoflavene, both demonstrated estrogen-like activities. Similar to estradiol-17beta (E2), glabridin (gla) stimulated DNA synthesis in human endothelial cells (ECV-304; E304) and had a bi-phasic effect on proliferation of human vascular smooth muscle cells (VSMC). Raloxifene inhibited gla as well as E2 activities. In animal studies, both intact females or after ovariectomy, gla similar to E2 stimulated the specific activity of creatine kinase (CK) in aorta (Ao) and in left ventricle of the heart (Lv). Glabrene (glb), on the other hand, had only the stimulatory effect on DNA synthesis in vascular cells, with no inhibition by raloxifene, suggesting a different mechanism of action. To further elucidate the mechanism of action of glb, cells were pre-incubated with glb and then exposed to either E2 or to gla; the DNA stimulation at low doses was unchanged but there was abolishment of the inhibition of VSMC cell proliferation at high doses as well as inhibition of CK stimulation by both E2 and by gla. We conclude that glb behaved differently than E2 or gla, but similarly to raloxifene, being a partial agonist/antagonist of E2. Glabridin, on the other hand, demonstrated only estrogenic activity. Therefore, we suggest the use of glb with or without E2 as a new agent for modulation of vascular injury and atherogenesis for the prevention of cardiovascular diseases in post-menopausal women.

References

[1] Costello CH, Lynn EV. Estrogenic Substances from Plants: I. Glycyrrhiza. J Am Pharm Soc 1950; 39: 177-80.
[2] Kumagai A, Nishino K, et al. Effects of glycyrrhizin on estrogen action. Endocrinol Jpn 1967; 14:34-8.
[3] Somjen D, Knoll E, Vaya J, Stern N, Tamir S. Estrogen-like activity of licorice root constituents: glabridin and glabrene, in vascular tissues in vitro and in vivo. J Steroid Biochem Mol Biol. 2004 Jul;91(3):147-55.
[4] Tamir S, Eizenberg M, Somjen D, Stern N, Shelach R, Kaye A, Vaya J. Estrogenic and antiproliferative properties of glabridin from licorice in human breast cancer cells. Cancer Res. 2000 Oct 15;60(20):5704-9.
[5] Jo EH, Kim SH, Ra JC, Kim SR, Cho SD, Jung JW, et al. Chemopreventive properties of the ethanol extract of Chinese licorice (Glycyrrhiza uralensis) root: induction of apoptosis and G1 cell cycle arrest in MCF-7 human breast cancer cells. 2005. Cancer Letters. 230(2):239-247.
[6] Liu SD, Kato M, Akhand AA, Hayakawa A, Takemura M, Yoshida S, Suzuki H, Nakashima I. The herbal medicine sho-saiko-to inhibits the growth of malignant melanoma cell by upregulating Fas-mediated apoptosis and arresting cell cycle through downregulation of cyclin dependent kinases. Int J Oncol 1998; 12: 1321-6.
[7] Vlietinck AJ, De Bruyne T, Apers S, Pieters LA. Plant-derived leading compounds for chemotherapy of human immunodeficiency virus (HIV) infections. Planta Med 1998; 64: 97-109.
[8] Utsunomiya T, Kobayashi M, et al. Glycyrrhizin, an active component of licorice roots, reduces morbidity and mortality of mice infected with lethal doses of influenza virus. 1997. Antimicrob Agents Chemother 41(3): 551-6.
[9] Blumenthal M, et al. The Complete German Commission E Monographs. American Botanical Council, TX. 1998. Pp. 161-62.
[10] Xing GX, et al. Advances in studies on flavonoids of licorice. 2003. Zhongguo Zhong Yao Za Zhi.28(7):593-7.
[11] Vaya J, Belinky PA, Aviram M. Antioxidant constituents from licorice roots: isolation, structure elucidation and antioxidative capacity toward LDL oxidation. Free Radic Biol Med 1997; 23(2):302-13**.**
[12] Belinky PA, Aviram M, Fuhrman B, Rosenblat M, Vaya J. The antioxidative effects of the isoflavan glabridin on endogenous constituents of LDL during its oxidation. Atherosclerosis 1998 Mar; 137(1):49-61.
[13] Haraguchi H, Ishikawa H, Mizutani K, Tamura Y, Kinoshita T. Antioxidative and superoxide scavenging activities of retrochalcones in Glycyrrhiza inflata. Bioorg Med Chem 1998 Mar; 6(3): 339-47.
[14] Van Rossum TG, Vulto AG, de Man RA, Brouwer JT, Schalm SW. Review Article: glycyrrhizin as a potential treatment for chronic hepatitis C. Aliment Pharmacol Ther 1998 Mar; 12(3): 199-205.
[15] Yamamura Y, Kotaki H, Tanaka N, Aikawa T, Sawada Y, Iga T. The pharmacokinetics of glycyrrhizin and its restorative effect on hepatic function in patients with chronic hepatitis and chronically carbon-tetrachloride intoxicated rats. 1997. Biopharm Drug Dispos 18(8):717-25.
[16] Gumpricht E, Dahl R, Devereaux MW, Sokol RJ. Licorice Compounds Glycyrrhizin and 18beta-Glycyrrhetinic Acid Are Potent Modulators of Acid-induced Cytotoxicity in Rat Hepatocytes. 2005. J Biol Chem. 280(11):10556-10563.
[17] Tyler V. The Honest Herbal. Pharmaceutical Products Press, NY. 1993. pp197-99.