진세노사이드와 미네랄수로 이루어진 복합소재의 효과 연구

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A study on the components consisted of Korean cultivated wild ginseng and mineral water

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Introduction

Panax ginseng (P. ginseng) is a valuable agricultural commodity used in many traditional medicinal therapies. Nowadays, P. ginseng is used mainly to increase resistance to physical, chemical and biological stress and boost general vitality [1]. Ginsenosides are the main active constituents in P. ginseng, and the main ginsenosides are derived from the every part of P. ginseng. Up to now more than 30 ginsenosides have been reported from P. ginseng and most of them exhibit four types of aglycone moieties: protopanaxadiol, protopanaxatriol, ocotillol and oleanolic acid types [2]. P. ginseng root is considered to be the main part used for medicinal purposes, and most studies on the ginsenosides have focused on the P. ginseng root, although there exist publications on ginsenoside contents of the other parts of P. ginseng [3]. Latest surveys show that saponins account for about 3–4 % of Korean ginseng, and more than 30 kinds of ginsenosides have been found in it, double the number in ginseng of other countries [4]. Considering that each of these ginsenosides has different pharmacological activities, it becomes apparent that Korean ginseng might have a pharmacological effectiveness superior to those of any others.

It has long been known that thermal mineral water(so-called mineral water) can have beneficial effects on many medical conditions, and on the quality of users' skin, but the precise mechanisms are not yet fully understood. Researcher into these mechanisms is ongoing, but an increasing number of scientific double-blind studies demonstrate that the efficacy is real. Also, minerals elements in thermal mineral water play an important role of the health of skin, skin regeneration, and prevention of oxidative damage. Mineral waters are natural solutions formed under specific geologic conditions and characterized by a "chemico-physical dynamism". They originate in springs, are bacteriologically pure, and have a therapeutic potential. Mineral waters may be classified in many ways according to their distinctive chemical and physical elements, such as temperature, molecular concentration, chemical composition, and mechanisms of

therapeutic action. The composition and physical properties of various spa waters vary. Today water therapy is being practiced in many countries which have a variety of mineral springs and muds that are considerably different from one another in their hydrogeologic origin, temperature, and chemical composition. Bathing in water with a high salt concentration is safe, effective, and pleasant for healing and recovery [5-6]. This approach needs no chemicals or potentially harmful drugs. There are almost no side effects during and after treatment, and there is very low risk to the patient's general health and well-being. The major dermatologic diseases that are frequently treated by balneotherapy with a high rate of success are psoriasis and atopic dermatitis. Other conditions treated by balneotherapy include acne vulgaris, atopic dermatitis, alopecia areata, contact dermatitis, dyshidrotic dermatitis, eczema, granuloma annulare, ichthyosis vulgaris, lichen planus, lichen sclerosus and atrophicus, mycosis fungoides, necrobiosis lipoidica, palmoplantar keratosis, parapsoriasis group, pityriasis rubra pilaris, pruritus, psoriasis, rosacea, scleroderma, sebopsoriasis, seborrheic dermatitis, ulcer (chronic), urticaria pigmentosa, vitiligo, and xerosis [7].

In this study, we introduce new components consisted of Korean cultivated wild ginseng and mineral water for dermatological treatment.

Experimental

Samples of cultivated 6-year-old wild ginseng were collected in the Kangwodo identified as *Panax (P.) ginseng* from Jangsu Wild ginseng Agricultural Association Co.. The ginsenoside extraction procedure was completed by using mineral water. The mineral water was prepared from fractional distillation system with high temperature and pressure equipment.

The antioxidant activity was carried out using ABTS and DPPH assays, which determined the disappearance of free radical solutions usinga spectrophotometer.

Results and Discussion

Ginsenoside Extraction using Mineral Water (GEMW) has proven effective for extracting ginsenosides from ginseng using mineral water as extraction solvents. Only mineral water was used as the extraction solvent in this experiment because it yielded the best extraction efficiency. GEMW conditions were optimized experimentally in terms of pressure, temperature, static time, flush volume, purge time, preheating time, and cycle time. These optimized GEMW conditions are shown in the GEMW conditions section.

Each sample was extracted a second time using the optimized GEMW method, and essentially no additional ginsenosides were recovered. The extraction efficiency for all the ginseng samples was > 98%. Figure 1 compares the second extraction of the Asian ginseng from Korea and a blank injection. Figure 1 shows an overlay of chromatograms for three individual extractions of notoginseng, showing good reproducibility of the optimized GEMW method.

Ginsenosides Re and Rg1 are two important ginsenosides with similar structure that coeluted in previous studies. Ginsenosides Rb2 and Rb3, a pair of isomers with different pharmacological effects, are also difficult to quantify because they are difficult to separate by HPLC. Experiments showed that a good separation of ginsenosides Re and Rg1 could be achieved by increasing column temperature to 50 °C. Ginsenosides Rb2 and Rb3 were resolved using a simple gradient of acetonitrile. Also, the reproducibility of six injections of a mixture of 15 standards; Figure 6 shows a comparison of the separation on three Acclaim 120 C18 columns. Both figures show that this 25 min separation is reproducible.

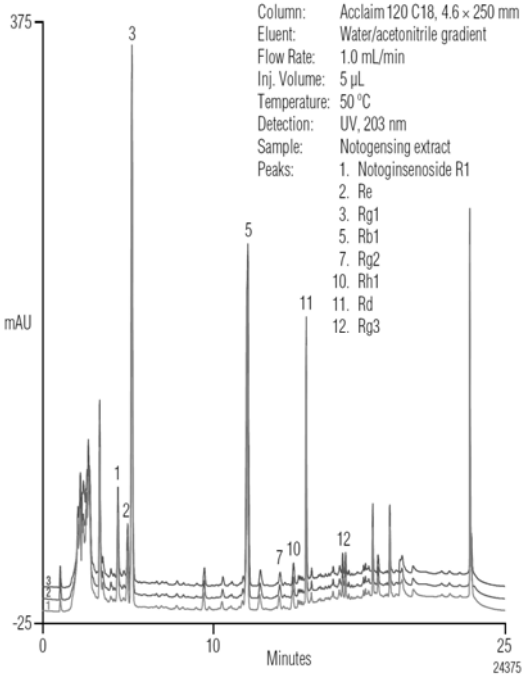

Fig. 1. Overlay of chromatograms of a) a blank, b) the second extraction of Korean ginseng, and c) the first extraction of Korean ginseng. Ginsenoside peaks are nearly nonexistent in the second extract, showing that the first extraction removed essentially all of the ginsenosides.

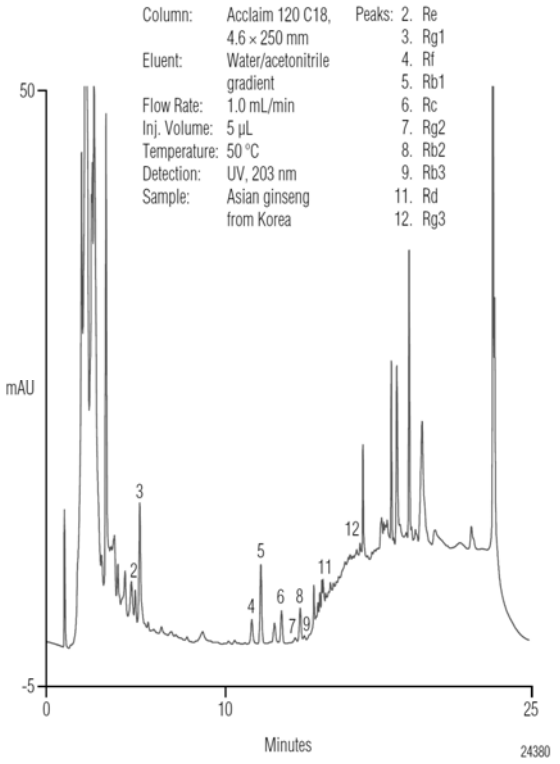

Fig. 2. Chromatogram of the GEMW extraction of Korean ginseng.

Six ginseng samples from different species and countries of origin were analyzed (Fig. 2). The major ginsenosides in these samples are similar, but the ginseng varieties can be identified by their characteristic saponins and the ratios of certain ginsenosides. The characteristic saponin of Asian ginseng is ginsenoside Rf, a compound not found in American ginseng. The characteristic saponin of notoginseng is notoginsenoside R1. The ratio of peak heights of ginsenosides Re and Rg1 (peaks 2 and 3) is a suitable value to differentiate the Asian ginseng (Re:Rg1 = 1:2), American ginseng (Re:Rg1 = 10:1) and notoginseng (Re:Rg1 = 1:10).

The antioxidant capacities of crude extracted were also found to be sensitive to mineral water effect. In comparison of other solvents such as MeOH. EtOH, ButOH, the extraction from mineral water was associated with increasing of antioxidant capacities (ABTS and DPPH) of crude extract.

Conclusion

In this study, mineral water was used to investigate the main and interaction effects of important independent variables for extraction of antioxidants from wild ginseng on the basis of single-factor experiments. The optimum conditions for antioxidant extraction from wild ginseng were established. Research shows that the optimized experimental process increases the antioxidant activity of antioxidants from wild ginseng. The manufacturing process optimized using mineral water needs lower energy, shorter time and offers simplified manipulation. The extract was green, healthly, safe and thus shows potential as an additive in cosmetic products.

In addition, the successful extraction of antioxidants from wild ginseng provides a basis for the development and utilization of wild ginseng resources.

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