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# The skin-depigmenting potential of *Paeonia lactiflora* root extract and paeoniflorin: in vitro evaluation using reconstructed pigmented human epidermis

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## Abstract

**Objective:** The roots of the herb *Paeonia lactiflora* ('White Peony') are used in association with other herbs in traditional clinical cosmetic practice in China as oral treatment for skin pigmentary disorders, such as brown or dark pigmentary spots. However, the skin-depigmenting potential of *Paeonia lactiflora* root extract and its main ingredient paeoniflorin has been scarcely investigated by topical application. The purpose of this study was to evaluate the efficacy of *Paeonia lactiflora* root extract and paeoniflorin as skin whitening agent in cosmetic application.

**Methods:** *Paeonia lactiflora* root extract (containing 53.25% of paeoniflorin) and paeoniflorin (97% purity) were applied topically on reconstructed pigmented human epidermis model, a three-dimensional (3D) human skin equivalent, showing morphological and functional characteristics similar to those of in vivo human skin. Two specific methods were used for quantifying melanin inside the reconstructed pigmented epidermis: Fontana-Masson staining (2D quantification) and multiphoton microscopy (3D quantification).

**Results:** Compared to vehicle (dimethyl sulfoxide DMSO), a significant decrease in 2D and 3D melanin content was observed after topical application on reconstructed pigmented epidermis of *Paeonia lactiflora* extract at 300  $\mu\text{g mL}^{-1}$  (-28% and -27%, respectively) and paeoniflorin at 120  $\mu\text{g mL}^{-1}$  /250  $\mu\text{M}$  (-30% and -23%, respectively), which is in the same order of magnitude as the positive reference 4-n-butylresorcinol at 83  $\mu\text{g mL}^{-1}$  /500  $\mu\text{M}$  (-26% and -40%, respectively).

**Conclusion:** These results demonstrate, for the first time, the depigmenting potential of paeoniflorin and thus the potential interest of using *Paeonia lactiflora* root extracts containing paeoniflorin in cosmetic or dermatological applications for reducing the severity of some hyperpigmented skin disorders.

**Keywords:** cell culture; melanogenesis; paeoniflorin; pigmented epidermis model; skin physiology.

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