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Chondroitin sulfate and Phelinus linteus mushroom : skin whitening

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ABSTRACT

This study was conducted to develop a new biomaterial to be used for skin whitening.

The melanin elimination effect of chondroitin sulfate and phelinus linteus mushroom in rabbit back skin were evaluated. Rabbit dorsum was exposed to chronic UV irradiation(320nm) once daily for 30 days after initial melanin injection (100mg/kg). And then, chondroitin sulfate and phelinus linteus mushroom at dose of 0.7g for 30days were applied on the zone. The dorsal skin was histologically examined. Furthermore, we investigated free-radical extinction effect, antioxidation and tyrosinase activity inhibition effects.

The histological study indicated that chondroitin sulfate and phelinus linteus mushroom decreasd melanine pigment significantly. As a result, chondroitin sulfate and phelinus linteus mushroom have a remarkable effect on the skin whitening by melanin elimination.

INTRODUCTION

Whitening and aging of skin are associated with markedly increased melanin and free radical. Among the nonenzymatic scavengers, vitamin C(Vit C) and vitamin E (Vit E) have been used as main intracelluar antioxidant in the previous studies.[1 2] We investigated that chondroitin sulfate (20% CS) and Phelinus Linteus Mushroom(PLM) might have the inhibition effect of melanin synthesis and tyrosinase activity.

CS is glycosaminoglycan composed of alternate sequence of differently sulfated residues of uronic acid (β-D-glucuronic) and α-D-N-acetyl-galactosamine linked by $\beta(1\rightarrow3)$bonds.[3] CS may be employed as chondroprotective drugs[4] with application in the therapy of tibiofibular osteoarthritis of the knee[5] and in the articular cartilage osteoarthritis by intra muscular and oral route. Reduced cartilage CS levels may be a risk factor of articular disorders in elderly people.[6]

PLM contains polysaccharide, which increasd immunity by raising activity of immunocompetence in a living body. Furthermore, this inhibits thrombus and release of histamin in cells.

We measured the free radical elimination, antioxidation, tyrosinase inhibition and melanin synthesis inhibition. We established PLM and CS as new biomaterials which had whitening effect by melanin decomposition.

MATERIAL AND METHOD

EXPERIMENTAL ANIMALS

Groups	melanin injection dose (1st day)	exposing to irradiation (30days)	Applying for sample dose (30days)
CON	100mg/kg of melanin	chronic UV irradiation (320nm) once daily for 30days	non sample
CS + PLM	100mg/kg of melanin		applied for 0.7g of CS + PLM
PLM	100mg/kg of melanin		applied for 0.7g of PLM

* CON : Only melanin induced group
* CS + PLM : The group of application of chondroitin sulfate and PLM after the melanin injection
* PLM : The group of application of phelinus linteus mushroom after the melanin injection

HISTOLOGICAL EXAMINATION

* removing dorsal hair of the rabbit
* rabbit dorsum was exposed to chronic UV irradiation (320nm) oncd daily for 30days after initial melanin injection (100mg/kg)
* chondroitin sulfate(mixed with PLM) and phelinus linteus mushroom at dose of 0.7g for 30days were applied on the zone
* cut off the dorsal skin
* The dorsal skin was fixed for overnight in 10% formaldehyde solution, and then embedded in paraffin wax, sectioned in 5㎛ size, followed by staining with hematoxylin-eosin (H&E).

TYROSINASE INHIBITION EFFECT

preperation of each sample → samples were put in microplate(96well) → adding 0.1M phosphate buffer(pH 6.86), 1.5mM L-tyrosin solution and 2,380 unit/ml mushroom tyrosinase (sigma,USA) (0.05M phosphate buffer, pH 6.86) → detecting absorption at 490nm

INHIBITION EFFECT OF MELANIN SYNTHESIS

B16 melanoma cell was suspended to DMEM(5×10^4cell/ml, contained 10% of BSA) → adding sample → incubation for 4 days (condition of 5% CO_2/ 95% air at 37℃) → washing by phosphate buffer before treating by trypsin → examine with the unaided eye

CONCLUSION

1) Histological examination

Melanin is naturally present in stratum basale. Generally, melanin is known as pigment of skin. In our studies , the application of PLM and PLM+CS on the skin catabolized melanin extensively. On the other hand, there is no side effect in the skin by injection of melanin. The inhibition of melanin pigment was significantly showed by treating the PLM+CS compared with the PLM.

2) Tyrosinase inhibition effect

PLM + CS (28%) restrainted tyrosinase activity more than Vit C (22.8%).

3) Inhibition effect of melanin synthesis

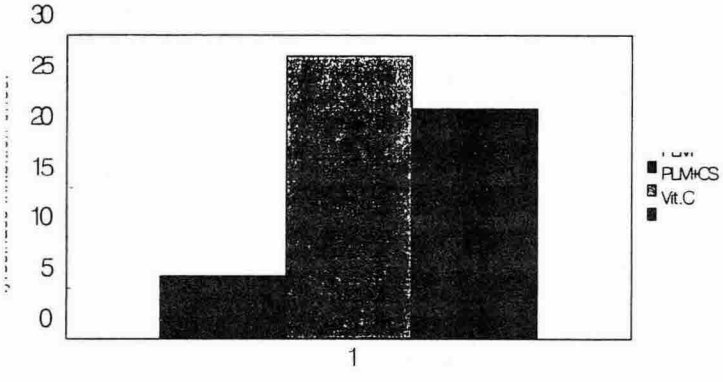
PLM + CS(55%) inhibited production of melanoma cell more than Vit

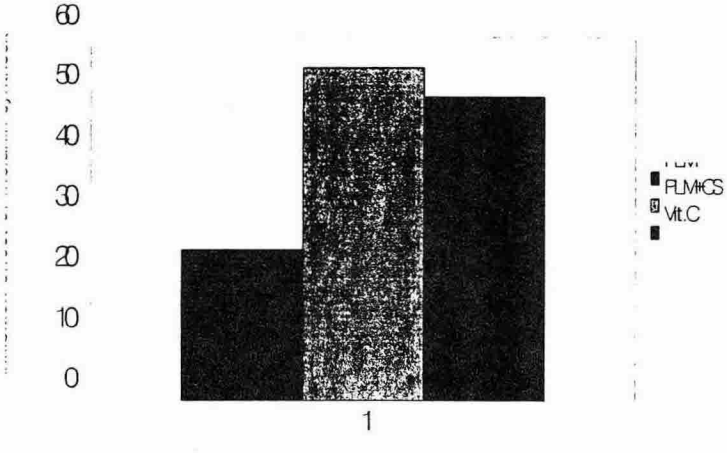
C(50%).

As the results, PLM and PLM + CS supressed melanin synthesis by theinhibition of tyrosinase activity and the catabolizing of melanin. In addition, the biomaterials increased antioxidative effect by the elimination of free radical.

Thus, we found out that PLM and CS had whitening and antiaging effect by melanin catabolizing and free radical elimination.

RESULT





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