Synopsis of Original Research Paper

Application to cosmetology of the highly expressed melanin-synthesizing gene operon from a microbial source

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Streptomyces (*S.*) *castaneoglobisporus* HUT6202 produces a large amount of diffusible melanin-like pigment. We have cloned an operon, designated *mel*, which is responsible for the synthesis of melanin pigment, from the chromosomal DNA of *S. castaneoglobisporus*. The sequence analysis revealed that the *mel* operon consists of two genes: the tyrosinase gene (*tyrC*) consisting of 819 bp and a gene, designated *orf378*, consisting of 378 bp. The *orf378* was located just upstream of the *tyrC* gene. Although the precise function of the *orf378* product remains unclear, its functuion is thought to be involved in the transfer of copper ion which is essential for tyrosinase.

The present study has the following aims: the first is to express the microbial mel operon in human epidermis or in albino mouse hair follicle cells. This approach will be applicable for the gene therapy of pigment disorders. The second is to establish a cell line that expresses *mel* constitutively. The cell line can be used to screen inhibitors of melanin-synthesis, which will be applicable for the cosmetology.

In the present study, we tested whether the microbial *mel* operon is expressed in mammalian cells using COS-7 cells as host cells. The *orf378* and *tyrC* genes, contained in the operon, were PCR-amplified and independently inserted into downstream of the cytomegalovirus promoter, respectively. When COS-7 cells were co-transfected with the mammalian expression vectors, the transfectants expressed tyrosinase activity, suggesting that the microbial *mel* is expressed in mammalian cells. A human keratinocyte A431 cell was also used for constitutive expression of the *mel* operon.