iGEM BUCT

Design

Strengthen the consumption of aliphatic acid of probiotics: balance oil with *E. coli* Nissle 1917 and compete to inhibit *Staphylococcus* and *Malassezia*, so as to exert the regulation effect of bacterial community.

Through its own metabolism, it produces fragrance molecule 2-phenylethyl alcohol: 2-phenylethyl alcohol is a fragrance substance, which can produce fragrance at the same time while consuming aliphatic acid of human scalp itself.

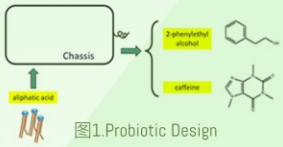

图1.Probiotic Design

Take aliphatic acid as carbon source to synthesize growth promoting factor caffeine: synthesize caffeine in *E. coli* Nissle 1917, prolong hair follicle growth cycle, stimulate growth factor production, and reduce hair loss.

Design bacteria suicide mechanism: We constructed the △*fes* strains by knocking out the *fes* gene in *E. coli* so that it could not grow in an iron-restricted environment, and then re-introduce the *fes* gene controlled by the anaerobic promoter into *E. coli* with a plasmid that allows it to die in eutrophic conditions, but prefers to live in skin keratin and hair follicles. When the bacteria escaped to an iron-deficient environment, it would die of iron deficiency.

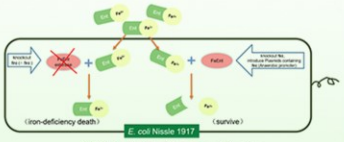

图2.Suicide System Design

Background

We know from our own experience that hair loss is a concern. After investigation, we found that the external environment also plays a key role in the hair. In the era of high pressure and fast rhythm, the head skin care is inevitably neglected. Scalp water-oil imbalance, bacterial and fungal growth, the production of odor, and other phenomena are also easily ignored. However, the skin of the head is weaker than the skin of the face and arms, so we think it is important to take care of the soil where hair grows.

Introduction

BUCT finds inspiration in diseases that can cause hair loss, such as androgen alopecia (AGA). Therefore, our design can balance the oil on the scalp surface, secrete hair follicle growth factor and inhibit the breeding of harmful bacteria, committed to reducing the hair loss caused by bad scalp environment problems while improving the dander, odor and other problems caused by excess sebum. It is hoped that our design can alleviate the problem of hair loss in AGA people, and that other people with excessive oil secretion, itching and desquamation of scalp can also try this unprecedented "skin care method".

Human Practices

Questionnaire survey: We collected about 500 valid questionnaires. After investigation, we found that most people currently have hair loss worries and worries and have not found a satisfactory solution.

Interview with experts: we consulted with experts and scholars in the field of hair loss, such as Dr. Zhang Haobo of Beijing University of chemical technology and Dr. Li Jinfang, a senior dermatologist of Mengzhong hospital in Wuhai, Inner Mongolia. We improved our own design and shortened the distance between the project and the real world.

External publicity: We popularized science about what synthetic biology is and what the highlights of the iGEM project are through the production of push and online live broadcast. We gained a large group of fans and audiences and received extensive attention.

Practical education: the BUCT team of Beijing University of chemical technology went to Hengdong County, Hengyang City, Hunan Province to popularize science in biology.