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<tr><td>Technology/ Title</td><td colspan="3">Method and composition for treatment of hair loss disorder</td></tr>
<tr><td rowspan="2">Technology Type</td><td>☐Biotechnology</td><td colspan="2">☐Device/Diagnostics</td></tr>
<tr><td>■Pharmaceutical</td><td colspan="2">☐Others:_____-</td></tr>
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<tr><td>Technology Description</td><td colspan="3">Everyone may face the problem of dwindling hair caused by aging, mental stress, and disease. In androgenetic alopecia patients, their hair follicles gradually become smaller, thinner, and finally atrophied. After chemotherapy and radiotherapy, the hair follicles of cancer patients are damaged to varying degrees, leading to temporarily hair loss. The purpose of our invention is to enhance the growth phase of hair follicles and maintain the regenerative capability of hair follicle stem cells, which is beneficial to prevent scalp aging and slow down androgenetic alopecia, as well as to revive alopecia after chemotherapy and radiation therapy.
Adult hair follicles undergo a cyclic anagen (growing phase), catagen (regressing phase), and telogen phase (resting phase). The club hair in telogen phase sheds normally, and hair loss is usually caused by abnormal shedding of the club hair. We abrogated Notch signaling effectors in mouse epidermis, and found that the hair follicles of mutant mice initiate the growth phase slower than that of control mice. Applying repetitive plucking on the back skin, we found that the hair regeneration of the mutant mice was gradually deteriorating compared with the control group, showing a phenomenon of baldness. Because the Notch ligand is a transmembrane protein, we construct the extracellular part of the Notch ligand into a soluble-form recombinant protein. Using this soluble ligand, we found that mouse hair follicle stem cells cultured in vitro have enhanced self-renewal capability. The Notch soluble ligand was also prepared on Affi-gel beads and then injected under the skin of mice, and we found that the soluble ligand can initiate hair growth. These results indicate that topical application of a Notch soluble ligand can promote the hair growth and maintain the self-renewal of hair follicle stem cells.
We propose that Notch soluble ligand can be massively produced, purified, and formulated to apply on the human scalp to prevent hair loss resulting from aging, androgenic alopecia, chemotherapy and</td></tr>
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	radiation therapy. Our invention is unique in that we found a substance that can be used locally on the scalp and should not have global effect on the body, and that can promote the anagen initiation in hair growth and sustain the self-renewal of hair follicle stem cells.
Intellectual Property	1. USA patent: “Method and Composition for Treatment of Hair Loss”, 2020/07/21, Inventor: Liang-Tung Yang, Assignee: NHRI, Application No.: US 10716829 B2. 2. Taiwan patent: “Notch 訊息傳遞路徑之活化劑用於治療掉髮之用途及其組成物”, 2020/12/21, 發明人:楊良棟, 專利權人: 財團法人國家衛生研究院, 專利(申請)號: TW I713590 B
Key Publications	Suen WJ, Li ST, Yang LT*. Hes1 regulates anagen initiation and hair follicle regeneration through modulation of Hedgehog signaling. Stem Cells. 2020;38(2):301-314
Business Opportunity	Our invention can be used to sustain the hair follicle regeneration, which is of great help for people who lost their hair by aging or under stress. The invention can also be applied to accelerate the hair regrowth after radiation therapy or chemotherapy accompanied by cancer treatment. Treatment of hair loss/alopecia has a great market potential, and we predict that our invention can be applied to make shampoo or hair regrowth kit.