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L'Oréal Research and Innovation Applies the Cutting-edge Ingredient "Aminexil" Based on Findings of its Hair Research to Scalp-care Products Against Hair Loss

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L'Oréal Research and Innovation (Barbara Lavernos, Deputy Chief Executive Office; 41, rue Martre, 92117 CLICHY, France), the research and development arm of the L'Oréal Group that is the world's largest cosmetics company, has applied Aminexil that has been developed based on years of hair research, to scalp-care products for anti-hair loss treatment. This ingredient prevents thickening of the hair root sheath, which is considered one of the causes of hair loss and keeps the scalp healthy.

■ Japanese women's hair loss troubles

L'Oréal surveyed 15,560 Japanese women (15-74 years old) about hair troubles in 2019 and found that 27% suffer from hair loss in average. Among younger women in their 10s to 30s, a significant percentage of 32-35% have this problem. In women of any age, 19% answered they suffer from hair thinning at the top of the head. The percentage of women with this problem progressively increases with age and reaches an average of 27% in the age groups of the 50s and older.

■ Structure of hair follicles and hair loss

The hair follicle is a skin appendage from which hair grows, comprised of tissues such as the dermal papilla that controls hair growth, the hair bulb in which hair matrix cells divide and grow, and the root sheath that encompasses those tissues and anchors hair in the skin. Capillary vessels run around the hair follicle and provide this apparatus with oxygen and nutrients.
Follicles take root deeply in the healthy scalp skin. In the scalp skin with a hair loss, however, it is observed that follicles are shallow-rooted, the sheath around the follicle becomes thick (Figure 1, circled in red in the bottom right picture), and each hair becomes thin. Thus, we speculated that hair loss might occur partly because the malfunction of collagen metabolism induces collagen deposits on the sheath around the follicle, making the sheath thick and inhibiting the supply of oxygen and nutrients from capillary vessels.

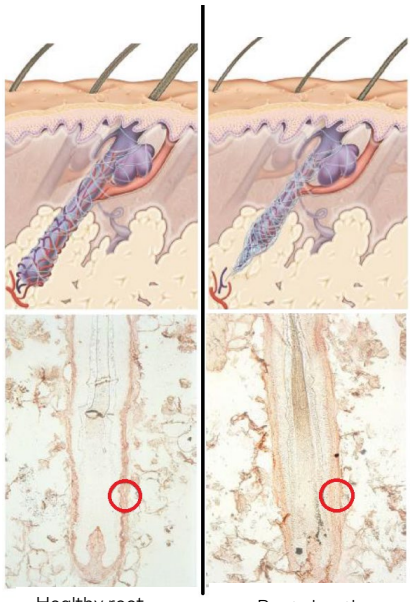

Figure 1: Healthy hair follicle (left) and follicle in a hair loss area (right)

Collagen is fibrous protein that forms living bodies, composing the skin, tendons, and bones and is the main component of the extracellular matrix. The structure of collagen fibers, assembly of many collagen molecules, is reinforced by crosslinking between amino acids, lysine or proline, which are the constituents of each collagen molecule. We decided to focus on lysyl oxidase, one of the enzymes involved in the process of this cross-linking.

■ Development of lysyl oxidase inhibitor and its efficacy

It is well known that pyrimidine N-oxide inhibits lysyl oxidase activity; however, this molecule induces hypotensive reaction (vasodilatation), which is problematic as a cosmetic ingredient. Thus, we synthesized more than 150 derivatives of pyrimidine N-oxide and selected 2,4-diamino-pyrimidine N-oxide, or Aminexil, which effectively inhibits lysyl oxidase activity without hypotensive activity. Our studies showed that Aminexil inhibits the activity of lysyl oxidase a well as the expression of this enzyme at the mRNA level. In addition, we found that this molecule prevents the aggregation of collagen fibers produced from fibroblasts and makes the structure of the collagen matrix ordered (Figure 2).

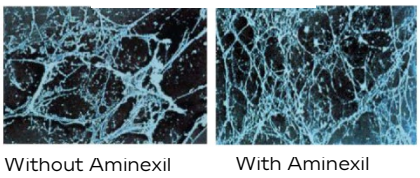

Figure 2: Effect of Aminexil on the collagen matrix

■ Effect of aminexil on the scalp

To assess the effect of aminexil on the scalp, we evaluated the expression level of mRNA by Quantitative PCR using a reconstructed human skin model. This assay revealed that Aminexil decreased the expression levels of the cytokines (substances secreted from cells) related to skin irritation and oxidative stress as well as the enzymes that break down collagen. On the other hand, an increase in the expression of proteins involved in the homeostasis of epidermal cells and regeneration of the epidermis was observed. These findings suggest that Aminexil can keep the scalp healthy.

■ **Use test of the formulation containing Aminexil**

We conducted a use test of the formulation containing Aminexil on 105 Japanese women for six weeks and asked them about their impressions during its use. The percentages of the participants who answered “the volume of my hair has increased” and “the strength and resilience of my hair seem to have improved” went up over time and reached 57% and 66%, respectively, indicating that more than half of them noticed some improvements in their hair.

In addition, a use test on 232 men suffering from moderate hair loss showed a statistically significant decrease in the percentage of follicles in telogen after three months in the group of men who used the formulation containing Aminexil (n = 127) compared with that in the group of men who used the control formulation (n = 105) (Figure 3, the left graph). Furthermore, although the follicles in telogen would seasonally increase 1.5 months after starting the formulation, they were observed to decrease in the Aminexil group (Figure 3, indicated by an arrow in the left graph).
Another use test on 119 men with moderate hair loss found that the hair density in the men who used the formulation containing Aminexil (n = 68) was as much as 6% more than that in the men in the control group (n = 51) (Figure 3, the right graph).

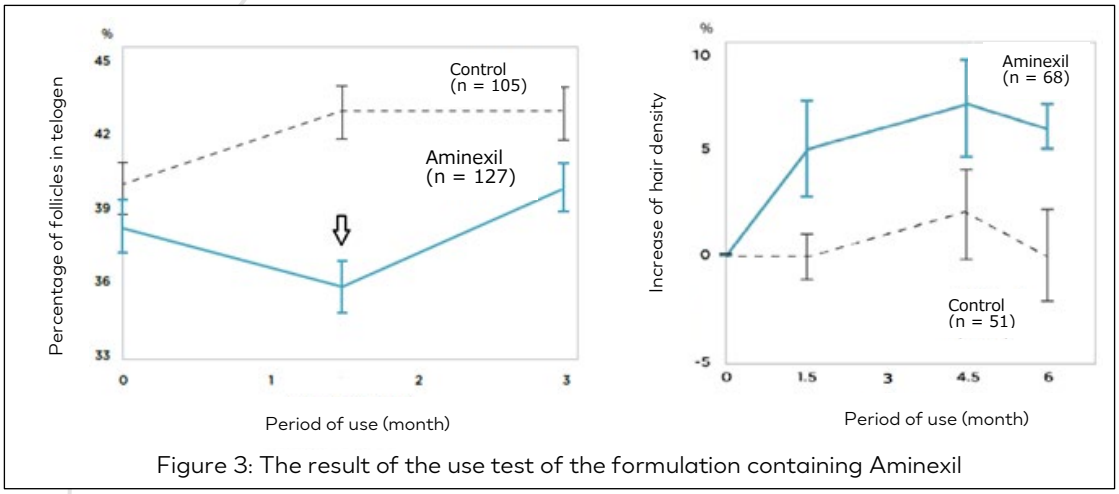

Figure 3: The result of the use test of the formulation containing Aminexil

Based on these findings, L’Oréal will expand the possibility of developing products for the scalp and hair that will be more effective than ever.

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