

Immunopotentiator from Pantoea agglomerans (IP-PA1) Promotes Murine Hair Growth and Human Dermal Papilla Cell Gene Expression

Hiroshi Okawa

Scarecrow Incorporated, Japan

Koji Wakame

Dept. of Pharmacology, Hokkaido Pharmaceutical University, Hokkaido, Japan

Hiroyuki Inagawa

Niigata University of Pharmacy and Applied Life Sciences, Niigata, Japan

Abstract

Background/Aim: Pantoea agglomerans-derived lipopolysaccharide (IP-PA1) is a known immunopotentiator with anti-inflammatory and anti-allergic properties. While utilized in veterinary medicine for canine atopy and coat quality, recent developments focused on a synergistic fusion of IP-PA1 and Pycnogenol (IP-PA1-SC). This study investigated the hair growth-promoting efficacy and unique macrophage-mediated mechanisms of this combination in murine models and human clinical trials.

Materials and Methods: In vivo, shaved C3H/HeN mice received oral or topical IP-PA1-SC, with growth monitored for 14 days. In vitro, human dermal papilla cells were stimulated with the solution to measure FGF-7 and VEGF mRNA expression via real-time PCR. Additionally, a DNA array analyzed anti-inflammatory markers compared to minoxidil. A human clinical trial (n=26) evaluated hair thickness over 30 days without concomitant medication.

Results: IP-PA1-SC significantly accelerated murine hair regrowth compared to controls. Histology confirmed hair elongation, while in vitro results showed significant upregulation of FGF-7 and VEGF ($p<0.05$). DNA array testing revealed superior anti-inflammatory effects compared to traditional tonics. The human trial demonstrated a 100% success rate in increased hair thickness within 30 days.

Conclusion: Unlike conventional medical products (e.g., minoxidil) that primarily improve blood flow, IP-PA1-SC promotes hair growth through macrophage network improvement and growth factor stimulation. This distinct mechanism offers a high-efficacy, non-pharmaceutical alternative for hair restoration in both humans and animals.

Index Terms

Pantoea Agglomerans, Hair Loss, Dermal Papilla Cell, FGF-7, VEGF.