



Research field: Life science and medicine

Keywords: hair growth, eyelashes, kukui nut oil, prostaglandin F2 α

Elucidated eyelash growth mechanism/elongation effect of naturally derived kukui nut oil (aleurites moluccanus oil)

—The oil promotes the secretion of PGF2 α , which helps hair growth—

[Outline]

- ◆ It has been revealed that kukui nut oil has new potential for growing Japanese women's eyelashes without causing pigmentation around the eyes.
- ◆ The hair growth effects and mechanisms of kukui nut oil, which is used in Southeast Asia, have not been fully understood until now. This research discovered that kukui nut oil promotes the secretion of prostaglandin F2 α *2 (PGF2 α), which promotes hair growth, by increasing the expression of AKR1C family enzymes.*1
- ◆ Further understanding of the mechanism is expected to lead to new treatments for eyelash hypotrichosis and alopecia and contribute to improving QOL by improving the physical and aesthetic functions of eyelashes.

❖ Overview

A joint research group led by Guest Professor Fumitaka Fujita and Specially Appointed Assistant Professor (Full Time) Hiroko Kato of the Laboratory of Advanced Cosmetic Science, the Graduate School of Pharmaceutical Sciences, the University of Osaka, and Professor Noorma Rosita Badjuri and Professor Tristiana Erawati in the Department of Pharmaceutical Sciences, Faculty of Pharmacy of Airlangga University (Indonesia), Mandom Corporation, and others has confirmed that kukui nut oil has the effect of elongating eyelashes and clarified its growth mechanism.

Kukui nut oil (aleurites moluccanus oil), extracted from the seeds of the aleurites moluccanus tree, is used mainly in Southeast Asia to moisturize and add shine to hair and promote hair growth. Due to its anti-inflammatory properties, it has also been used to treat eczema and other skin troubles. However, its elongation effect on eyelashes had not been clarified as there were many unknowns about the detailed mechanism of hair growth.

The researchers have revealed that kukui nut oil promotes the growth of Japanese women's eyelashes without causing pigmentation around the eyes. The mechanism of this action was revealed to be that kukui nut oil increases the expression of AKR1C family enzymes "AKR1C1," "AKR1C2," and "AKR1C3," thereby further promoting the secretion of "PGF2 α ," a substance known to promote hair growth.

Growing healthy eyelashes is thought to improve the function of protecting the eyes from foreign objects while also improving aesthetic function. This is expected to increase confidence in one's appearance and boost self-esteem, satisfaction, and happiness. Furthermore, appropriate eyelash care will help to improve the quality of life (QOL) of people who have an inferiority complex about thin eyelashes and are thought to have a positive impact not only on physical function but also on emotional and social aspects.

❖ Research Background

Eyelashes serve both protective and aesthetic functions for eyes. Most women aspire to have long, lush eyelashes, and maintaining healthy eyelashes is important not only for protecting the eyes but also enhancing their aesthetics. Also, there is a certain number of consumers who suffer from eyelash hypotrichosis due to aging, skin diseases, and side effects of medication.

Kukui nut oil has been traditionally used for skin and hair care purposes in Indonesia and other Southeast Asia regions. It is used to moisturize and add shine to hair and promote elongation and is incorporated as part of Jamu.³ Kukui nut oil also has anti-inflammatory properties and has been used to treat eczema and other skin troubles. However, its elongation effect on eyelashes had not been clarified as there were many unknowns about the hair growth mechanism.

❖ Research Contents

The research group applied a sample containing kukui nut oil to the eyelashes of 15 Japanese women and examined the growth degree of eyelashes. The results showed that the sample containing the oil significantly elongated the eyelashes compared to the sample without it (Fig. 1). Pigmentation around the eyes was not observed in this test.

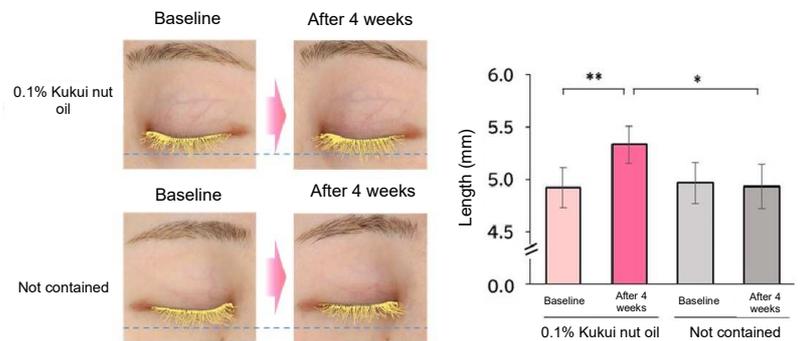


Fig. 1 Eyelash growth effect of kukui nut oil

Next, the research group attempted to elucidate the hair growth mechanism of kukui nut oil using human hair follicles and epidermal cells. When kukui nut oil is applied to human hair follicles, the hair elongates. This hair growth effect was found to be comparable to that of bimatoprost, which is used as a treatment for glaucoma and known for its effect to promote eyelash growth (Fig. 2). Furthermore, it has been confirmed that kukui nut oil increases the expression of AKR1C family enzymes involved in the production of PGF2 α , a factor that promotes hair growth (Fig. 3). It was also found that production of PGF2 α increases (Fig. 4). This suggests that kukui nut oil enhances the activity of AKR1C family enzymes and increases the production of PGF2 α .

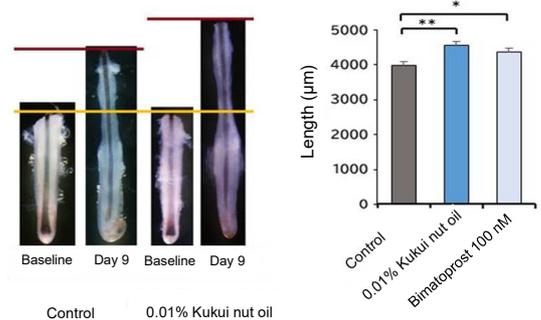


Fig. 2 Hair growth effect of kukui nut oil

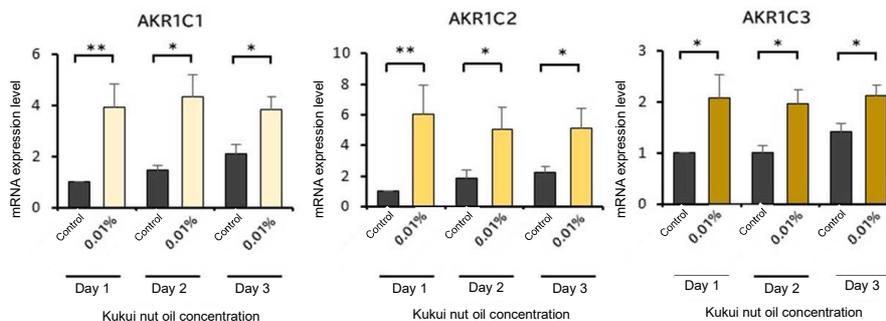


Fig. 3 Expression of AKR1C family enzymes induced by kukui nut oil

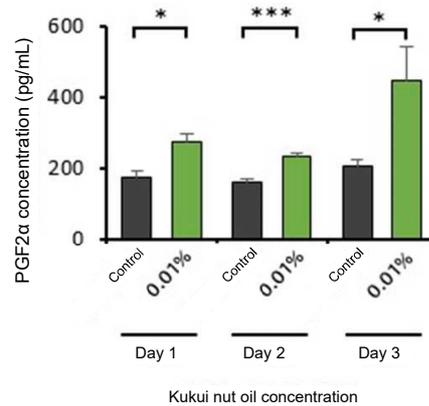


Fig. 4 Increased PGF2α by kukui nut oil

❖ Social Impact of the Research

Growing eyelashes not only improves the physical function of eye protection from foreign objects but is also thought to be an important factor in contributing to improving consumers' QOL, which enhances mental stability and happiness in daily life, by raising self-esteem, increasing emotional satisfaction, etc. By further clarifying the mechanisms of hair growth based on the research results, it is expected that this will lead to the proposal of new treatments for eyelash hypotrichosis and alopecia.

❖ Note

This research will be presented at the following congress held in Cannes, France, from September 15 to 18, 2025.

The International Federation of Societies of Cosmetic Chemists (IFSCC) 2025

Title : Eyelash Growth Cosmetics Containing Aleurites Moluccanus (AMS) Oil

: Hair Growth Mechanism by Anti-oxidant Nrf2/ARE-AKR1C Family-PGF2α Axis Activity

Presenters: Hiroko Kato, Noorma Rosita Badjuri, Jeremia Febrian, Tristiana Erawati, Muhammad Agus Syamsur Rijal, Shiori Sai, Defri Rizaldy, Kaori Saito-Otsuka, Miku Tanaka, Kaori Motonami, Takeshi Hara, Fumitaka Fujita

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❖ Glossary

*1 AKR1C family enzymes

A group of enzymes that belong to the "Aldo-Keto Reductase 1C" family, involved in regulating the activity of sex hormones (estrogens, androgens, etc.), regulating the production of prostaglandins, and breaking down harmful substances related to oxidative stress.

*2 Prostaglandin F2α

It is a bioactive substance that plays an important role in the body, acting on hair follicles and hair matrix cells to promote hair growth.

*3 Jamu

Jamu is a traditional natural medicine practiced in Indonesia that uses plants, herbs, and spices as its main ingredients. Various plants are used as ingredients for medicine, both for ingestion and for topical use (skin care and massage).

❖ Inquiries regarding this research

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[Comments from Specially Appointed Assistant Professor (Full Time) Hiroko Kato of the Graduate School of Pharmaceutical Sciences]

Have you ever heard that glaucoma medication can make your eyelashes grow thicker? This is caused by eye drops containing PGF2 α derivatives. Although this was a side effect of a medication intended to lower intraocular pressure, its side effect resulted in the PGF2 α derivative being approved by the U.S. FDA in 2008 through drug repurposing, i.e., using an existing drug to treat a new disease. It is now used worldwide under the product name Latisse (known as GlashVista in Japan) not only to treat eyelash hypotrichosis caused by side effects of anticancer drugs but also for cosmetic purposes.

The kukui nut oil evaluated in this study is known to be used in Indonesia to promote hair growth in babies and has also been reported to be non-toxic to conjunctival cells. Kukui nut oil also activates Nrf2, a master key gene in the antioxidant pathway that is known to be induced by antioxidants such as sulforaphane. This not only causes hair and skin cells to produce PGF2 α , which promotes hair growth, but is also expected to protect the cells themselves from oxidative stress. Based on these findings, we believe that safe and healthy hair growth can be expected.