

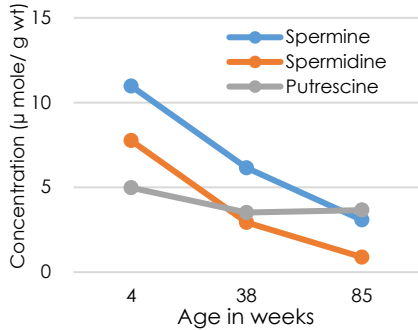
# Promote hair growth, Anti-glycation, Anti-inflammatory ORYZA POLYAMINE



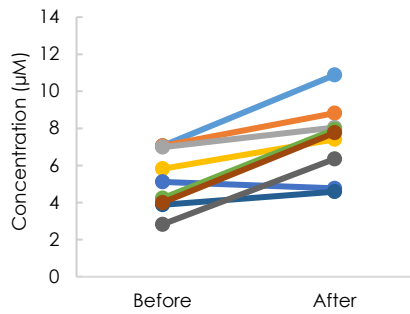
Polyamine is an organic compound consists of 2 or more amino groups (-NH<sub>2</sub>). Polyamines are synthesized in cells and play essential role in the proliferation and development of mammalian cells. In addition, polyamines have been shown to exert protein synthesis, antioxidant activity, anti-allergenic effect, and suppression on glycation process. The contents of polyamines in the body decline with age regardless of the consumption of food rich in polyamines. Polyamines has been reported to prevent arteriosclerosis and promote hair growth due to its anti-inflammatory properties and cell proliferative effect respectively. And, Spermidine, Spermine and Putrescine are the most prevalent polyamines. The ratio of each of polyamines in ORYZA POLYAMINE is **Putrescine : Spermidine : Spermine = 2 : 3 : 5**. We, Oryza Oil & Fat Chemical Co., Ltd. has venture into the research and development of **rice-derived polyamine**. Studies showed that rice-derived polyamines promote the cornification of keratinocytes and the production of keratin. According to the latest research, **Polyamine is reported to have anti-inflammatory and activate autophagy which is related to cleanup and recycling system of our body cell.**

## 1. Absorption of Polyamine and effect on inflammation

The effect of aging on concentration of brain polyamines



The effect of polyamine-rich diet on blood spermine concentration

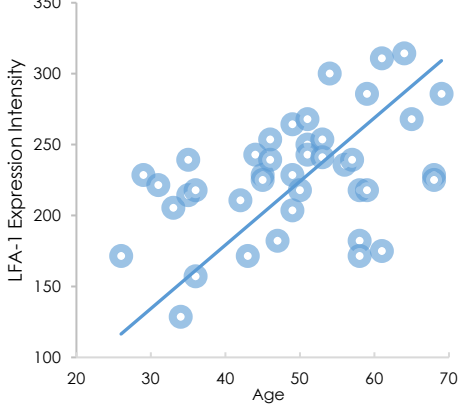


The contents of Polyamines in our body decrease with age. But we can supplement the amount by taking Polyamine. Regarding the absorption of Polyamines, it is easy to absorb into our body through the bloodstream because the molecular weight is less than 250, same as amino acids.

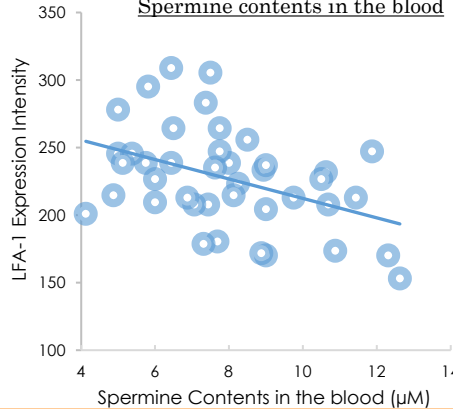
Das R. & Kanungo MS. Exp Gerontol 17:95-103(1982)

Soda K. Et al. J Nutr Sci Vitaminol, 55, 361-366 (2009)

Relationship between LFA-1 and Age



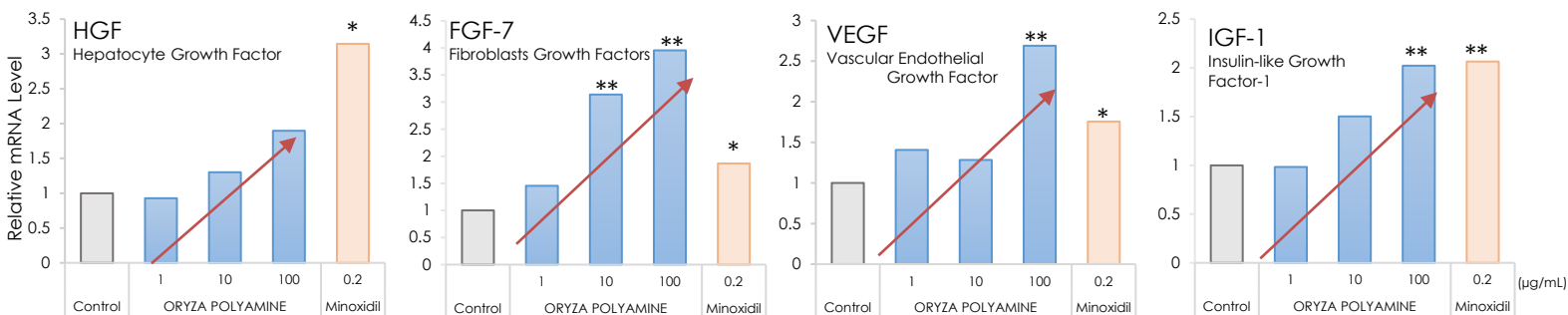
Relationship between LFA-1 and Spermine contents in the blood



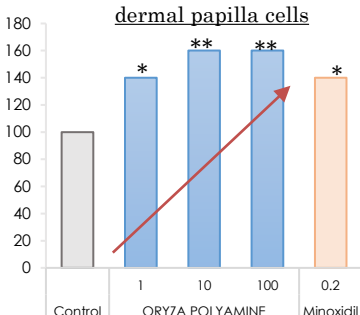
LFA-1 has been reported to be involved in the induction on inflammation. And it has been reported to be able to improve inflammatory and allergic disease by inhibition LFA-1. LFA-1 expression intensity increase with aging. However when the contents of spermine in the blood is high, LFA-1 expression intensity can be inhibited.

Nippon Shokuhin Kagaku Kogaku Kaishi, 61(12), 607-624, 2014

## 2. Promote Hair Growth



The growth ratio of dermal papilla cells



\*: p<0.05, \*\*: p<0.01 vs Control

Polyamine was reported to have an activity to prolong the anagen phase and accelerate the expression of the promoter of keratin 15 in hair follicles. Dermal papilla cells play important role in the process of hair growth and hair thickening. Larger dermal papilla cells helps in creating a thicker and stronger hair. The effect of Oryza Polyamine on hair growth is compared with minoxidil (a prescribed medication for alopecia). Oryza Polyamine demonstrated a 40-60% improvement in the proliferation rate of dermal papilla cells. HGF, FGF-7, VEGF and IGF-1 effect on the differentiation and proliferation of hair matrix cells. Our hair is produced by proliferation and differentiation of hair matrix cells. Therefore, those genes expression are quite important for our hair growth.

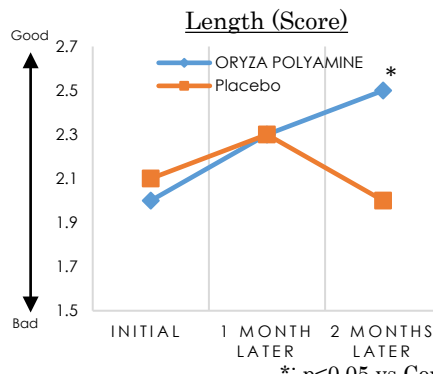
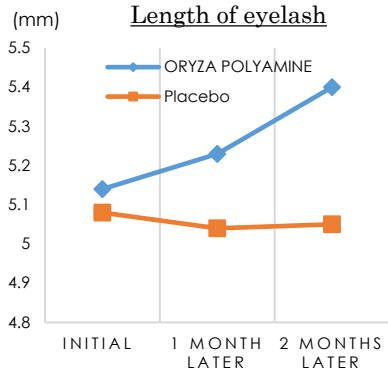


### 3. Clinical Study (For Eyelash)

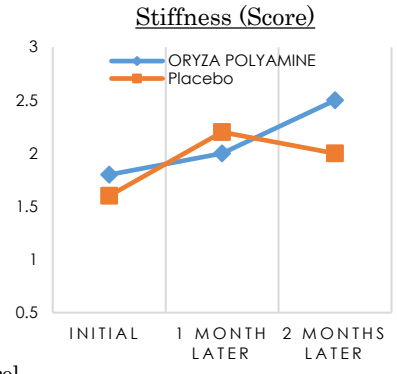
<Protocol>

Subjects: 20 subjects (male and female), Dosage: ORYZA POLYAMINE-P 50mg per day, Dextrin 50mg per day

Duration: 8 weeks, Evaluation Items: Length of eyelash, Questionnaire



Questionnaire

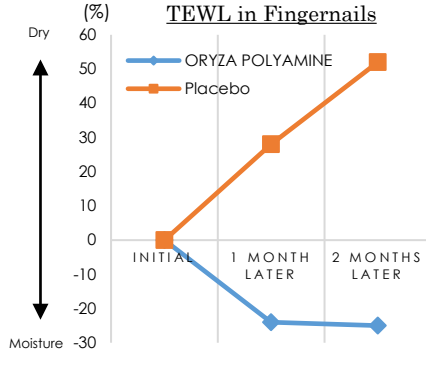
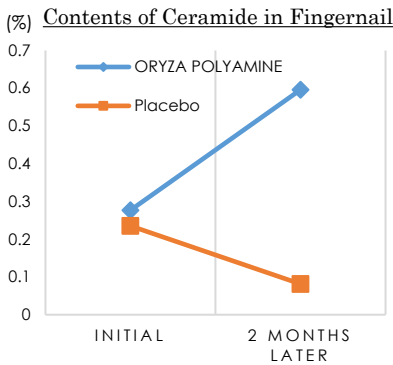


### 4. Clinical Study (For Fingernails)

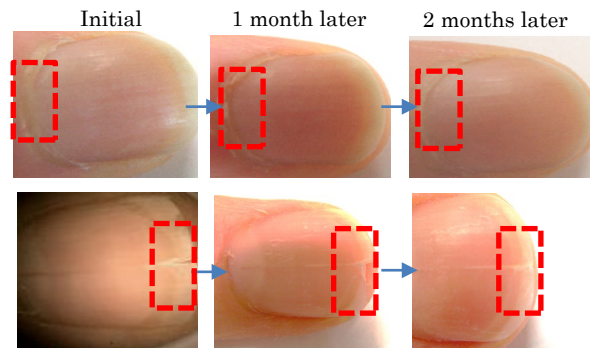
<Protocol>

Subjects: 20 subjects (male and female), Dosage: ORYZA POLYAMINE-P 50mg per day, Dextrin 50mg per day

Duration: 8 weeks, Evaluation Items: Ceramide contents, TEWL, Conditions of fingernails



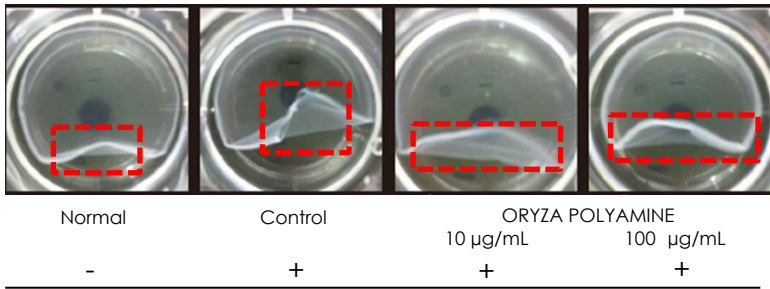
Condition of Fingernails



Condition of fingernails such as cracked nail and hang nail improved by taking ORYZA POLYAMINE-P.

### 5. Anti-glycation: Promote the formation of collagen matrix

The effect of ORYZA POLYAMINE on glycated fibroblasts and collagen formation



The thickness of collagen in the control cell became thin compared with normal cell by adding of glyoxal. Glyoxal is well known to destroy the collagen matrix as glycation inducer. Meanwhile the cells with ORYZA POLYAMINE showed to recover the thickness of collagen even though glyoxal were added. It was found that ORYZA POLYAMINE can prevent the glycation of fibroblasts and maintain the good collagen matrix condition.

ORYZA POLYAMINE	
Type	Water soluble powder (P)
Polyamine	Min. 0.2%
Recommended dosage	50mg to 100mg per day
Safety data	Acute Toxicity (LD50): 2,000mg/kg Ames test: Negative

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