

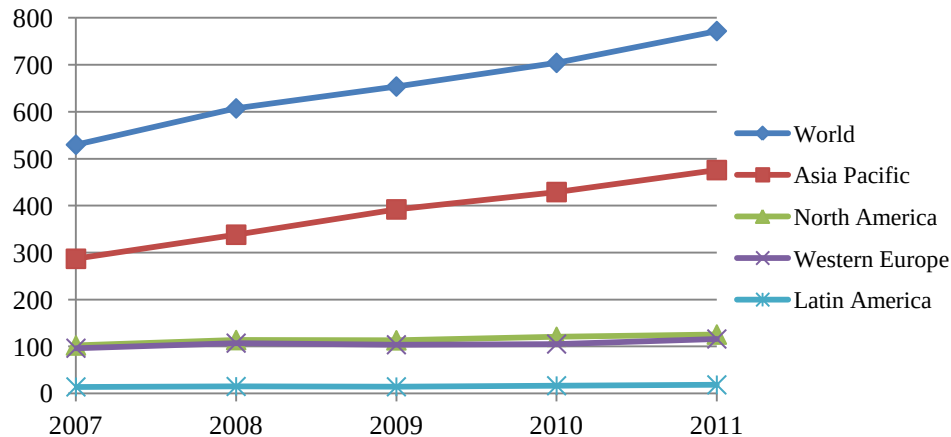
Recent Technology and Products for Anti-Hair Loss



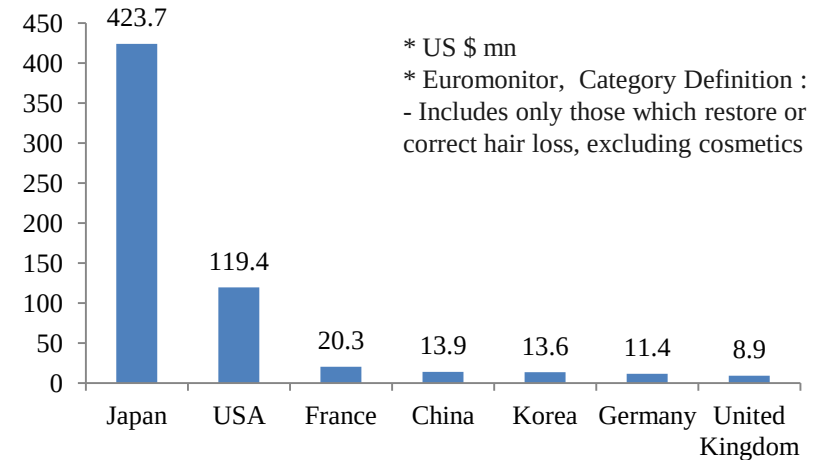
AMORE PACIFIC
R&D Center

Hair Loss Treatment Market

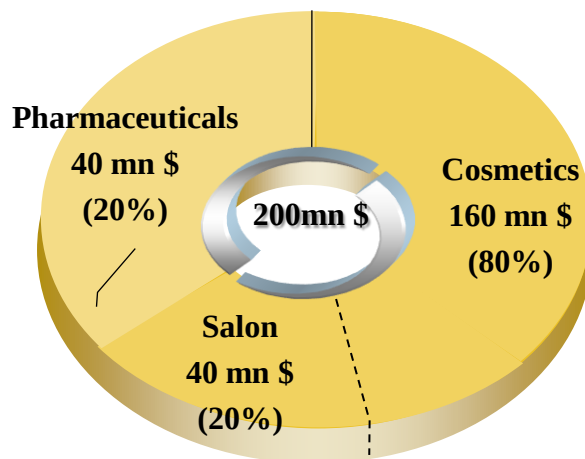
Global Market size for 5 years



Market size in 2011



Estimation the size of Anti-hair loss market in Korea



(08' Economy21 Magazine)

[Evolution of Scalp care market in Korea]

Self care → Receiving scalp & hair treatment in Salon

Anti-hair loss + Head Spa Market size is estimated 2 bn \$.

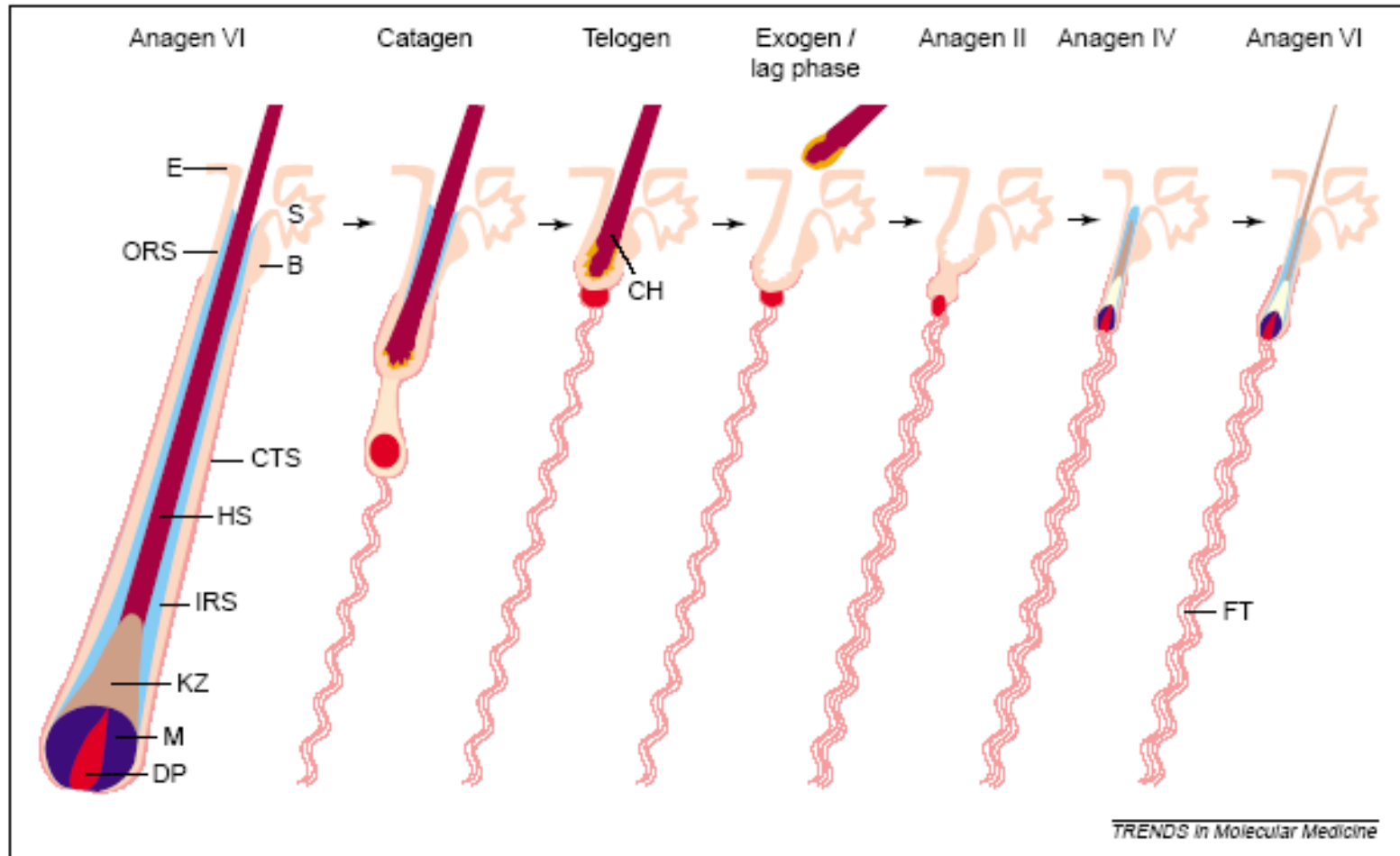
Market of Scalp care products is 200 mn \$.

[cosmetics +Quasi-drugs 80% : Pharmaceutical products 20%]

The Symptoms and Causes of Hair Loss

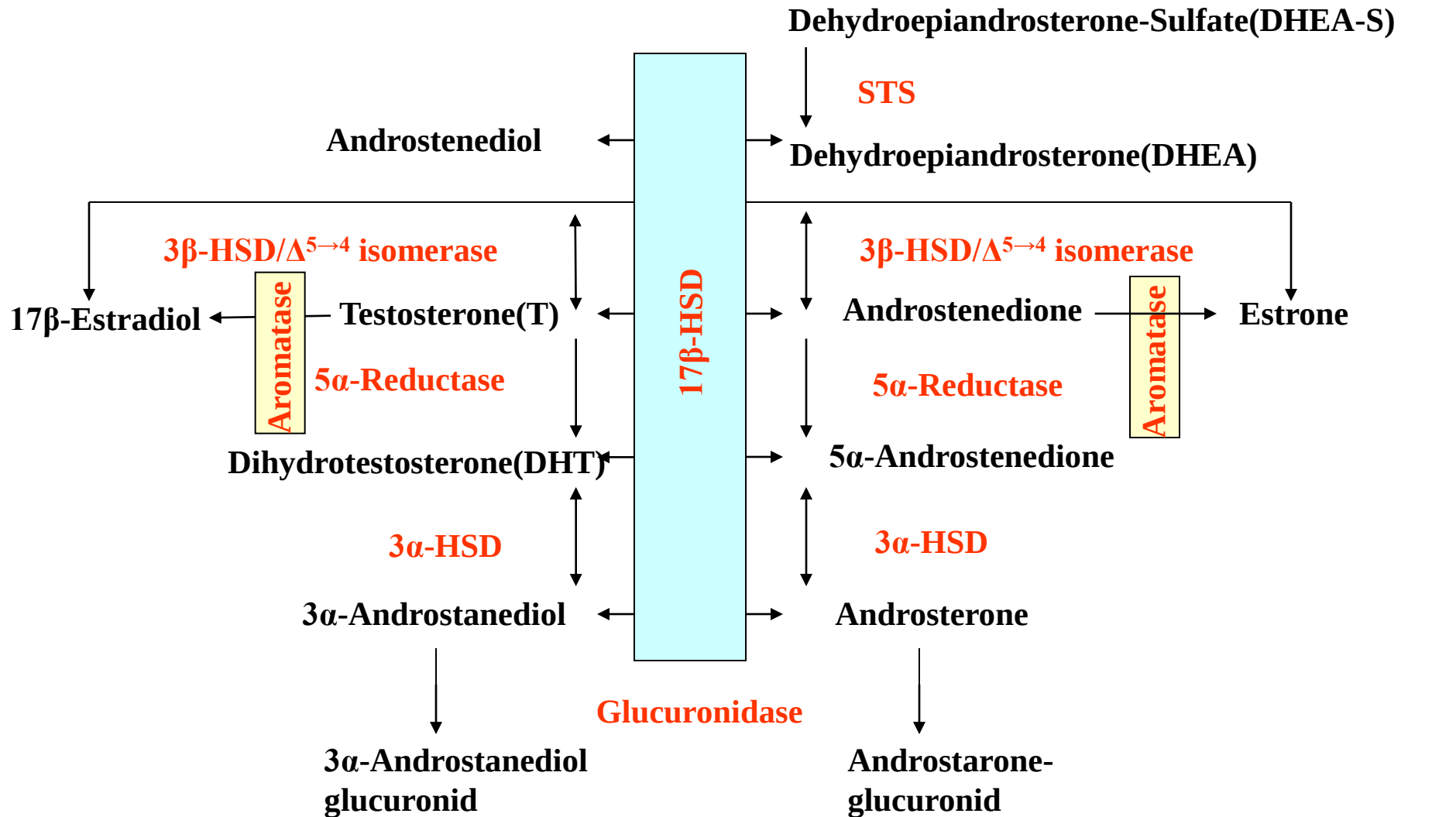
Diagnosis	Causes and Featured Symptoms
Androgenetic Alopecia	■ The leading cause of bald (genetic reason, testosterone)
Alopecia Areata	■ Causes bald spots on scalp, or spread to the entire scalp. (Alopecia Totalis) ■ Autoimmunity defect by stress ■ Can be cured by continuous treatment
Postpartum Telogen Effluvium	■ A reactive process caused by a metabolic or hormonal stress ■ A form of hair loss where more than normal amounts of hair fall out
Endocrine Disorder	■ Malfunction of hypothalamus, hypothyroidism, diabetes
Nutrition Lesion, Disturbances of metabolism	■ Disorder of nutrition
Medical Substances	■ Anticancer drug ■ Suppression of germinal matrix division
Traumatic Alopecia	■ Induced by physical trauma. ■ Traction, Pressure, Tricotillomania(mental illness)
Skin disease	■ External factor : parasite, worm, ■ Internal factor : food, drugs, blood vessel system ■ Sectional pruritus : alopecia seborrheica, dandruff
Cicatricial Alopecia	■ Chemical exogenic reasons (acid,alkali), Physical exogenic reasons (radiation)

Miniaturizing Process of Hair Bulb in Androgenetic Alopecia



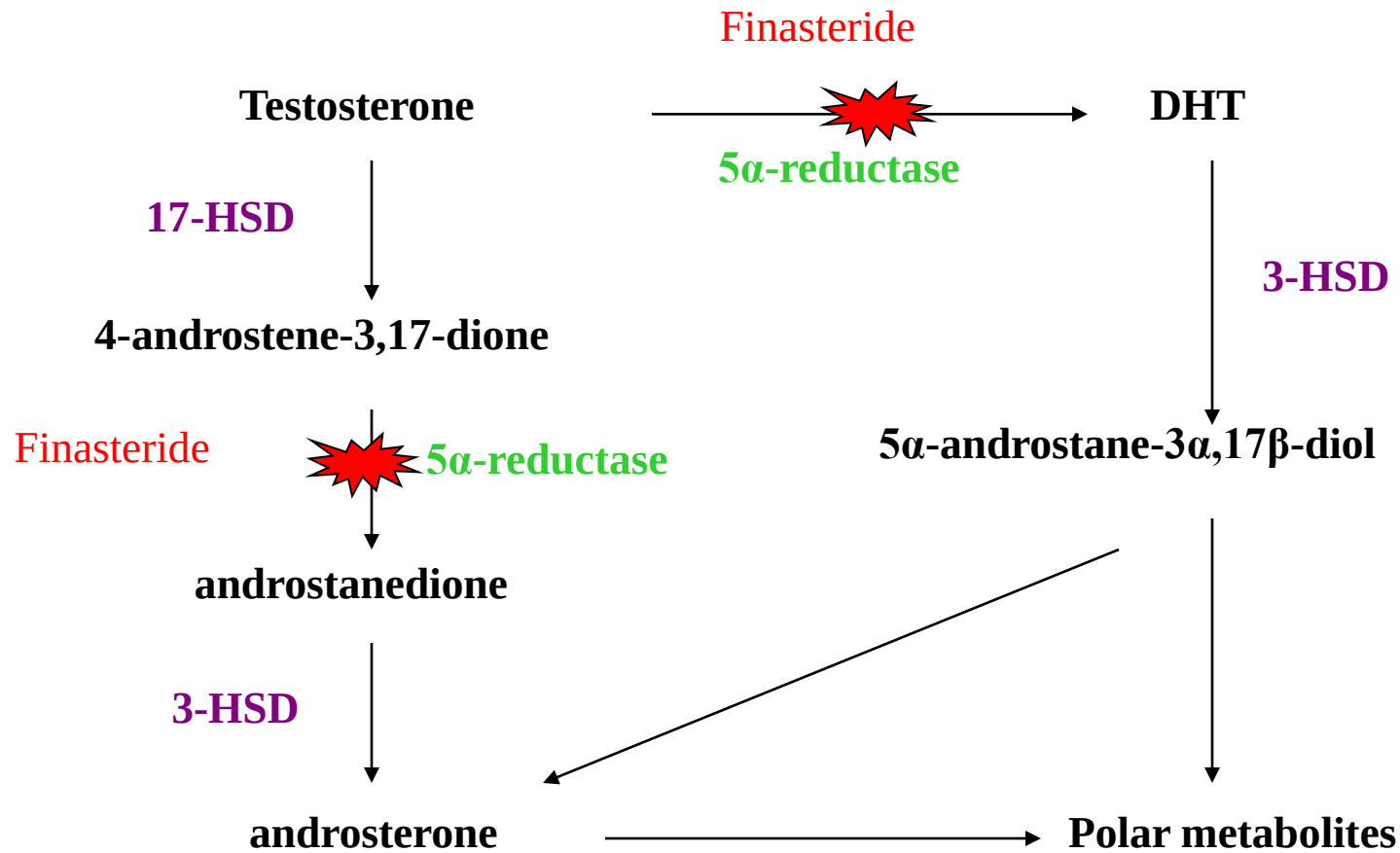
(TRENDS in Molecular Medicine Vol.7 No.7 July 2001)

The Metabolism of Male Sex Hormone

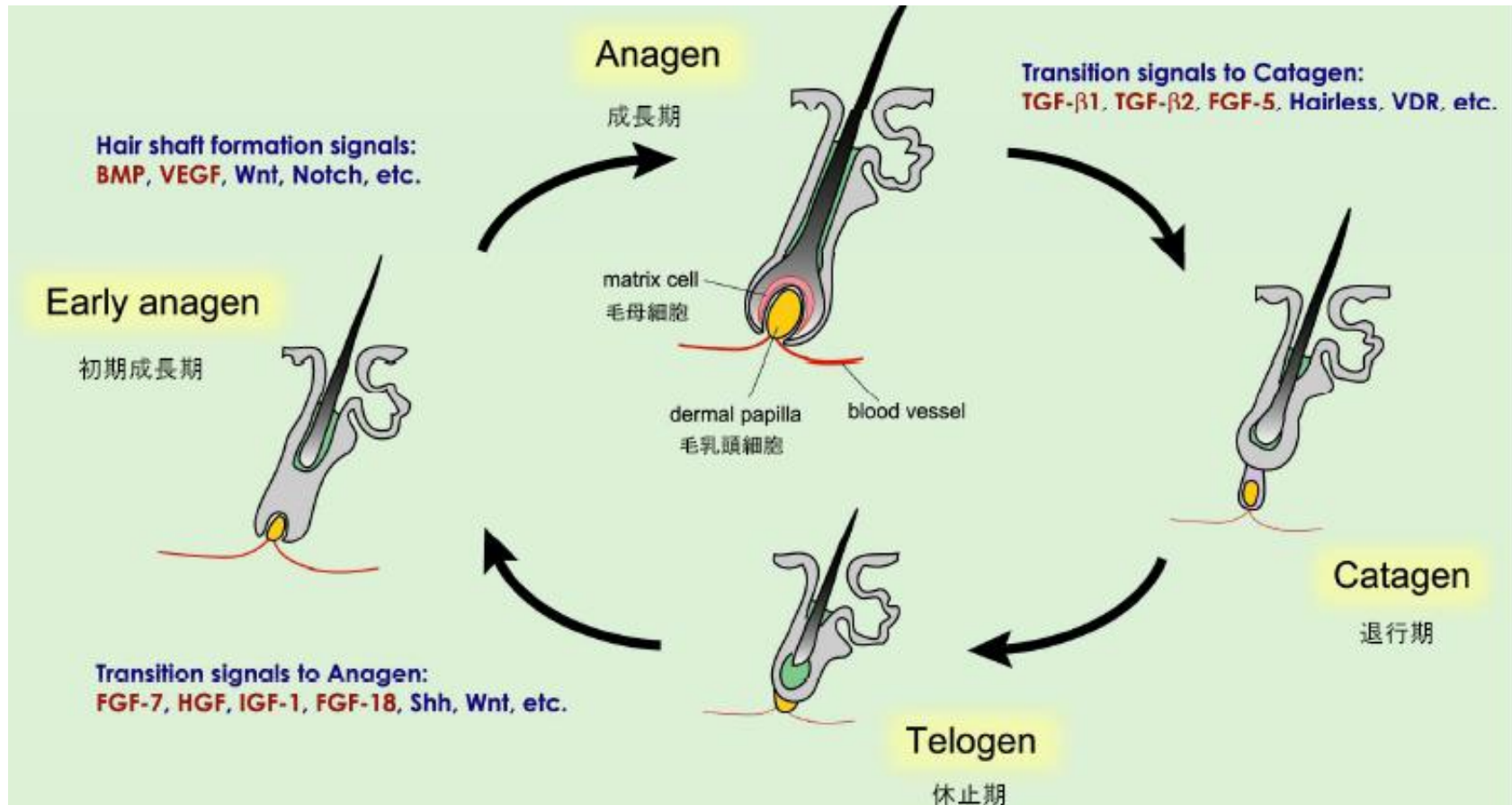


(Eur. J. Dermatol., 2000, 10, 319-326)

The Mechanism of Propecia (medicine)



Target Parameters of Anti-Hair Loss Treatment by Regulating Hair Cycle



BMP Bone Morphogenetic Protein
VEGF Vascular endothelial Growth Factor

FGF Fibroblast Growth Factor
HGF Hepatocyte Growth Factor
IGF Insulin Growth Factor

TGF Transforming Growth Factor

Research Trend of Anti-Hair Loss and Related Products

Stimulation of
FGF-7 (adenosine; Shiseido),
BMP-2 (benzyl aminopurine; Lion)



Suppression of
FGF-5 expression (Kao)

Inhibition of androgen

-5 α -Reductase inhibitor(Finasteride)
-TGF-beta suppressor
(Morus root extract, Sophora extract)



Proliferation of
Dermal papilla cells

-IGF-1, IGFBP-3, HGF

Modulation of Curling

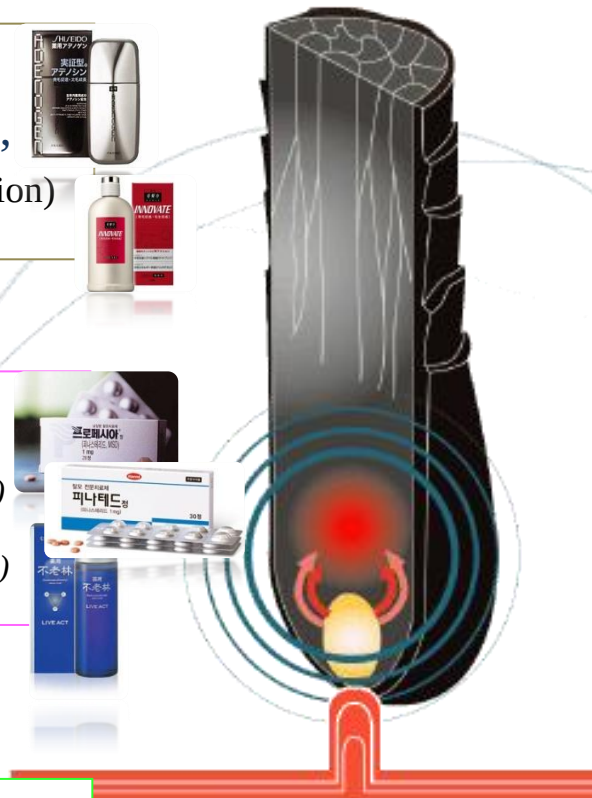
-Ethnic Hair (Loreal)

Anti-Graying

-MITF upregulation (Shiseido)
-Anti-apoptosis(Bcl-2; Loreal)
-TRP-2 upregulation (Loreal)

Stimulation of VEGF

Minoxidil foam (J&J)
Adenosine(Shiseido)
Evolvulus alsinoides extract(POLA)



Claimed Points and Effective Ingredients of Anti-Hair Loss Products

1. Stimulation of Blood Circulation

Ingredients	Product	company
Minoxidil	Regaine, Rogaine, RiUP, Minoxil,	Pharmacia & Upjohn, Hyundai pharm, hanmi pharm
Pyrimidine-3-N-Oxide Derivatives	Aminexil	L'oreal
Dialkylmonoamine Derivatives	藥用 紫電改 Z	Kanebo
Vitamin E acetate	Karoyan, Success Tonic, 藥用毛髮力 M power RADKAM	Kao, Lion, Jeil Pharm.
Swertiall	Karoyan, Success Tonic, 藥用毛髮力 M power	Kao, Lion, Jeil Pharm.
Nicotic acid amide	藥用 不老林 Live ACT	Shiseido, LG
Benzyl nicotinate	藥用 不老林 Live ACT, 藥用 紫電改 Z, Mo & Moa	Shiseido, Lion, LG
Dialkylmonoamine Derivatives	藥用 紫電改 Z	Kanebo
Sophora		Shiseido
Staphylea bumalda extract	Success hair active	Kao
Pantothenyl ethylether	藥用 不老林 Live ACT RADKAM	Shiseido
Adenosine	Adenogen, Adenogengracy	Shiseido
t- flavanone	Success Tonic, Segreta scalp essence	Kao

2. Regulation of Testosterone

Ingredients	Product	company
Finasteride	Finasteride	Merk
Eugenyl glucoside	藥用紫電改 Z	Kanebo
Sophora flavescens Aiton extract		LG

3. Activation of Dermal Papilla Cell

Ingredients	Product	Company
Pentadecanglyceride (PDG)	藥用毛髮力 M power	Kanebo
Hinokitiol	RADKAM	
Pyridoxine HCL(Vit. B6)	RADKAM	
D-panthenol	藥用紫電改 Z	Kanebo

4. Scalp moisturization

Ingredients	Product	Company
paeonia suffruticosa extract	藥用 不老林 Live ACT	Shiseido
cuachalalate (juliania adstringent) extract	藥用 不老林 Live ACT	Shiseido
Coleus extract	藥用毛髮力 M power	Liom
Biofluorine	kearastase biotic	Loreal
Coix extract	Mo & Moa	LG

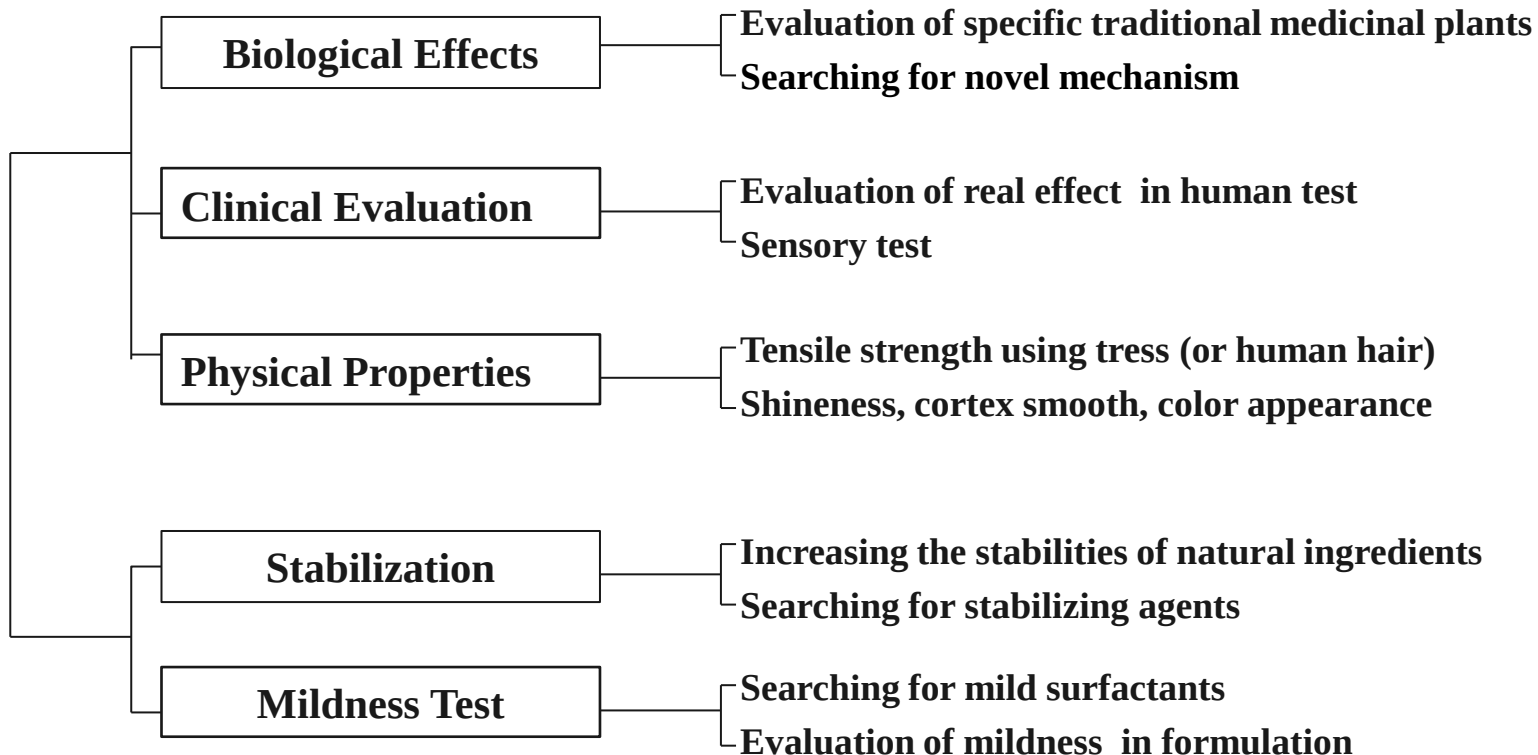
Research flow of AmorePacific

Research Method

The Selection of Candidate Material

Refer to the Oriental traditional medical book and folk remedies

Ex) Donguibogam, Korean traditional medical book



Previous Study Results

Activity evaluation of *Thujae occidentalis* semen (TOS) extract

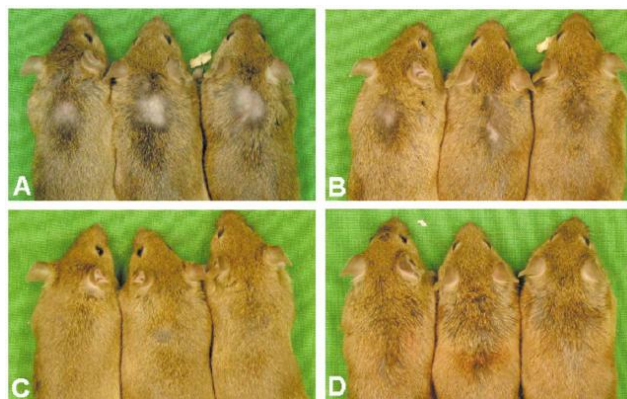
- In our search for 5α -reductase inhibitor from oriental medicinal plants (340 species), we found that the extract of *Thujae occidentalis* semen (TOS) is effective for inhibition of 5α -reductase
- The leaves and the fruits of *Thujae occidentalis* have been known as well to serve as an oriental herbal medicine for the treatment of renopathy, leukotrichia and alopecia



***Thujae occidentalis* semen (TOS)**

< IC₅₀ values in HEK293-5 α R2 cell line >

Compound	IC ₅₀ values
Linoleic acid	31.55 μ g/ml
γ -Linoleic acid	5.55 μ g/ml
TOS extract	2.6 μ g/ml



A : testosterone

B : testosterone + vehicle

C : testosterone + 5% cyproterone acetate (CA)

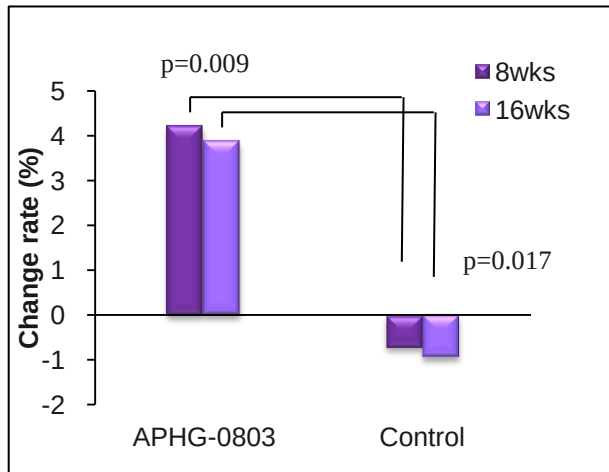
D : testosterone + 1% TOS extract

Previous Study Results

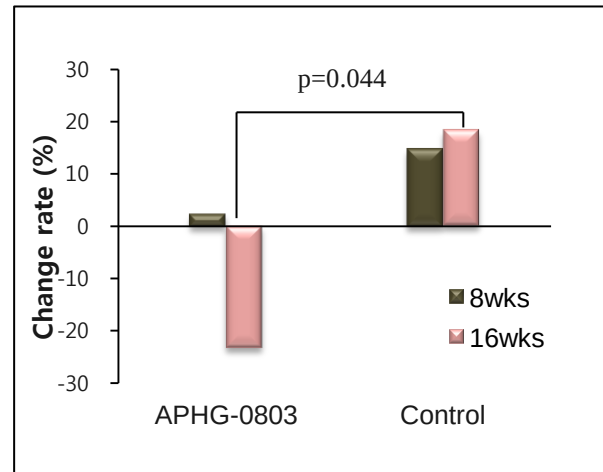
Clinical test (total 40 volunteers)

- 20 people used APHG-0803 shampoo (including TOS extract) and the other 20 people used control shampoo once in a day
- For the base line, hairs on the transitional zone was shaved (1.5cm in diameter)
- Shed hair count, phototrichogram parameters (total hair count, anagen/ telogen ratio)
- Statistical analysis : wilcoxon signed-rank test or two sample T test

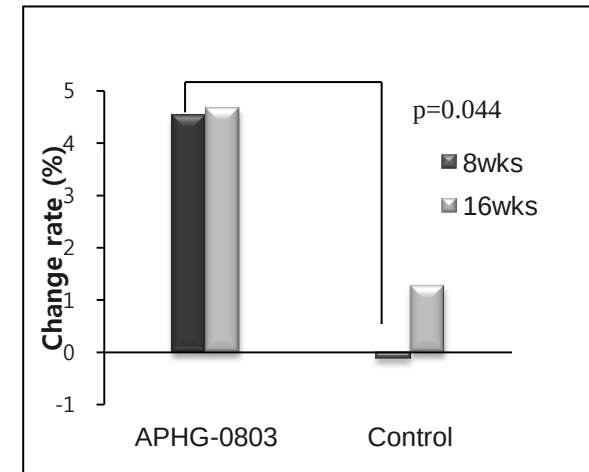
Total Hair Counts



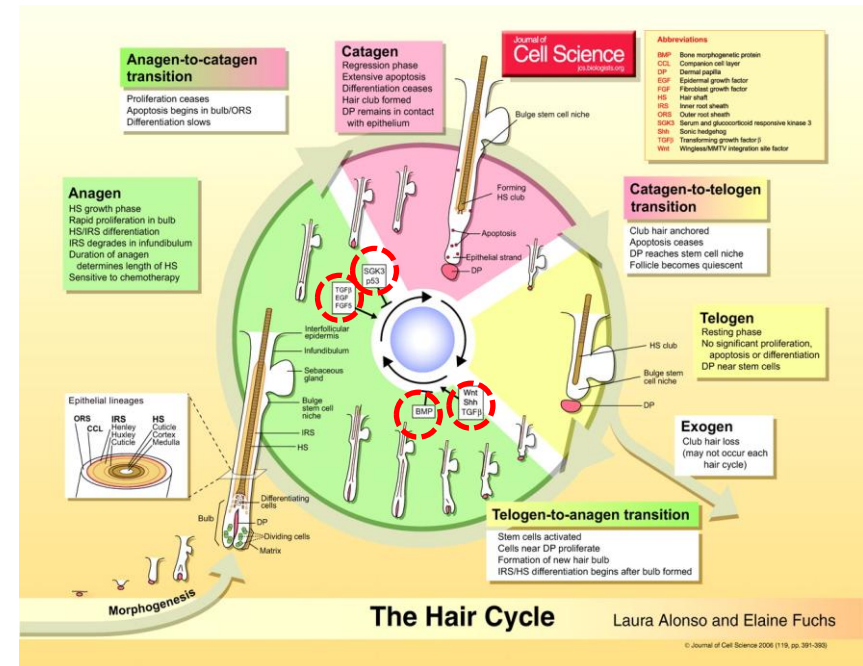
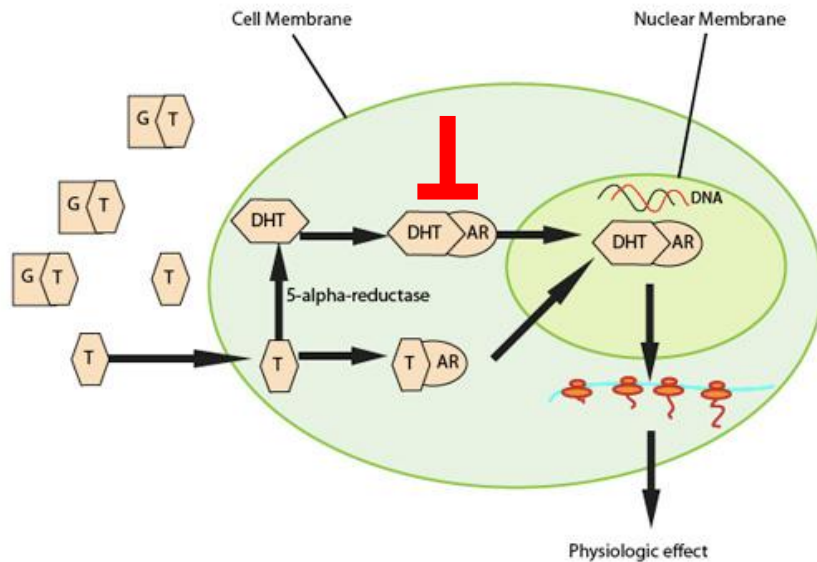
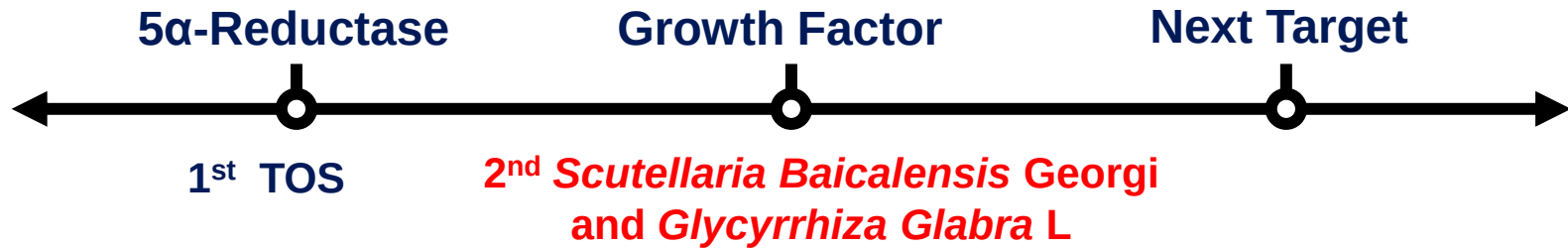
Fallen Hair Counts



Terminal Hair Counts



Approach Method



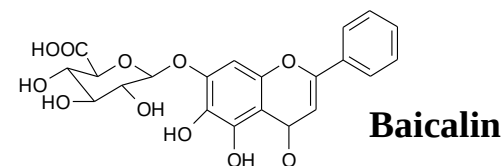
Approach Method

Verification of Anti-Hair Loss Effects (in vitro)

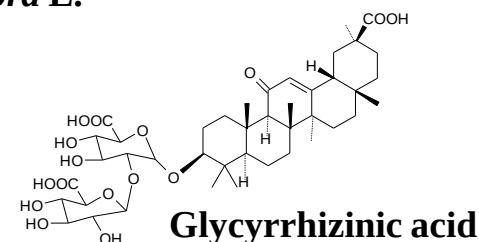
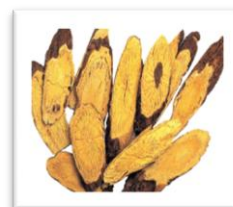
Categories	Assay List
Growth Factors assay	▪ Stimulation of IGF ▪ Suppression of EGF ▪ Suppression of TGF-β ▪ Stimulation of FGF
Anti-androgen effect	▪ Inhibition of Androgen Receptor



Scutellaria baicalensis Georgi



Glycyrrhiza glabra L.



The usage in Oriental traditional medical book

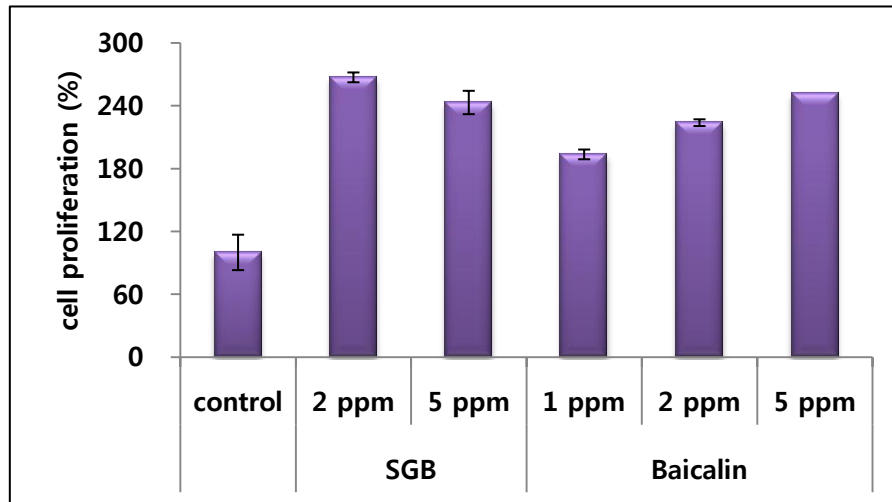
<i>Scutellaria baicalensis</i> Georgi	Scutellaria baicalensis Georgi (SBG) is the representative traditional plant for the treatment of inflammation, anti-oxidant and alopecia. In oriental medicine, its property is cold and it is belived that SBG extract can bring down fever (anti-inflammation)
<i>Glycyrrhiza glabra</i> L.	Licorice (<i>Glycyrrhiza glabra</i> L., GGL) is also frequently used in traditional medicine to treat inflammatory and allergic diseases and widely used in pharmaceutical. Especially dipotassium glycyrrhizinate originated from licorice is very famous for alopecia

Experimental Results

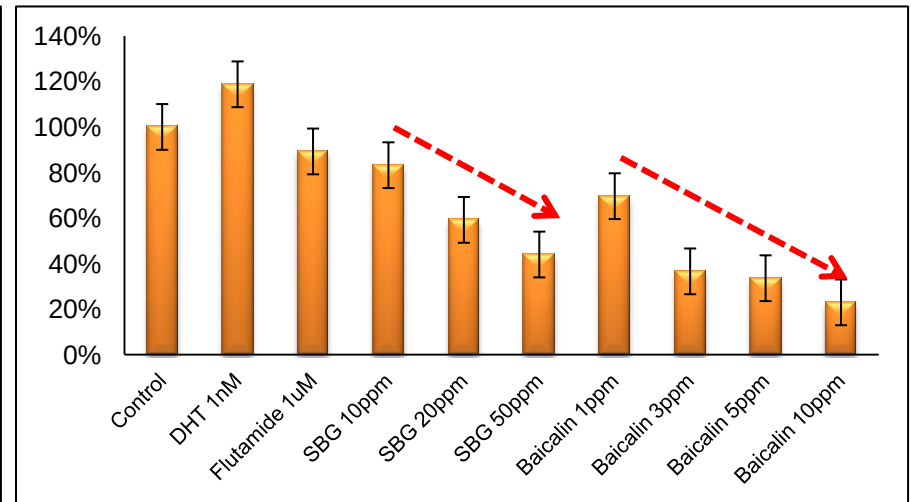
Biological Effects of *Scutellaria baicalensis* Georgi (SBG)

- The androgen receptor is an intracellular steroid receptor that specifically binds testosterone and dihydrotestosterone. Flutamide is used as a positive control and SBG extract is the effective inhibitor of androgen receptor. Baicalin, which is the main component of SBG, also can decrease the binding affinity dose-dependently.

<DPC proliferation Assay>



<Androgen Receptor Inhibition Assay>

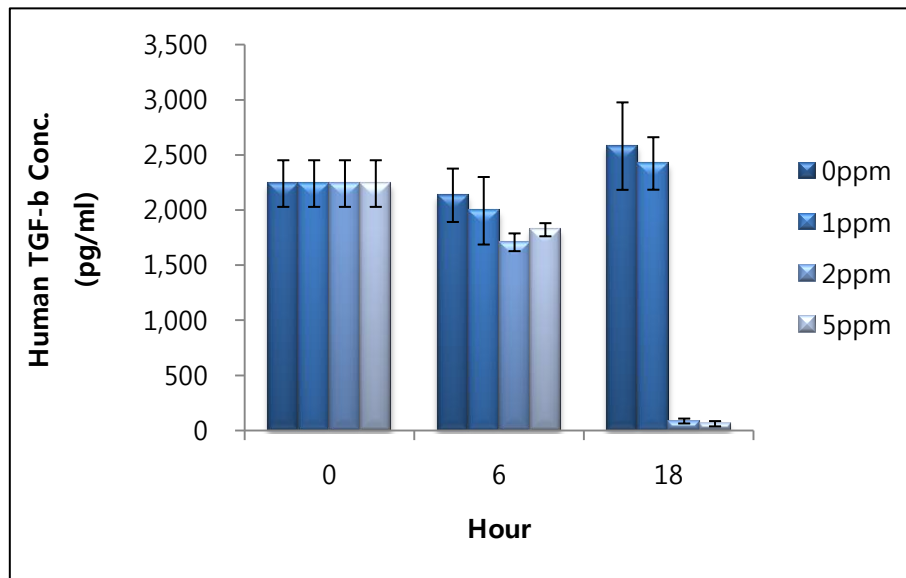


Experimental Results

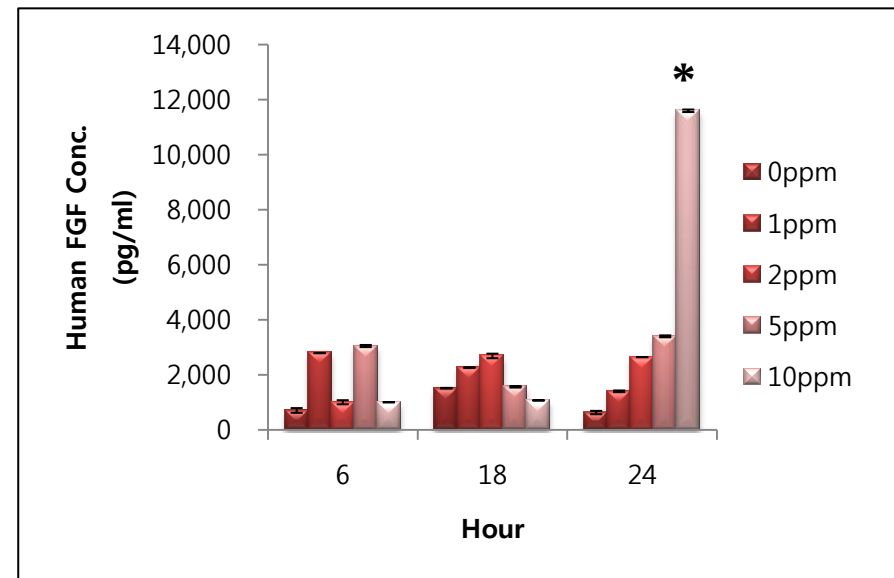
Biological Effects of *Glycyrrhiza glabra* L. (GGL)

- Transforming growth factor (TGF- β) plays important roles in the induction of catagen during the hair cycle. Licorice (*Glycyrrhiza glabra* L., GGL) extract can effectively suppress TGF-beta action.
- Production of Fibroblast growth factor (FGF) is increased by GGL extract, especially it showed the highest activity at 10ppm, respectively.

<Inhibition of TGF- β >



<Activation of basic-FGF>



Anti -Hair Loss Quasi-Drug of Amorepacific : 룬 (Ryo)



룬 (Ryo)
Anti-hair loss
Quasi -drug products

- Shampoo
- Scalp & Hair Pack
- Scalp Essence

Clinical Results of 呂(Ryo) Anti-hair loss shampoo

Clinical Evaluation Methods

- 40 volunteers , four-block randomized
- 20 people used RJ shampoo and the other 20 people used control shampoo once in a day
- For the base line, hairs on the transitional zone was shaved (1.5cm in diameter)
- Shed hair count, phototrichogram parameters (total hair counts and hair diameter)

Volunteers Information

	Number	Age (year)	Total Hair Counts (N/cm ²)	Hair Diameters (mm)
Control	20.00	41.65	100.60	0.068
RJ group	20.00	42.05	110.11	0.063

Phototrichogram evaluation

1. Total hair count (number/cm²)
2. Hair diameter (mm)

Shampoo Formulation

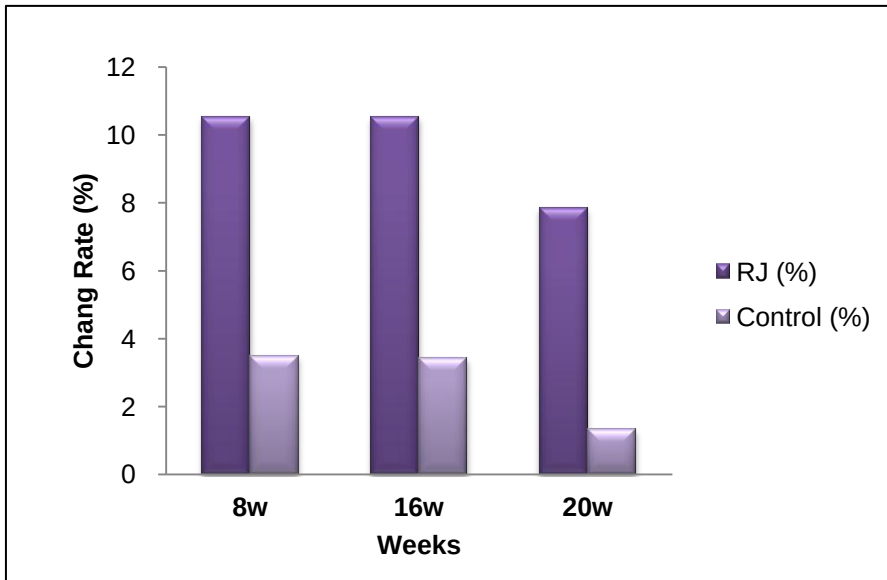
Ingredient	Control	RJ
Deionized water	To 100	To 100
Ammonium lauryl sulfate (25%)	30	30
Zinc pyrithione(48%)	0.6	0.6
SBG extract	-	0.1
GGL extract	-	0.1
Ammonium lauryl ether sulfate(25%)	20	20
Soyamidopropyl amine oxide(25%)	5	5
Polyquaternium 10	0.2	0.2
EDTA 2Na	0.02	0.02
Phenoxyethanol	0.9	0.9
Fragrance	1.0	1.0

Clinical Results of 呂(Ryo) Anti-hair loss shampoo

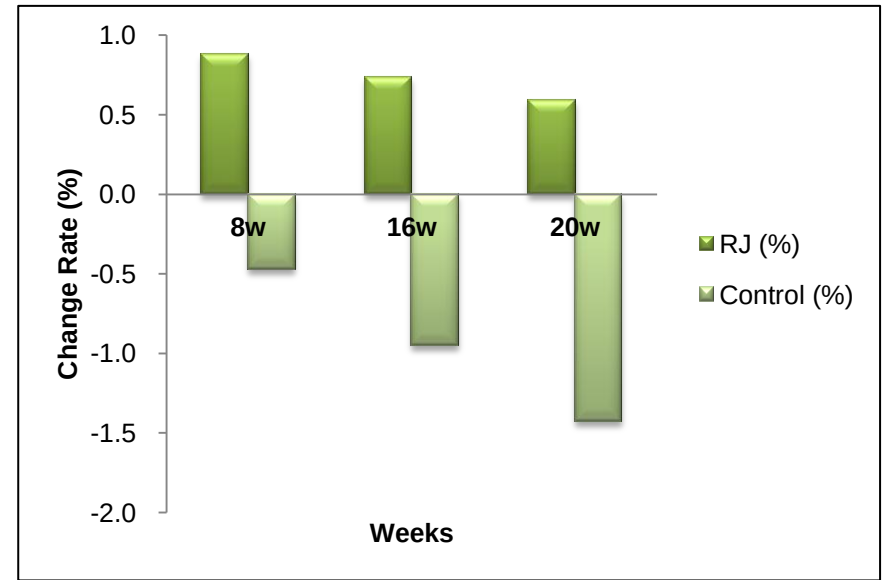
Phototrichogram results

- The results of phototrichogram analysis showed that the total hair count and hair diameter of RJ group (test group) increased respectively.
- The RJ group showed great effect compared to control group respectively.

Total Hair Counts (number/cm²)



Hair Diameter (mm)



Clinical Results of 呂(Ryo) Anti-hair loss shampoo

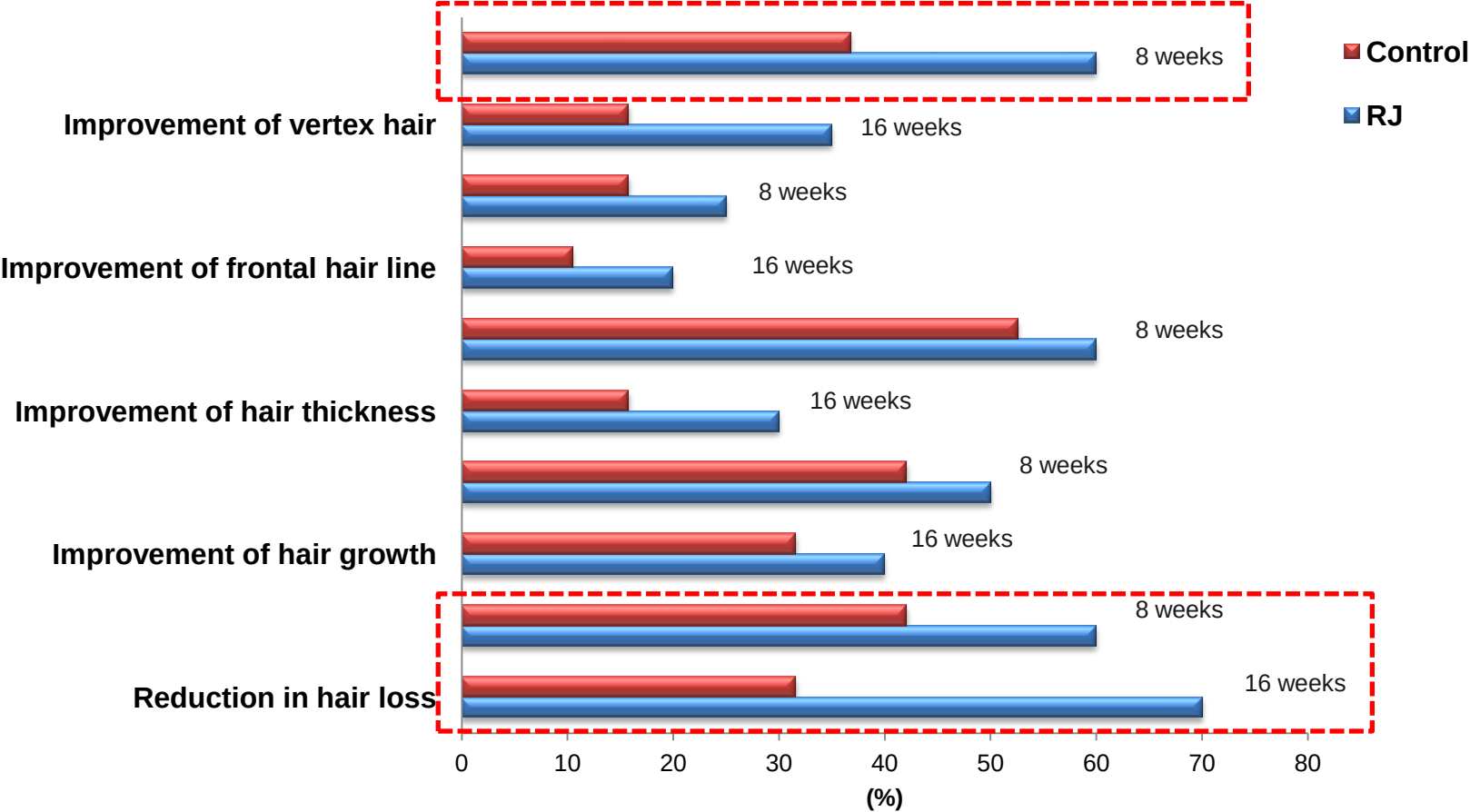
Clinical photography results

- The clinical photography shows that the hair density of RJ group increased compared to control group respectively.



Clinical Results of 呂(Ryo) Anti-hair loss shampoo

Comparison of self-sensory affirmative evaluations



Clinical Results of 呂 (Ryo) Scalp & Hair Pack

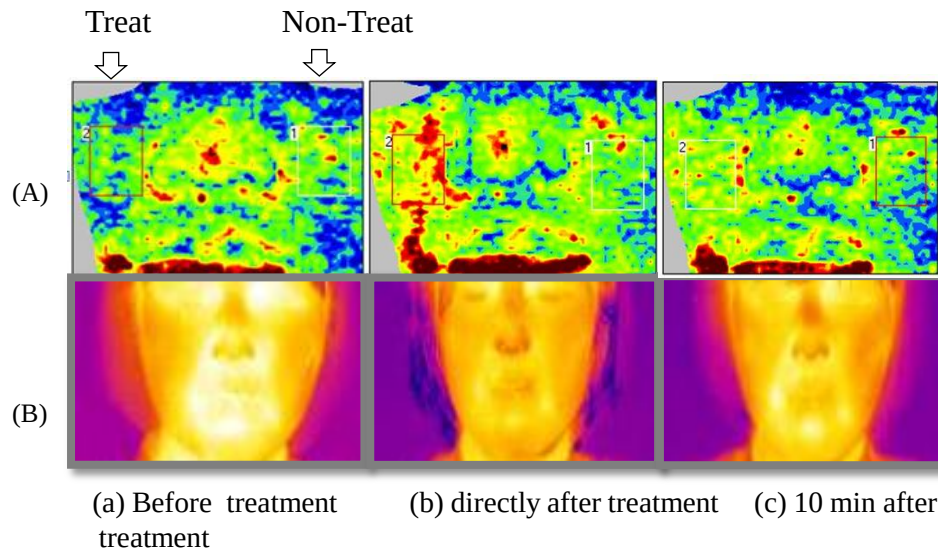
Clinical test results



(a) Decrease the number of fallen hair

(b) Increase hair diameter

(c) Increase rate of hair growth



(A) Measurement of the temperature of skin by LDI (laser Direct Imaging),.

(B) Imaging of skin that before and after treatment of Ryo scalp & hair pack by IR imaging camera.

- (a) Before treatment,
- (b) directly after the treatment of Ryo scalp & hair pack and wash-off,
- (c) 10 minutes after the treatment.



Conclusion

1. Recently, various effects of Korean traditional medicinal plants are studied in the field of hair-care product.
2. In the previous study, *Thuja occidentalis* semen extract showed an inhibitory effect on human 5 α -Reductase and also showed retardation of hair loss in 16 weeks clinical test.
3. *Scutellaria baicalensis* Georgi and *Glycyrrhiza glabra* L. can control the growth factors related to hair-loss and be the regulators of Androgen Receptor.
4. *Scutellaria baicalensis* Georgi and *Glycyrrhiza glabra* L. showed anti-hair loss effects in clinical tests.
5. Anti-hair loss quasi-drugs and cosmetics related with scalp care are increasing, and types of products will be highly diversifying.

A modern architectural rendering of a building with a large overhang and a green courtyard. The building features a long, low profile with a prominent overhang supported by a series of columns. The courtyard is lush with green grass and several young trees. A curved path leads through the courtyard. The overall atmosphere is clean and contemporary.

THANK YOU

AMOREPACIFIC