

12th Annual Meeting of The Korean Hair Research Society

제12차 대한모발학회 학술대회



- 일시 : 2016년 5월 29일(일) 09:00~16:30
- 장소 : 가톨릭대학교 서울성모병원 지하1층 대강당

대 한 모 발 학 회



초대의 글



대한모발학회 회원 여러분 안녕하십니까.

희망찬 2016년의 봄을 맞이하여 회원님들의 가정과 직장에 행복과 기쁨이 충만하기를 기원합니다. 대한모발학회에서는 다가오는 2016년 5월 29일 일요일, 가톨릭의대 서울성모병원 지하 1층 강당에서 『제12차 대한모발학회 학술대회』을 개최하게 되었습니다.

여러 회원들의 적극적인 참여로 11차에 걸친 지난 대한모발학회 학술대회가 성황리에 마무리되었음에 감사의 말씀을 드립니다. 이번 『제12차 대한모발학회 학술대회』는 영어 세션과 한국어/영어 혼용 세션으로 구성되어 있으며, 1) Free communications, 2) Progress in Hair Biology, 3) Update in Hair Disorders, 4) Cosmetics & Devices 세션으로 나뉘어 진행될 예정입니다.

이번 학술대회에서는 국내외 저명한 연자들을 모시고 모발 연구 및 임상분야와 관련된 다양한 강연을 준비하였습니다. Xingqi Zhang 교수 (First Affiliated Hospital of Sun Yat-sen University, Guangzhou, China), Joyce Lee 교수 (National Skin Center, Singapore), Koh-ei Toyoshima 박사 (Center for Developmental Biology RIKEN, Japan), Shigeki Inui 교수 (Department of Regenerative Dermatology, Osaka University, Japan) 및 Ralph Trüeb 교수 (University of Zurich, Switzerland) 등 다섯 명의 강연이 준비되어 있습니다. 뿐만 아니라, 국내외 저명한 연자들께서도 모발 분야의 다양한 학문적 성과와 발전에 대하여 폭넓고 심도 있는 강연을 해주실 예정입니다.

이번 학술대회가 회원 여러분들께 모발관련 임상과 기초 연구 그리고 정보교환에 유익한 토론의 장으로써 적극 활용되기를 기대합니다. 지금까지 대한모발학회에 보내주신 회원님들의 관심과 성원에 감사드리며 이번 『제12차 대한모발학회 학술대회』에도 열성적이고 적극적인 참여를 부탁드립니다. 감사합니다.

2016년 5월

대한모발학회 회장 **심우영**

제12차 대한모발학회 학술대회

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10:00	Coffee Break, Posters & Exhibition (10:10-10:35)
10:30	Opening Ceremony (10:35-10:45)
11:00	Session II. Progress in Hair Biology (English speaking session) (10:45-12:10)
11:30	
12:00	Group Photo (12:10-12:20)
12:30	Lunch / KHRS Board Meeting (12:20-13:30)
13:00	
13:30	Session III. Update in Hair Disorders (English & Korean speaking session) (13:30-14:40)
14:00	
14:30	Coffee Break, Posters & Exhibition (14:40-15:00)
15:00	Session IV. Cosmetics & Devices (English & Korean speaking session) (15:00-16:25)
15:30	
16:00	Closing Remark (16:25-16:30)
16:30	KHRS General Assembly (16:30-)

프 로 그 램

08:20-09:00 Registration

Session I	Free Communications (Korean-speaking session) Chairs: Chang Kwun Hong (<i>Chung-Ang Univ.</i>), Jee Ho Choi (<i>Univ. of Ulsan</i>)
09:00-09:08	Klotho might be an important regulatory factor for human hair growth Long-Quan Pi et al. (<i>Yonsei University Wonju College of Medicine</i>)
09:08-09:16	Therapeutic effects of growth factor cocktail including FGF9 in patients with androgenetic alopecia Suk Young Lee et al. (<i>Seonam University College of Medicine</i>)
09:16-09:24	Isolation of malassezia species from Chinese and Korean patients with scalp seborrheic dermatitis Soo Young Kim et al. (<i>Konkuk University School of Medicine</i>)
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09:40-09:48	Dermoscopy-assisted monitoring reduces steroid injections in alopecia areata Young In Lee et al. (<i>Yonsei University College of Medicine</i>)
09:48-09:55	An epidemiological study of alopecia in 4,012 Korean patients: 10-year single center follow up 홍지연 et al. (중앙의대)
09:55-10:02	Geometric alopecia underlying lupus erythematosus panniculitis of the scalp Su-Kyung Park et al. (<i>Chonbuk National University</i>)
10:02-10:10	Treatment of severe alopecia areata with tofacitinib: a case series Hyun-sun Park et al. (<i>SMG-SNU Boramae Medical Center</i>)
10:10-10:35	Coffee Break, Posters & Exhibition
10:35-10:45	Opening Ceremony Opening Address Woo Young Sim (<i>President, Korean Hair Research Society</i>) Congratulatory Address Jee Ho Choi (<i>President, Korean Dermatological Association</i>)

Session II	Progress in Hair Biology (English-speaking session) Chairs: Woo Young Sim (<i>Kyung Hee Univ.</i>), Hoon Kang (<i>Catholic Univ.</i>)
10:45-11:10	Clinical aspect of alopecia areata on pathogenic factors and treatment Xingqi Zhang (<i>First Affiliated Hospital of Sun Yat-sen University, China</i>)
11:10-11:40	From bench to hair clinic: Leptin as an anagen inducer for red LED-induced hair growth stimulation Shigeki Inui (<i>Osaka University, Japan</i>)
11:40-12:10	Fully functional hair follicle regeneration via the in vitro reconstruction and transplantation of the bio-engineered hair follicle germs Koh-ei Toyoshima (<i>RIKEN, Japan</i>)
12:10-12:20	Group Photo
12:20-13:30	Lunch, KHRS Board Meeting
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13:30-13:55	Histopathological findings in alopecias: An overview Joyce Lee (<i>National Skin Center, Singapore</i>)
13:55-14:20	Alopecia areata progression index Do Won Kim (<i>Kyungpook National University, Korea</i>)
14:20-14:40	Quality of life in the patients with alopecia areata Gwang Seong Choi (<i>Inha University, Korea</i>)
14:40-15:00	Coffe Break, Posters & Exhibition
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15:00-15:20	<i>Hamamelis virginiana</i> -based scalp care and protection for sensitive scalp, red scalp, and scalp burn-out Ralph Trüeb (<i>University of Zurich, Switzerland</i>)
15:20-15:40	Basic mechanism and clinical application of the ADSC protein extract for hair regeneration Byung Soon Park (<i>CeLLPARK Clinic, Korea</i>)
15:40-15:55	Development of a robot-assisted automatic hair removal system Wooseok Koh (<i>JMO Dermatology Clinic, Korea</i>)
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제12차 대한모발학회 학술대회

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¹Department of Dermatology, Seoul National University College of Medicine, Seoul, Korea ²Laboratory of Cutaneous Aging and Hair Research, Biomedical Research Institute, Seoul National University Hospital, Institute of Human-Environment Interface Biology, Medical Research Center, Seoul National University, Seoul, Korea ³Department of Pathology and Graduate School of Immunology, Seoul National University College of Medicine, Seoul, Korea..... 65
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¹Dermatology, University of Colorado Denver School of Medicine, Aurora, CO, United States.
²Division of Dermatology, Denver Health Medical Center, Denver, CO, United States
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Session 1

Free Communications
(Korean-speaking session)



The Korean Hair Research Society

O1

Klotho might be an important regulatory factor for human hair growth

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The klotho gene, known as an “aging-suppressor” gene, increases the life span when it is over-expressed but hastens aging when it is disrupted in mice. Klotho-deficient mice display a complex phenotype reminiscent of human aging, including skin atrophy and hair loss. To date, klotho expression has only been detected in a few human tissues and cell lines. However, it is unclear whether klotho is expressed in human hair follicles and is correlated with hair growth. The purpose of this study was to investigate the expression and effects of klotho on human hair growth. We examined klotho expression patterns in human hair follicles from young as well as aged donors. Furthermore, we examined the functional roles of klotho on human hair growth using klotho recombinant protein. As results, klotho was expressed in human hair follicles at both gene and protein levels. In hair follicles, prominent klotho expression was mainly observed in the outermost regions of outer root sheath and hair bulb matrix cells. Quantification of klotho protein expression in young and aged donors showed that klotho expression decreased with aging. In human hair follicle organ culture, klotho prolonged human hair growth and delayed premature catagen induction. These results indicate that klotho might be an important regulatory factor for human hair growth.

O2

Therapeutic effects of growth factor cocktail including FGF9 in patients with androgenetic alopecia

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Growth factor cocktail (GFC) treatment in combination with microneedling in androgenetic alopecia (AGA) patients is effective and safe. However, there is a lack of study on its effect including fibroblast growth factor 9 (FGF9). Importance of FGF9 in hair follicle regeneration was reported. The aim was to evaluate the efficacy of GFC including FGF9 on AGA. The study was performed on AGA patients (9 males and 9 females) who were treated with topical GFC including FGF9 with microneedling once in 2 weeks for 3 months. The scalp was divided to right and left and treated with GFC including FGF9 and normal saline, respectively; both sides were treated 0.5mm depth of microneedle. GFC including FGF9 was topically applied by a medical device of microneedle. Treatment efficacy was evaluated by phototrichogram and digital photograph analysis on 6 repeated treatments for 3 months. Phototrichogram of GFC including FGF9 and normal saline treated side on scalp showed 27.1/cm² and 5.4/cm² increase in hair density and 2.7μm and -0.6μm change in hair diameter, respectively. These results were statistically significant except hair diameter in normal saline side. In density and diameter, GFC including FGF9 was significantly more effective than in normal saline. GFC including FGF9 treatment was compared with ordinary GFC which is a GFC without FGF9, and was more effective in hair density compared to ordinary GFC. More research is necessary to confirm the study results and determine the most effective factor with various factors of GFC.

O3

Isolation of malassezia species from Chinese and Korean patients with scalp seborrheic dermatitis

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We investigated the distribution of *Malassezia* yeast in 120 Chinese and 20 Korean patients with scalp seborrheic dermatitis (SD) and dandruff (SD/D) using ITS1 and ITS2 PCR-RFLP. Bioactivity was studied by quantifying sebum lipid production by human primary sebocytes and inflammatory cytokine, interleukin-8 (IL-8) production was studied by exposing HaCaT keratinocytes with extracts of five standard *Malassezia* strains: *M. globosa*, *M. restricta*, *M. sympodialis*, *M. dermatis* and *M. slooffiae*. *M. restricta* and *M. globosa* were the most frequently encountered species from both Chinese and Korean patients. These two *Malassezia* species also promoted neutral lipid synthesis and induced significant increase in IL-8 production among the five *Malassezia* species studied.

O4

프로스타글란딘과 다른 전사인자에 의한 모유두세포에서의 안드로겐 수용체 활성화

정관호, 손기민, 김정은, 강훈

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In androgenetic alopecia (AGA), dihydrotestosterone (DHT) binding to androgen receptors activates genes responsible for the gradual miniaturization of terminal hair follicles. Prostaglandin D2 (PGD2) is involved in various inflammatory disorders, and recent studies suggested its role in the pathogenesis of AGA. PGD2 binds to G protein coupled receptors referred to CRTh2 and post-transcriptional pathway of androgen receptor (AR) on dermal papilla cell (DPC) remains unclear. In this study, we suggest that CRTh2 may play an important role in DHT-AR pathway. First, we examined the effect of DHT on DPCs using real time-PCR and Western blot assay. AR, type 2 5α -reductase, PGD2 synthase and CRTh2 were upregulated in 100nM DHT-treated DPCs. Second, we antagonized CRTh2 in the DHT-treated DPCs. The expression of CRTh2 and AR markedly decreased in antagonist treated group. In addition, we examined the expression of AR related transcription factors and apoptosis related genes in the DHT-treated DPCs. Finally, using immunocytochemistry, we could demonstrate the expression of CRTh2 and AR on the DHT-treated DPCs. These findings suggest that AR activation may be related with CRTh2 as well as apoptosis and regulated by other transcription factors. These effects might positively act on DPCs and PGD2 inhibition could be the therapeutic option for AGA in the future.

O5
SFRP2 augments Wnt/ β -catenin signaling in cultured dermal papilla cells

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Recent studies have been reported that Wnt signaling maintains the hair-inducing signal of dermal papilla cells through the β -catenin pathway, and demonstrated that the β -catenin activity of Wnt signaling is correlated with trichogenicity. Activity of the Wnt signaling is regulated by secreted inhibitors. Among these, SFRP2 has generally been considered as antagonists of canonical Wnt signaling. However, several studies have found that SFRP2 can also enhance Wnt-mediated signaling. Here, we showed that SFRP2 augments Wnt3a-mediated increases in the transcriptional activity of β -catenin. In line with this, we observed Wnt3a-mediated elevation of β -catenin signaling is much higher in beard DP cells where SFRP2 expression is significantly higher compared with DP cells of scalp hair follicles. The effects of SFRP2 in human DP cells on hair follicle neogenesis have not been reported. Therefore, to elucidate the possible role of SFRP2 in hair follicle neogenesis, we performed siRNA-mediated gene knockdown approach and formed spheroid to restore hair-inductive capacity. And then, DP spheres were mixed with mouse epidermal cell and implanted into nude mouse. We found that the ablation of SFRP2 in human DP cells did not recover hair trichogenicity. In this study, we found that SFRP2 augments Wnt3a-mediated β -catenin signaling in human DP cells. Moreover, SFRP2 in human DP cells is believed to be involved in hair follicle neogenesis.

O6

Dermoscopy-assisted monitoring reduces steroid injections in alopecia areata

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Dermoscopic evaluation noting black dots, exclamation marks, and broken hairs allows us to assess active hair loss in patients with AA. Here we report the treatment and monitoring of patients with localized AA and the subsequent assessment of disease activity using serial dermoscopy and a hair pull test (HPT). We retrospectively analysed 155 alopecic patches from 104 patients, involving limited area of the scalp and treated with intralesional steroid injections, from 2012 to 2015. Disease activity was assessed with a modified HPT in 49 patients, and an additional serial dermoscopic evaluation was used in 55 patients. The intralesional triamcinolone acetonide (5 mg/ml) was administered until AA disease activity ceased. Discontinuing treatment once the disease became inactive resulted in 89.0% and 84.1% of the response rate in patients received only HPT and serial dermoscopy/HPT. Response rate and relapse showed no meaningful differences between the two groups. However, a statistically significant reduction in the number of injections was observed in patients monitored with serial dermoscopy/HPT compared to patients monitored with only HPT ($p < 0.001$). Furthermore, there was a lower risk of atrophy in patients monitored with serial dermoscopy/HPT ($p = 0.007$). Serial dermoscopy may serve as a useful tool for monitoring disease activity in AA patients and reduces the number of triamcinolone acetonide injections needed during treatment.

O7
An epidemiological study of alopecia in 4,012 Korean patients: 10-year single center follow up

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Although there have been many clinical studies on individual alopecic disorders, long-term reports of overall alopecia patients are rare. This study was performed to investigate the clinical and epidemiologic aspects of diseases occurring in alopecia in 4,012 patients over 10 years. Clinical records of 4,012 alopecic patients who visited Chung-Ang University Hospital from January 2006 to December 2015 were analyzed for diagnosis, age, sex, and annual distribution. During the last 10 years, clinically diagnosed alopecia patients comprised 5.32% of the total number of dermatology patients, showing composition of androgenic alopecia (68.1%), alopecia areata (18.0%), telogen effluvium (7.4%), and trichotillomania (1.5%). The overall ratio of male to female patients was 1.3:1. In particular, androgenic alopecia showed male predominance (M:F=2:1) with increasing proportion of female patients compared to 4:1 ratio described in 2006, while alopecia areata showed similar distribution (M:F=1:1.1). There was a trend of lowering in the age of onset of alopecia in both genders, and more than 36.6% of patients visited the clinic within one year of onset. Family history was present in 41.5% of androgenic alopecia patients and 12.9% of alopecia areata. The most frequently associated disease was seborrheic dermatitis. Autoimmune disorders, such as thyroid disease, were more prevalent in females, while males had higher rates of gastrointestinal and hepatic disorders. In this study, we could provide the essential findings from clinical data of various alopecia patients over recent 10 years.

O8

Geometric alopecia underlying lupus erythematosus panniculitis of the scalp

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Background: A few cases of lupus erythematosus panniculitis of the scalp (LEPS) presenting linear or annular configuration of non-scarring alopecia along Blaschko's line have been reported in the literatures. Apart from classical lupus panniculitis, it is known to have distinct clinical and histopathological characteristics.

Objective: The purpose of this study is to investigate the clinical and histopathological characteristics of LEPS presenting peculiar geometric configuration of alopecia.

Methods: We retrospectively reviewed the 9 patients of LEPS showing geometric pattern of non-scarring alopecia who visited our institution from 2006 to 2016.

Results: Nine LEPS patients (M:F = 3:6) showing geometric configuration were reviewed in our study. The mean age at diagnosis was 30.0 years (range: 14-50). Linear shape (n=4), annular shape (n=4), and rectangular shape (n=1) were identified. Most of patients (n=7) had shown alopecia associated with Blaschko's line; however, two patients did not follow this line. One patient showed LEP lesion on distant area from the scalp. Four patients revealed positive antinuclear antibody test result, and one patient had progressed into systemic lupus erythematosus. Histopathologic findings including hyaline fat necrosis, relatively sparse inflammatory infiltrate, and abundant mucin deposition were observed in all cases. All of our patients showed complete remission or significant improvement after treatment of oral hydroxychloroquine and corticosteroid.

Conclusion: LEPS presenting geometric shape of reversible and non-scarring alopecia is a distinct clinical variant of lupus panniculitis. The geometrical shape of lesions may be related to the anatomical characteristics of the subcutaneous fatty tissue making each compartment.

O9

Treatment of severe alopecia areata with tofacitinib: a case series

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Background: Alopecia areata (AA) is a common cause of hair loss, but the treatment of severe form is often empiric and not yet satisfactory. Recently, there are anecdotal case reports that Janus kinase inhibitor was promising and reversed AA.

Objective: To investigate efficacy and tolerability of oral tofacitinib for the treatment of severe AA.

Methods: We performed a retrospective study of patients with severe AA who were treated with off-label use tofacitinib in SMG-SNU Boramae Medical Center. Their medical records and clinical photographs were reviewed and the patient epidemiology, treatment response using severity of alopecia tool (SALT), and side effects were investigated.

Results: Six patients (5 females and 1 male) were included. The median age was 29 (range 19-43) and they had alopecia universalis intractable to variable treatments such as oral/topical/intralesional steroid, cyclosporine, phototherapy, cryotherapy, immunotherapy, and herbal medicine. SALT score was significantly improved after 4 or 5 month-intake of 5mg bid tofacitinib (median 62.2, range 14.0-96.8), compared to baseline (median 100.0, range 54.2-100) ($p=0.027$). However, the change was minimal (range 3.2-5) in three patients and two of them had total body hair loss. The treatment was well-tolerated except for mild transient side effects.

Conclusions: Oral tofacitinib may be an effective and tolerable alternative option in some patients with severe and refractory AA. Further studies are required to confirm these findings and to identify poor prognosis factor of tofacitinib treatment.



Session II

Progress in Hair Biology
(English-speaking session)



The Korean Hair Research Society

Clinical aspect of alopecia areata on pathogenic factors and treatment

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Background: Alopecia areata (AA) is a chronic inflammatory, non-scarring hair loss of unknown etiology, difficult to treat and eradicate in part of the patients.

Objective: To understand pathogenic factors so as to design better treatment modules.

Methods: Clinical and laboratory investigations have been carried out to study lesional infiltration, morphology of hair follicle and hair roots, serum sIgE and cytokine profile.

Results:

1. In the early phase of AA, inflammatory cells infiltration around follicles was found earlier in upper dermis than that in lower cutaneous area. Spreading of T-lymphocytes may be the mechanism under extension of the hair loss lesion. The presence of eosinophils, mast cells and T lymphocytes was found correlated with disease severity and decrease of follicular terminal to vellus ratio. Also, the peri-vascular infiltration of mast cell and CD8+ lymphocyte in the superficial dermis, suggests that these cells play an important role in pathological process of alopecia areata.
2. Lesional cytokine profiles: Expression levels of pro-apoptotic genes increased in follicles and Th1 cytokines IL-12 and IFN- γ mRNA increased while Th2 cytokine IL-10 mRNA expression level decreased in superficial layers of early AA lesions. In deep scalp skin layers, IFN- γ expression was higher in deep layers as compared to superficial layers, IL-10 expression level is significantly higher in superficial skin layer of AA lesions as compared to deep layers.
3. Expression level of Filaggrin was found decreased in hair loss lesion of AA irrespective of atopic status and is probably related to VDR deficiency. Up-regulation of Th1 and down-regulation of Th2 cytokines was also detected in AA lesions.
4. Sequential cyclic staging of shed hairs in DAA patients indicates the insult maybe hair cycle specific and possibly a one-hit event. Hair root pigmentation disturbance may not necessarily indicate termination of the hair cycle. Exogen may be premature in both DAA and ATE. Anti-inflammatory treatment should be started early in the disease progression with presence of

- anagen hair roots and lesional infiltration to prevent relapse.
5. The prevalence of tIgE and sIgE against dust mites (Der-p and Der-f) in AA patients with early onset and severe type were significantly higher than those with late onset and mild type AA respectively ($P=0.019, 0.016$). Notably, the elevations of tIgE and sIgE were independent of the history of atopy.
 6. Elevated pre-treatment serum levels of IL-4 and IL-12 can be used as unfavorable and favorable predictors of DPCP therapeutic effect, respectively.
 7. Common treatment modalities for treatment of AA include topical steroids, intralesional steroids, topical immunotherapy using sensitizers (eg, diphencyprone, DPCP) and topical minoxidil. The optimal choice of treatment modules adapt for individual patient is base on the patient's age, activity and duration of disease, presence of hypersensitivity to dust mite, and sometimes, distance between one's dwelling to the hospital.
 - ① For children with a severe type of AA, we use topical occlusion of the whole scalp with halometasone cream overnight and a shower cap, to achieve an effective response rate above 80%.
 - ② In adult patients with a mild type of AA involving a single patch, oral compound glycyrrhizin and topical minoxidill is usually effective for hair regrowth.
 - ③ For extensive and progressive AA in adult patients, we use systemic intramuscular injection of long-acting corticosteroids, such as compound betamethasone, for 3-4 times at intervals of 3 weeks. In people with a diffuse type of AA, or AA incognita, multiple muscular injections with long-acting steroids should be used immediately to interfere with the inflammatory infiltration at the early stage.
 - ④ Only in long-standing AT/AU, do we use topical immunotherapy with sensitizers (eg, diphencyprone, DPCP). We found that elevated serum total IgE before the treatment may predict severe adverse side-effect risk.
 - ⑤ In patients with long term seasonal relapse and allergic to dust mites, we introduce desensitizer of dust mites sublingually and daily for 2 years, with or without antihistamines.
 - ⑥ Last but not least, wig is also a good choice in patients with long standing AT/AU.

Conclusion: The expression level of pro-apoptotic genes and Th1 cytokines are increased and Th2 cytokines are decreased in AA. This finding is supported by previous studies which also report similar results as to an increase in Th1 immune response during pathogenesis of AA. Th1/Th2 imbalance in the superficial layers has a more influential role in the pathogenesis of AA than in the deep layers. Allergy to dust mites may have impact on the immune response in AA and may contribute to its early onset and severity in these patients of Chinese origin. We suggest an early and effective intervention of AA ensures a better outcome with longer disease-free intervals and fewer relapses.

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Featured Publications :

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From bench to hair clinic: Leptin as an anagen inducer for red LED-induced hair growth stimulation

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While hair follicles in dorsal skin of 5-week old C57/BL6 mice had progressed to late anagen phase, those in dorsal skin of 5-week old leptin receptor deficient db/db mice remained in the first telogen and later entered the anagen at postnatal day 40, indicating that deficiency in leptin receptor signaling delayed the second hair cycle progression. Then we shaved dorsal hairs on wild-type mice at postnatal 7 weeks and injected skin with mouse leptin or a mock. After 20 days, although mock injection showed no effect, hair growth occurred around leptin injection area, demonstrating that leptin, a well-known adipokine, acts as an anagen inducer. Later, we found that red LED induces anagen in mouse hair cycle models and identified leptin as a candidate for the mediators in this red LED-induced hair growth stimulation.

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Proof-of-concept of fully functional organ regenerative therapy for hair follicle insufficiency

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The hair follicles, which produce various types of hair shaft in the hair bulb through the epithelial-mesenchymal interaction, are structurally and functionally associated into an integumentary organ system, composed of skin and various ectodermal mini-organs. The hair follicle has various and important roles in thermoregulation, physical insulation, sensitivity to noxious stimuli, and social communication. In the developing embryo, an organogenesis of hair follicle arises from a formation of hair organ germ, which is composed by embryonic skin epithelial and mesenchymal stem cells, similarly to almost all organs. Almost organ development is induced only once during embryogenesis, whereas the hair follicle undergoes repeatedly regeneration, and resting phases, termed hair cycles, driven by adult stem cells.

Organ regenerative therapy is expected to provide a future innovative therapy for the organ insufficiency by disease, injury or aging. A concept of the organ regenerative therapy has been proposed that fully functional bioengineered organ is regenerated by organ-inducible stem cells via the representation of organogenesis process and substituted for dysfunctional organ. It is well known that the organ-inductive epithelial and mesenchymal stem cells provide a source of differentiated hair follicle cells that enable hair cycling to occur over the lifetime of a mammal. Thus, it is logical for the organ regenerative therapy of hair follicle to utilize organ-inducible stem cells of epithelial and mesenchymal origin that are isolated from adult tissues.

We have demonstrated fully functional hair organ regeneration via the intracutaneous transplantation of a bioengineered hair follicle germ, which was reconstituted with adult epithelial and mesenchymal stem using by organ germ method. The bioengineered hair follicle reproduces the histologically correct structures and configures proper connections with surrounding host tissues, and restored the enduring hair cycles and piloerection ability through the rearrangement of various follicular stem cells and their niches. The achievement of this study reveals the potential applications of adult tissue-derived stem cells as a bioengineered organ replacement therapy

[CURRICULUM VITAE]

Koh-ei Toyoshima, Ph.D.

Laboratory for Organ Regeneration, RIKEN Center for Developmental Biology

Department of Regenerative Medicine, Plastic and Reconstructive Surgery, Kitasato University School of Medicine



Education and Training :

1999 Ph.D. Niigata University, Graduate School, Division of Science and Technology, Doctor's Course, Niigata, Japan

1994 University. Niigata University, Faculty of Science, Niigata, Japan

Experience :

2014-Present Visiting Researcher (Fundamental Science and Technology), Laboratory for Organ Regeneration, RIKEN Center for Developmental Biology (CDB), Academia

2014-Present Researcher (Industrial and Practical R&D), Organ Technologies Inc. Venture Company

2012-Present Visiting Lecturer (Bridge Study for Clinical), Department of Regenerative Medicine, Plastic and Reconstructive Surgery, Kitasato University School of Medicine

2009-2014 Project Researcher, Organ Regeneration Project, Tokyo University of Science, Research Institute for Science and Technology, Academia

2003-2009 R&D Group Leader (Hair Regenerative Medicine), PhoenixBio Co Ltd. Venture Company

2001-2003 Research Fellow (Industry-Academia-Government Collaboration), Japan Science and Technology Agency (JST) , Administrative Program

2001-2003 Doctoral Researcher, Division of Product Development, ARTNATURE Inc. Company

Honors and Awards :

- Research Grant Adaption, Mochida Memorial Foundation for Medical and Pharmaceutical Research (Public Interest Incorporated Foundation), 2012
- Hirayama Prize, 14th Annual Meeting, Japan Society of Clinical Hair Restoration, 2008, Fukuoka, Japan
- Best Poster Presentation Award, Annual Meeting, European Hair Research Society, 2000, Marburg, Germany

Publications / Presentations :

- Major Articles with Peer Reviewed

1. Takagi R, Ishimaru J, Sugawara A, Toyoshima KE, Ishida K, Ogawa M, Sakakibara K, Asakawa K, Kashiwakura A, Oshima M, Minamide R, Sato A, Yoshitake T, Takeda A, Egusa H, Tsuji T. Bioengineering a 3D integumentary organ system from iPS cells using an in vivo transplantation model. *Sci. Adv.* 2, doi: 10.1126/sciadv.1500887, 2016.
2. Asakawa K, Toyoshima KE, Ishibashi N, Tobe H, Iwadate A, Kanayama T, Hasegawa T, Nakao K, Toki H, Noguchi N, Ogawa M, Sato A, and Tsuji T. Hair organ regeneration via the bio-engineered hair follicular unit transplantation. *Scientific Reports* 2(424), DOI: 10.1038/srep00424, 2012.
3. Toyoshima KE, Asakawa K, Ishibashi N, Toki H, Ogawa M, Hasegawa T, Irié T, Tachikawa T, Sato A, Takeda A, and Tsuji T, Fully functional hair follicle regeneration through the rearrangement of stem cells and their niches. *Nature Communications*, 3, 784, 2012.
4. Toyoshima KE, Sato A, Toki H, Ishibashi N, Asakawa K, Iwadate A, Kanayama T, Tobe H, Takeda A and Tsuji T, Single follicular unit transplantation reconstructs arrector pili muscle- and nerve-connections and restores functional hair follicle piloerection. *J. Dermatol.* 39, 1-6, 2012.
5. Yamao M, Inamatsu M, Ogawa Y, Toki H, Toyoshima KE and Yoshizato K, J. Invest. Dermatol. Contact Between Dermal Papilla Cells and Dermal Sheath Cells Enhances the Ability of DPCs to Induce Hair Growth. *J. Invest. Dermatol.* 130 (12), 2707-18, 2010.

- Books in Collaboration

- Yuha Y Kojima, Akio Sato, and Koh-ei Toyoshima, 5B. The emerging role of pharmacogenetics in the treatment of patterned hair loss, P97-105, *Hair transplantation 5th edition*, Edited by Walter Unger and Ronald Shapiro, 2010, Informa Healthcare.

- Invited Lecture

- Fully functional hair follicle regeneration through the rearrangement of stem cells and their niches, World Congress of Hair Research 2013, Science Education Session 2: What's new in hair follicle model systems?, Edinburgh, UK, April 2013.



Session III

Update in Hair Disorders
(English & Korean-speaking session)



The Korean Hair Research Society

Histopathological findings in alopecias: an overview

Joyce Lee, M.D.

National Skin Centre, Singapore

Background: Performing scalp biopsies are an important part of the diagnostic armamentarium of the dermatologist.

Objective: This talk aims to introduce a simple approach to interpreting scalp biopsies for both scarring and non-scarring alopecias.

Methods: Choice of biopsy site contributes significantly to accurate histopathological diagnosis. Areas of active hair loss are preferred. At the National Skin Centre, Singapore, it is routine practice to take two 4mm punch biopsy specimens in suspected non-scarring alopecia; one specimen is sectioned vertically while the other is sectioned transversely. For scarring alopecias, apart from the routine two 4mm punch biopsies, an additional biopsy specimen is taken for direct immunofluorescence if discoid lupus erythematosus is suspected. Transverse sections render very useful information. It allows for assessment of follicular unit integrity, hair counts, anagen: telogen and terminal:vellus hair ratios. It also allows for visualisation of all hair follicles within the biopsy specimen at a glance. Vertical sections are useful, particularly in scarring alopecias where visualization of the epidermis and basement membrane are important.

Results: This talk aims to introduce a simple approach to the interpretation of various forms of scarring and non-scarring alopecias

Conclusion: At the end of the talk, the audience would be familiar with the key histopathological features of various forms of scarring and non-scarring alopecias.

[CURRICULUM VITAE]

Joyce Lee, M.D.

Head of Dermatopathology and Laboratories Division, National Skin Centre, Singapore



Education and Training :

- 1996 MBBS (Bachelor of Medicine, Bachelor of Science) (NUS, Singapore)
- 2000 MMED (Int Med)/MRCP (UK)
- 2003 Obtained specialist accreditation in dermatology
- 2005 Joined FAMS (Fellowship of the Academy of Medicine Singapore)
- 2006 ICDP-UEMS International Board Certification – Diploma in Dermatopathology

Current Professional Positions :

- Head of Dermatopathology and Laboratories Division at the National Skin Centre, Singapore
- Head, Hair and Nail Clinic, National Skin Centre, Singapore
- Clinical Tutor, Yong Loo Lin School of Medicine, Singapore
- Clinical Tutor, Lee Kong Chian School of Medicine, Singapore
- Core Clinical Faculty Member for the Dermatology Senior Residency Programme in Singapore
- Course instructor for Histopathology National Training Programme, Singapore
- Course organiser and instructor for Dermatopathology National Training Programme, Singapore

Awards :

- 2008, 2012 National Skin Centre Best clinical teacher award
- 2010, 2011, 2012, 2013 National Skin Centre Service Award
- 2009, 2010 Dean's Award for Teaching Excellence for Academic Year

Society Memberships :

- Member of the Dermatological Society of Singapore
- Member of the International Society of Dermatopathology (ISDP) from 2008 to present
- Executive committee member of the ISDP (from 2010 to 2013)
- Member of Dermatopathology section of F1000 (from 2009 to present)
- Member of the International Committee for Dermatopathology (from 2010 to 2012)
- Chapter of Dermatologists, Singapore (Fellowship of the Academy of Medicine, Singapore)

Featured Publications :

1. Lee SS, Lee YS, Giam YC. Pseudopili annulati in a dark-haired individual: a light and electron microscopic study. *Pediatr Dermatol.* 2001;18:27-30
2. Lee JSS, Kossard S. Progressive trichodysplasia spinulosa in a non-immunosuppressed patient with leukaemia in remission. *Austral J Dermatol* 2008;49:57-60
3. Pan JY, Theng C, Lee J, Goh BK. Vitiligo as an adverse reaction to topical diphencyprone. *Ann Acad Med Singapore.* 2009;38(3):276-7
4. Lee JS. Successful treatment of 'leucotrichotillomania' by hair dyeing. *Clin Exp Dermatol.* 2009;34(7):e407-8
5. HY Chia, HL Tey, JS Lee. Follicular spicules associated with *Propionibacterium acnes* in response to erythromycin. *Journal of Dermatology* 2010;37:1-3
6. Joyce SS Lee. Interpreting a histopathology report on alopecias. *Derm bulletin* 2011;22(1):5-11
7. Lynn YT Chiam, YL Lim, KT Tan, Joyce SS Lee. Guidelines on the management of non-scarring alopecia. *Derm bulletin* 2011;22(1):46-49
8. SI Tee, Joyce SS Lee. Guidelines on the management of primary scarring (cicatricial) alopecia. *Derm bulletin* 2011;22(1):50-56
9. Oon HH, Lee JS. Treatment of Pseudofolliculitis in Trichotillomania improves Outcome. *Int J Trichology.* 2011 Jul;3(2):92-5
10. Is *Propionibacterium acnes* associated with hair casts and alopecia? Etienne Wang, HH Tan, JSS Lee. *Int J Trichology* 2012;4(2):93-97
11. Wang E, Lee JS, Tang M. Current treatment strategies in pediatric alopecia areata. *Indian J Dermatol* 2012;57:459-65
12. Oon HH, Sze Chan AW, See Lee JS, Leow YH, Giam YC. Trichothiodystrophy in a child with occult learning disorder. *Int J Trichol* 2013;5:35-7

Alopecia areata progression index

Do Won Kim, M.D., Ph.D.

Department of Dermatology, Kyungpook National University School of Medicine, Daegu, Korea

Treatment choices of alopecia areata (AA) are usually based on disease extent as well as the age of the patient. The severity of AA can be measured by the Severity of the Alopecia Tool (SALT) score, developed by the National Alopecia Areata Foundation working committee.¹ Although the overall hair loss activity has important impacts on the response to therapy, little has been said concerning this factor. Existing evaluation methods of hair loss activity in AA, such as the hair pull test, observation of exclamation mark hairs, and a biopsy of the scalp can assess the activity of only localized hair loss patches.

The author and colleagues decided to develop a simple scoring system (Alopecia Areata Progression Index, AAPI) for evaluating overall hair loss activity in AA patients with pigmented hair using clinical/trichoscopic findings.² The AAPI is a tool which adds variability to the SALT score. The current limitation of the SALT score, emphasizing mostly the area of the disease, cannot correctly represent the activity of AA. We measured AAPI in patients with different severities of AA. The scalp surface area of a patient was divided into 4 quadrants. In each quadrant, hair loss activity was scored on the basis of the percentage of alopecic area, clinical/trichoscopic findings associated with hair loss. The results showed that intraobserver reliability was excellent, and interobserver reliability was statistically reliable. The AAPI seems to represent a system capable of truly quantifying overall hair loss activity in AA patients with different severity, demonstrating trustworthy interobserver and intraobserver reliability. To better confirm the validity of the AAPI, further evaluation, refinement and modification are needed.

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1. Olsen EA, Hordinsky MK, Price VH, Roberts JL, Shapiro J, Canfield D, et al. National Alopecia Areata Foundation: Alopecia areata investigational assessment guidelines. Part II. *J Am Acad Dermatol* 2004;51:440-7.
2. Jang YH, Moon SY, Lee WJ, Lee SJ, Lee WK, Park BC, Kim H, Kim DW. Alopecia Areata Progression Index, a scoring system for evaluating overall hair loss activity in alopecia areata patients with pigmented hair: A development and reliability assessment. *Dermatology* 2016 Jan 13. [Epub ahead of print]

[CURRICULUM VITAE]

Do Won Kim, M.D., Ph.D.

Professor, Department of Dermatology, Department of Dermatology,
Kyungpook National University School of Medicine, Daegu, Korea



Education and Training :

- 1977.2 M.D. Kyungpook National University School of Medicine
- 1981.3-1984.2 Resident in Dermatology, Kyungpook National University Hospital(KNUH)
- 1986.2 Ph.D. Kyungpook National University
- 1991.3-1992.2 Postdoctoral fellow, University of California at San Francisco(UCSF), USA

Curent and Past Professional Positions :

- 2000.1-2007.4 Chairman in Department of Dermatology, Kyungpook National University
- 2000.9-2004.9 Chairman(first 2 years) and President(next 2 years) in the Korean Society for Skin Barrier Research
- 2005.4-2007.4 Director of Biomedical Research Institute, KNUH
- 2006.6-2008.5 Secretary General in the Korean Hair Research Society
- 2007.4-2008.4 Director of Clinical Services, KNUH
- 2009.11-2011.11 President in The Korean Atopic Dermatitis Association
- 2010.5-2012.5 President in The Korean Society for Cosmetic Dermatology
- 2010.6-2012.6 Vice-president in the Korean Hair Research Society
- 2012.6-2014.5 President in the Korean Hair Research Society
- 2015.1-2015.12 Vice-president in the Korean Dermatological Association(KDA)
- 1987.3-present Instructor ~ Professor in Dermatology, Kyungpook National University

Major Interest :

Atopic Dermatitis, Skin Barrier, Hair

Quality of life in Korean patients with alopecia areata

**Gwang-Seong Choi¹, Ji-Won Byun¹, Woo-Young Sim², Won-Soo Lee³,
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Seong-Jin Kim⁹, Bark Lynn Lew², Ohsang Kwon¹⁰, Chang-Hun Huh¹⁰,
Dong Youn Lee¹¹, Byung-In Ro¹², Jin Park¹³, Bum Joon Kim¹⁴, Young Lee¹⁵**

¹Department of Dermatology, Inha University School of Medicine, Incheon,

²Kyung Hee University School of Medicine, Seoul,

³Department of Dermatology and Institute of Hair and Cosmetic Medicine, Yonsei University
Wonju College of Medicine, Wonju,

⁴The Catholic University of Korea School of Medicine, Seoul,

⁵Kunkuk University School of Medicine, Seoul,

⁶Dong-A University School of Medicine, Busan,

⁷Kyungpook National University School of Medicine, Daegu,

⁸Pusan National University School of Medicine, Busan,

⁹Chonnam National University School of Medicine, Gwangju,

¹⁰Seoul National University School of Medicine, Seoul,

¹¹Sungkyunkwan University School of Medicine, Seoul,

¹²Seonam University School of Medicine, Namwon,

¹³Chonbuk National University School of Medicine, JeonJu,

¹⁴ChungAng University School of Medicine, Seoul,

¹⁵Chungnam National University School of Medicine, Daejeon

Alopecia areata (AA) may significantly affect a variety of psychological and social experience and the individual's quality of life (QoL). It has been reported that various type of hair loss decrease patient's QoL. However, few studies have been conducted on the QoL of AA patients.

The aim of this research was to evaluate QoL in Korean patients with AA.

This research surveyed 1389 patients with AA who visited 16 university hospitals between January 2015 to February 2016. All patients were interviewed with hair specific skindex-29, Beck depression and Beck anxiety inventories.

The results and discussion will be focused on the QoL of AA patients and discover the factors that can influence the QoL of AGA patients.

[CURRICULUM VITAE]

Gwang Seong Choi, M.D., Ph.D.

Professor and Director, Department of Dermatology, Inha University College of Medicine

Chairman of Institutional Review Board (IRB), Inha University Hospital.

Director of Medical Center Branch, Inha University Research and Business Foundation



Education :

- 1983-1989 Graduated from Yonsei University College of Medicine
- 1994-1996 Received the Master's degree at Graduate School of Ajou University
- 1997-1999 Received the Ph.D. at Graduate School of Yonsei University

Career :

- 1989-1990 Internship in Severance Hospital, Yonsei University College of Medicine
- 1993-1997 Resident in the Dept of Dermatology, Severance Hospital
- 1997-1999 Research instructor in the Dept of Dermatology, Inha University Hospital
- 1999-present Clinical instructor, Assistant professor, Associate professor and Professor in the Department of Dermatology, Inha University College Medicine
- 2005-2006 Visiting Investigator, Center for Cutaneous Research, Bart and London, London University
- 2015-present Chairman of Institutional Review Board (IRB), Inha University Hospital.
- 2016-present Director of Medical Center Branch, Inha University Research and Business Foundation

Society :

- 1997-present Member and Director of Korean Dermatological Association
- Member and Director of Korean Society for Investigative Dermatology
- 2008-present Academic, Treasurer, Planning Director of Korean Hair Research Society
- Academic Director of Korean Society for Chemical Peeling
- 2012-present Educational, Treasurer, General Secretary of Korean Society for Aesthetic and Dermatological Surgery
- 2012-present Academic, General Secretary, Inspector of Korean Academy of Vitiligo



Session IV

Cosmetics & Devices
(English & Korean-speaking session)



The Korean Hair Research Society

***Hamamelis virginiana*-based scalp care and protection for sensitive scalp, red scalp, and scalp burn-out**

Ralph M. Trüeb, M.D.

Center for Dermatology and Hair Diseases, Bahnhofplatz 1A,
CH-8304 Zurich-Wallisellen, Switzerland

Red scalp was originally reported by Thestrup-Pedersen and Hjorth and commented by Moschella as 'diffuse red scalp disease which can also be itchy and burning, is nonresponsive to therapy including topical steroids or antiseborrhoeic therapy'. Rebora et al proposed the term trichodynia for discomfort of the scalp. The conditions seem to be related.

The cause of trichodynia remains obscure. The most prevalent speculations have been: perifollicular inflammation, increased expression of neuropeptide substance P, and underlying psychiatric disorders. These findings suggest that blood vessels are of importance in stinging sensations, and a connection exists between sensory or subjective irritation and cutaneous vascular reactivity. Substance P represents an important mediator of nociception and neurogenic inflammation, and exerts a vasodilatory effect. By the virtue of their bidirectional effects on the neuroendocrine and immune systems, neuropeptides represent key players in the interaction between the central nervous system and the skin immune and microvascular system. Such mechanisms would explain the noxious effects of external stimuli and emotional distress on cutaneous nociception through release of neuropeptides.

Since Willimann and Trüeb found a correlation of scalp telangiectasia with presence of scalp discomfort, eventually an analogy was proposed to the observation that patients with telangiectatic rosacea respond more frequently with stinging sensations to topical application of 5% lactic acid on the cheeks than patients with papulopustular rosacea or normal controls. Eventually, the observation of red scalp with clinical and histopathologic findings consistent with rosacea suggest that a subset of patients represent a rosacea-like dermatosis.

Finally, the burnout syndrome is defined as a condition of emotional exhaustion with reduced capacity, that is understood to represent a development line starting with enthusiastic idealism and leading through frustrating experiences to disillusionment, psychosomatic disorders, depression, and aggression. Just as the syndrome is not recognized to represent a true medical condition by the scientific community, but is rather defined as a coping problem in ICD-10, we encounter individuals in daily clinical practice with an analogous patient's career with regard to the condition of the scalp,

which represents rather a question of problem solving than a specific dermatologic condition. Therapy includes avoidance of UVR exposure and of topical overtreatment, especially with alcohol-based, topical corticosteroids, and in refractory cases use of oral tetracyclines, or tricyclic antidepressants. Ultimately, treatment with botulinum toxin (BTX) seems a rational approach, since BTX decreases the mechanical sensitivity of nociceptors and inhibits neurogenic vasodilation through inhibition of sensory neuropeptide release.

Nonetheless, the choice of appropriate hair care products represents an important aspect in the management of sensitive scalp and related conditions. Since hair washing is the most common form of treatment of the hair and scalp, a shampoo must accomplish more than just cleanse. It should additionally be adapted to the specific requirements of different hair types, and washing habits, and most importantly, it should elicit a positive effect on problematic scalp conditions. With available high-quality *Hamamelis virginiana*-based hair care products, successful treatment of the scalp has become feasible, especially in the context of problems associated with red scalp, scalp burn-out, and the use of irritant topical minoxidil products for androgenetic alopecia.

Ref. Trüeb RM. North American Virginian Witch Hazel (*Hamamelis virginiana*)-Based Scalp Care and Protection for Sensitive Scalp, Red Scalp, and Scalp Burn-Out. Int J Trichology. 2014 Jul;6(3):100-3.

[CURRICULUM VITAE]

Ralph Michel Trüeb, M.D.

Professor, Department of Dermatology, University of Zurich, Switzerland



Education and Training :

- 1985 M.D., School of medicine, University of Zurich
- 1994 Swiss Board Certifications, Dermatology and Venerology
- 2000 Swiss Board Certifications, Allergology and Clinical Immunology

Current and Past Professional Positions :

- 1994-1995 Fellow, Department of Immunodermatology, University of Texas Southwestern Medical Center at Dallas & Howard Hughes Medical Institute
- Until 2010 Associate Professor, Department of Dermatology, University Hospital of Zurich
- 2011-present Professor, Department of Dermatology, University Hospital of Zurich

Society Memberships :

- Founding President of the Swiss Trichology Working Group
- Past President of the European Hair Research Society (EHRS) 2008-2011

Featured Publications :

He is author/co-author of 7 textbooks on hair and 1 textbook on the history of anti-aging medicine, a number of book chapters on hair disorders and hair care, and currently 183 publications in peer-reviewed scientific journals. His latest books in English on hair in Springer Scientific Publications are: "Aging Hair" (2010), "Female Alopecia. Guide to Successful Management" (2013), "Male Alopecia. Guide to Successful Management" (2014), and "The Difficult Hair Loss Patient. Guide to Successful Management of Alopecia and Related Conditions" (2015).

Basic mechanism and clinical application of the ADSC protein extract for hair regeneration

Byung-Soon Park, M.D., Ph.D.

Cellpark Dermatology Clinic, Seoul, Republic of Korea

Background: Human mesenchymal stem cells (MSCs), by virtue of its capability to self-renew and differentiate into a variety of cell types, represent the first pluripotent stem cells to be used in clinical settings related to damage or degeneration. Therefore, there is an urgent need to understand how MSCs and their secretory factors contribute to regenerative medicine. The primary role of MSCs may be to maintain the stem cell niche, and to contribute to the recovery after injuries, healthy aging, and the homeostasis of organ and tissues. Recently, MSC has been emerged as a new therapeutic option for hair loss.

Objective: As adipose-derived stem cells (ADSCs) are the most accessible sources of MSCs, ADSC-based hair regeneration has been investigated as a possible alternative. We tried to investigate the basic mechanism and clinical application of the protein extract of ADSCs, produced and commercialized based on the safety guideline on manufacturing conditioned media from human cells and tissues issued by Korean Ministry of Food and Drug Safety.

Methods: We performed in vitro study, ex vivo organ culture and in vivo study. In addition, clinical pilot studies using the protein extract of ADSCs were performed for pattern hair loss of men and women.

Results: The protein extract of ADSCs promoted hair growth in vitro and in vivo by modulating the follicular cell cycles and hair cycle and protecting the follicular cells from androgens and reactive oxygen species. In the pilot clinical study, the protein extract of ADSCs showed significant increase in hair density and thickness for pattern hair loss of men and women.

Conclusion: These scientific data enabled us to achieve the cost effective treatment of hair regeneration using the legally acceptable cell therapeutic agents and their secretory factors. These approaches might mark the first practical application of stem cells among various trials in the field of hair regeneration. Additionally, practical therapeutic challenges and future research direction will be introduced.

[CURRICULUM VITAE]

Byung-Soon Park, M.D., Ph.D.

Director of Cellpark Clinic, Seoul, Korea



Education and Training :

- 1994 M.D., Seoul National University College of Medicine
- 1994-1999 Internship/Resident, Department of Dermatology, Seoul National University Hospital
- 1999 M.S., Medicine, Seoul National University, Graduate School of Medicine
- 2005 Ph.D., Medicine, Korea University, Graduate School of Medicine

Current and Past Professional Positions :

- 1999- 2002 Director of Dermatology, Chunchon Armed Forces General Hospital
- 2002-2013 Co-founder and Director, Leaders Clinic
- 2005-present Lecturer, Graduate School of Silver Industry, Sookmyung Women's University
- 2005-2007 CEO & President, Prostemics Inc.
- 2008-2011 Adjunct Assistant Professor of Dermatology, Seoul National University College of Medicine
- 2009-present Editorial Board Member of World Journal of Stem Cell, World Journal of Dermatology
- 2011-present Clinical Professor of Dermatology, Sungkyunkwan University College of Medicine
- 2013-present Clinical Professor of Dermatology, Graduate School of Medicine, Konkuk University
- 2013-present Founder and Director, Cellpark Clinic
- 2014-present Technical Consultant, Prostemics Inc.

Awards :

- 1994 President Award of SNUMC Alumni Association (Graduation with honors: summa cum laude)
- 2008 The 60th Annual Meeting of Korean Dermatological Association, Best Poster Award

Society Membership :

- Korean Dermatological Association
- The Association of Korean Dermatologists
- American Academy of Cosmetic Surgery

American Society of Liposuction Surgery
The Association of Stem Cell and Tissue Regeneration

Featured Publications – Books :

1. Kim PM, Park BS, Liposuction, In: Aesthetic Dermatologic Surgery (official publication of The Korean Society for Aesthetic and Dermatologic Surgery.), Hanmi medical publishing Co., 2007;331-345
2. Park BS, Kim WS, ADSCs and their secretory factors for skin aging, In: Textbook of Aging Skin, Editors M. A. Farage, K.W. Miller and H. I. Maibach. Springer-Verlag. 2009;201-12
3. Park BS, Kim WS, ADSCs and their secretory factors for skin aging and hair loss, In: Textbook of Aging Skin: Second Edition, Editors M. A. Farage, K.W. Miller and H. I. Maibach. Springer-Verlag. 2016 (in press)

Featured Publications – Papers :

1. Up-to-date Clinical Trials of Hair Regeneration using Conditioned Media of Adipose-Derived Stem Cells in Male and Female Pattern Hair Loss. Current Stem Cell Research and Therapy 2016 (corresponding author) (in press)
2. Clinical use of conditioned media of adipose tissue-derived stem cells in female pattern hair loss: a retrospective case series study. International Journal of Dermatology 2015;54(6):730-5 (corresponding author)
3. The hair growth promoting effects of adipose tissue-derived stem cells. Journal of Dermatological Science 2010;57:132-146
4. Hair growth stimulated by conditioned medium of ADSCs is enhanced by hypoxia: Evidence of increased growth factor secretion. Biomedical Research 2010;31(1): 27-34 (first author)
5. Hypoxia enhanced wound-healing function of ADSCs: Increase in stem cell proliferation and up-regulation of VEGF and bFGF. Wound Repair and Regeneration 2009;17:540-7 (corresponding author)
6. The wound-healing and antioxidant effects of ADSCs. Expert Opinion on Biological Therapy 2009;9: 879-87 (corresponding author)
7. Protective role of ADSCs and their soluble factors in photo-aging. Archives of Dermatological Research 2009;301(5):329-36 (corresponding author)
8. Antiwrinkle effect of ADSC: Activation of dermal fibroblasts by secretory factors. Journal of Dermatological Science 2009;53:96-102 (corresponding author)
9. Evidence supporting antioxidant action of ADSC: Protection of fibroblasts from oxidative stress. Journal of Dermatological Science 2008;49:133-42 (corresponding author)
10. Whitening effect of ADSC: A critical role of TGF-beta1. Biological & Pharmaceutical Bulletin

- 2008;31(4):606-10 (corresponding author)
11. ADSCs and their secretory factors as a promising therapy for skin aging. *Dermatologic Surgery* 2008;34(10):1323-6 (first author)
 12. Wound healing effect of ADSCs: A critical role of secretory factors on human dermal fibroblasts. *Journal of Dermatological Science* 2007;48:15-24 (corresponding author)
 13. Prevention of thyroidectomy scar by the treatments using a new 1550 nm fractional Erbium-glass laser. *Dermatologic Surgery* 2009;35:1-7
 14. Effect of quilting sutures on hematoma formation after liposuction with dermal curettage for treatment of axillary hyperhidrosis: A randomized clinical trial. *Dermatologic Surgery* 2008;34(8):1010-5
 15. Novel porous matrix of hyaluronic acid for the three-dimensional culture of chondrocytes. *International Journal of Pharmaceutics* 2009;369:114-20
 16. Vitamin D receptor polymorphism is associated with psoriasis. *Journal of Investigative Dermatology* 1999;112:113-116 (first author)

The development and safety of a robot-assisted automatic laser hair removal system

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¹JMO Dermatology, Seoul, Korea.

²Interdisciplinary Program for Bioengineering, College of Engineering, Seoul National University

³Department of Dermatology, Institute of Human-Environment Interface Biology, Seoul National University College of Medicine

⁴Department of Mechanical and Aerospace Engineering, Institute of Advanced Aerospace Technology, Seoul National University College of Engineering

⁵Department of Biomedical Engineering, Seoul National University College of Medicine

Background and Objective: The robot-assisted automatic laser hair removal (LHR) system is developed to automatically detect any arbitrary shape of the desired LHR treatment area and to provide uniform laser irradiation to the designated skin area. This study aimed to evaluate the number of laser irradiation sessions, process duration, and hair removal rate required for robot-assisted automatic versus physician-directed laser hair removal.

Methods: For uniform delivery of laser energy, a unit of a commercial LHR device, a laser distance sensor, and a high-resolution webcam are attached at the six axis industrial robot's end-effector, which can be easily controlled using a graphical user interface (GUI). During the treatment, the system provides real-time treatment progress as well as the total number of "pick and place" automatically. Six subjects 20-40 years of age, with skin types III-IV completed this study. A home-use LHR device with an 810 nm diode laser was used to treat equal-sized areas of both upper thighs; a random computer generator determined the use of a robot-assisted automatic LHR system or physician-directed LHR on the right or left thigh. The treatment schedule comprised five visits; subjects were photographed and shaved, and received LHR during the first through the fourth visits at 2-week intervals. The fifth visit occurred 1 month after the fourth, and only involved photography.

Results: During the test, it was demonstrated that the arbitrary shapes were detected, and that the laser was delivered uniformly. The localization error test and the area-per-spot test produced satisfactory outcome averages of 1.04mm error and 38.22mm²/spot, respectively. All subjects successfully completed the clinical trial with no noticeable or permanent side effects. The average hair removal rates were 49.0% (standard error of the mean [SEM]: 4.0) and 29.5% (SEM: 4.0) for

robot-assisted and physician-directed LHR, respectively. The average treatment duration and number of irradiation shots were 18 min, 30 sec (SEM:33 sec) and 260 (SEM: 5.7) for robot-assisted LHR and 3 min, 11 sec (SEM: 15 sec) and 73 (SEM: 5.9) for physician-directed LHR.

Conclusions: Results showed that the system successfully demonstrated accuracy and effectiveness. The clinical study successfully demonstrated the safety and effectiveness of robot-assisted LHR. The proposed novel system will benefit both patients and clinicians.

[CURRICULUM VITAE]

Wooseok Koh, M.D.

Director of JMO Dermatology Hair Removal Clinic



Education and Training :

- 1987 M.D., Seoul National University, Medical School
- 1990-1991 Intern, Seoul National University Hospital, Korea
- 1991-1995 Resident, Department of Dermatology, Seoul National University Hospital, Korea

Current and Past Professional Positions :

- 1995-1997 Instructor, Department of Dermatology, Inje University, Seoul Korea
- 1997-2000 Assistant Professor Department of Dermatology, Inje University, Seoul Korea
- 1998-1999 Fellow, Harvard Laser Center, Harvard Medical School, Boston, MA
- 1998-1999 Fellow, Wellman Center of Photomedicine, Massachusetts General Hospital, Boston, MA
- 2001-Present Director, JMO Dermatology Hair Removal Clinic, Seoul, Korea

Society Memberships :

- Korean Dermatological Association
- American Society for Laser Medicine and Surgery
- The Korean Association of Stem Cell and Tissue Regeneration (Board member)
- The Korean Society for Clinical Therapeutic Dermatology (Past President)

Featured Publications :

1. Park S, Lim H-w, Cho M, et al. Improvement in Laser-Irradiation Efficiency of Robot-Assisted Laser Hair Removal Through Pose Measurement of Skin Surface. *Photomedicine and laser surgery* 2015.
2. Lim H-w, Lee D-H, Cho M, et al. Comparison of Efficacy Between Novel Robot-Assisted Laser Hair Removal and Physician-Directed Hair Removal. *Photomedicine and laser surgery* 2015;33: 509-16.
3. Jo SJ, Kim JY, Ban J, et al. Efficacy and Safety of Hair Removal with a Long-Pulsed Diode Laser Depending on the Spot Size: A Randomized, Evaluators-Blinded, Left-Right Study. *Annals of dermatology* 2015;27:517-22.
4. Noh S, Koh WS, Lim HW, et al. Tool to visualize and evaluate operator proficiency in laser

- hair-removal treatments. Biomedical engineering online 2014;13:40.
5. Lim HW, Park S, Noh S, et al. A study on the development of a robot-assisted automatic laser hair removal system. Photomedicine and laser surgery 2014;32:633-41.
 6. Suthamjariya K, Farinelli WA, Koh W, et al. Mechanisms of microvascular response to laser pulses. Journal of investigative dermatology 2004;122:518-25.

Recent progress in phototrichogram analysis

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Numerous methods, including invasive, noninvasive, and semi-invasive methods, are currently available in the clinic for the evaluation of hair loss. The majority of these methods are greatly advantageous in the rendering of exact diagnoses, and have been rapidly developed through modern advances in technology. Amongst these, the phototrichogram (PT) method is currently one of the most promising hair examination methods. Since the early work in 1970, PT methods have been developed and advanced, and have become extensively utilized because of their noninvasiveness and accuracy.

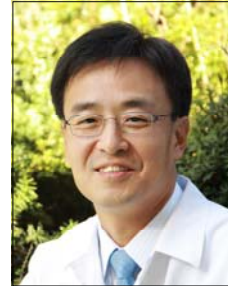
Essentially, PT involves the taking of a close-up picture of a hairy scalp area with the hair clipped short. This allows for the measurement of various hair related parameters, including hair density, hair thickness, hair growth rate, and the anagen/telogen hair ratio. If exact scalp site markings, such as tattoos, are available, this method yields accurate and reproducible data in a given scalp area. Although PT has powerful advantages, it is currently impractical for clinical office use for three reasons. First, repeat and multiple measurements are very difficult without hair clipping and scalp skin marking. Second, this technique requires a long evaluation time, and also requires an experienced operator. Third, although exact numerical data are valuable for scientific concerns, they are not particularly relevant to patients, who want to know exactly what they have and how much their global appearance can be improved.

For these reasons, more patient-friendly, interesting, and easily controllable methods for the evaluation of hair loss have continued to be an issue raised by hair clinics. Herein, recent progress in PT analysis for various conditions of hair loss disorders will be discussed and introduced to forecasting method for progression of hair loss with PT.

[CURRICULUM VITAE]

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Education and Training :

- 1982.3-1988.2 가톨릭대학교 의과대학 의학사
- 1991.9-1998.8 가톨릭대학교 의과대학 대학원 피부과학 석사, 박사

Current and Past Professional Positions :

- 1990.3-1995.2 가톨릭대학교 의과대학 강남성모병원 / 인턴, 전공의
- 1995.3-1998.2 국립의료원 피부과 의무사무관
- 1998.3-현재 가톨릭대학교 의과대학 피부과학교실 교수
- 1998.1-1998.3 Visiting fellow, Department of Immunology, Hokkaido University, Hokkaido, Japan
- 2008.1-2008.5 Visiting scalar, Department of Dermatology, New York University, New York, USA
- 2007.3-2008.8 Visiting fellow, Department of Dermatology, Science of Hair, University of British Columbia, Vancouver, Canada
- 2004.3-현재 가톨릭대학교 의과대학 성바오로병원 교수, 피부과장

Major Interest :

탈모증, 모발 및 두피 질환, 피부종양, 피부외과

Society Memberships :

- 1997.01-현재 대한피부과학회 고시위원회 위원, 부간사, 간사
- 2010.12-현재 대한여드름학회 교육이사
- 2012.12-현재 대한미용피부외과학회 부회장
- 2014.06-현재 대한모발학회 총무이사
- 2016.01-현재 대한피부과학회 고시이사

Robotic hair follicle harvesting in hair transplantation surgery

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Needs for Follicular unit extraction (FUE) have been increased in androgenetic alopecia patients, because it provides many advantages over strip method including absence of linear scar, much less pain, and short recovery time. However, stiff learning curve to become a good surgeon makes doctors hesitate to lush into hair restoration surgery with FUE. Also, FUE is a time-consuming, technically hard job for surgeons like beginners in hair restoration or strip surgeons.

ARTAS™ system (Restoration Robotics, Mountain View, CA, USA) is an interactive, computer-assisted, and physician-controlled robotic system used for the FUE harvest. ARTAS has been ungraded continuously since introduced 4 years ago, it compensate most of human errors and produced similar results in various surgeons and patients, if parameters are properly set. And any doctors who understand the basic principles of ARTAS could perform surgery successfully even if he or she is beginner in hair restoration surgery or FUE surgery.

Recently I have requested to make a teaching program for ARTAS new users by Korean doctors, and it has been applied to the doctors who never did hair restoration surgery at all. Even it was not only the first use of ARTAS, but it was the first experience of hair restoration surgery, after 1 hour educational lecture for doctors/assistants and 4 days close hands on course with quick start program, they can successfully do basic FUE surgery with ARTAS without further assistance. Thus I could prove it does not need stiff learning curve.

In this lecture, I would like to show the basic principles of ARTAS and key points to know for surgery, that would be helpful for the new user or doctors have in mind to be a ARTAS user.

[CURRICULUM VITAE]

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Associate Professor, Department of Dermatology,
Seoul National University Bundang Hospital, Korea



Education and Training :

- 1989-1995 Seoul National University, College of Medicine.
- 2001-2003 Graduate School (Master Course) of Seoul National University, College of Medicine
<Thesis: The influence of photo-epilation on wound healing>
- 2004-2007 Graduate School (Ph.D. Course) of Seoul National University, College of Medicine
<Thesis: Influence of adipose-derived adult stem cells on epidermis of living skin equivalents>

Current and Past Professional Positions :

- 1995-1996 Internship in Seoul National University Hospital
- 1996-1999 Military service as an Army Doctor. (lieutenant)
- 1999-2003 Residency in the Department of Dermatology, Seoul National University Hospital
- 2003-2004 Clinical Instructor of Dept. of Dermatology, Seoul National University Hospital
- 2004-2012 Clinical Assistant Professor of Dept. of Dermatology, Seoul National University Bundang Hospital.
- 2012-Present Clinical Associate Professor of Dept. of Dermatology, Seoul National University Bundang Hospital.
- 2010-2012 Visiting Physician of Sharp Health Care Center, San Diego, CA, USA
- 2012 Visiting Physician of Mayo Clinic, Rochester, MN, USA

Awards :

- 2003. 5 International Investigative Dermatology (IID) 2003 Travel Grant awarded by Japan Society for Investigative Dermatology (JSID)
- 2004. 2 American Academy of Dermatology (AAD) 2004 Travel Grant awarded by AAD
- 2006. 6 The 12th European Hair Research Society (EHRS) Meeting Travel Grant awarded by EHRS.
- 2006.10 Imrich Sarkany Non-European Exceptional Cases Grant awarded by the European Academy of Dermatology and Venereology.(15th EADV Meeting)
- 2008.5 International Investigative Dermatology (IID) 2008 Travel Grant awarded by

2011. 8 Japan Society for Investigative Dermatology (JSID)
 International Preceptorship Recipient by American Society for Dermatologic
 Surgery

Society Memberships :

- Domestic (Korean)

Treasurer of the Korean Dermatologic Laser Association
Treasurer of the Korean Society of Cosmetic Dermatology
Public Relation Director of Korean Hair Research Society
Director of the Korean Society for Aesthetic and Dermatologic Surgery
Director of the Korean Society for Skin Cancer

- International

Deputy Secretary General, International Society for Dermatologic Surgery 2015.
International Mentor of American Society for Dermatologic Surgery
International Society for Dermatologic Surgery preceptor

Publications :

Over 100 articles of domestic and SCI ranked international journals since 2001.

Presentations :

- Domestic: Numerous presentations since 1999.
- International symposiums: Over 80 verbal or poster presentations since 1999.



POSTER



The Korean Hair Research Society

P01

**IFN- γ 로 유발된 인간 모유두세포의 변화에 대한
발광다이오드의 JAK-STAT 경로를 통한 억제 효과**

주홍진, 정관호, 우영준, 김정은, 강훈

가톨릭대학교 의과대학 성마오로병원 피부과학교실

Alopecia areata (AA) is an autoimmune disease resulting in hair loss with psychosocial stress. Recent studies have identified prominent interferon (IFN)- γ in AA scalp signaling through JAK-STAT pathway, which could be a new therapeutic target. Light-emitting diode (LED) has been shown to promote hair growth but the efficacy is not consistent across clinical trials, and in vitro studies on human dermal papilla cells (hDPCs) have been rarely performed. We have shown previously that 660 nm was the most potent in hDPC proliferation. In this study, we examined whether LED could antagonize IFN- γ -induced changes in hDPCs via JAK-STAT pathway. IFN- γ treatment inhibited hDPC proliferation and 660 nm counteracted the effect of IFN- γ . However, 415, 525, and 830 nm had no significant effect. IFN- γ treatment transiently induced IFN- γ receptor (IFN- γ R) expression and the increased STAT1 phosphorylation lasted longer than that of IFN- γ R. All four wavelengths strongly counteracted IFN- γ -mediated activation of IFN- γ R and STAT1 phosphorylation. IFN- γ treatment increased IFN- γ -related genes such as caspase-1, interleukin-1 β (IL-1 β) and IL-18 expression. All wavelengths suppressed the effect of IFN- γ on caspase-1 and IL-18 expression but only 660 and 830 nm inhibited IL-1 β expression. Our findings suggest that LED could be a potential treatment option for AA by modulating JAK-STAT pathway.

P02**Hair Loss in a Patient with Sjogren's Syndrome :
Coincidence or Underestimated phenomenon?**

**Jae Yun Lim, Jung Yup Kim, Sun Min Lim, Ju-Yeon Choi,
Han-Saem Kim, Jung-In Kim, Jung Min, Joon Hong Min,
Young Jun Choi, Jae Hui Nam, Ga-Young Lee, Won-Serk Kim**

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Sungkyunkwan University School of Medicine, Seoul, Korea

Sjogren's syndrome (SS) is a systemic autoimmune disease that mainly affects salivary and lacrimal glands. It can cause debilitating, profound fatigue, chronic pain and other problems that can lead to disability. It may exist as a primary condition or in association with other systemic autoimmune diseases. The association between dermatomyositis or lupus and SS has been reported in few cases, but the association of SS with alopecia has not been reported except for the presence of antinuclear antibodies in postmenopausal frontal fibrosing alopecia (PFFA) cases. A 45-year-old female presented with diffuse hair loss, which started 7 years ago. It shows wax and wane of hair loss pattern. Histological findings of the scalp lesion revealed some scattered vellus hairs with mild lymphohistiocytic infiltration around follicles and no fibrosis. Finally, confirmed as inflammatory hair loss disease. Patient also complains persistent dryness of the mouth and eyes. Salivary gland scan shows decreased function of intake on both submandibular glands. Laboratory examinations showed abnormality of autoimmune target test. FANA test revealed positivity with speckled pattern (3+). Moreover, anti-Ro test shows positivity (1+) and anti-La test shows negative result. Consequently, this case was diagnosed as inflammatory hair loss disease accompanied by SS. Further studies are needed to clarify the relationship between SS and alopecia.

P03

Intramuscular triamcinolone acetonide: An undervalued option for refractory alopecia areata

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²Department of Dermatology, Yanbian University Hospital, Yanji, China

Severe alopecia areata (AA) can have an unpredictable clinical course and become refractory to contact immunotherapy. Novel treatment options include low-dose interleukin-2 and Janus kinase inhibitors; however, these treatments are still under investigation. Thus, we evaluated the efficacy and safety of intramuscular triamcinolone acetonide (TAC) as a rescue therapy for refractory AA. We defined AA as refractory if the patient showed an unsatisfactory response to both systemic treatment (not intramuscular TAC) and the consecutive DPCP immunotherapy. The initial systemic treatment was used to control extensive AA involving > 25% of the scalp. This study included 27 patients who exhibited a refractory course to both contact immunotherapy and systemic treatment of glucocorticoid and/or cyclosporine before receiving intramuscular TAC. Administration of intramuscular TAC for 3 to 6 months resulted in a 63.0% response rate, and all patients showed inactive disease after treatment. Final hair regrowth negatively correlated with initial scalp involvement (Spearman $r = -0.559$; $p = 0.002$). All patients showed complete recovery of adrenocortical reserve within 3 months after the last injection. Adverse effects of systemic steroid therapy were observed only in female patients (dysmenorrhea and osteoporosis). Intramuscular TAC may provide a valuable therapeutic option to manage active hair loss and facilitate hair regrowth in refractory AA, especially in male patients.

P04**UVB irradiation with anti-CD154 antibody improved hair follicle allograft survival in humanized mice**

**Jin Yong Kim^{1,2}, Ji-Seon Yoon², Bo Mi Kang², Hee Jung Park³, Hae Joo Wi³,
Kyeong Cheon Jung³, Seong Jin Jo^{1,2}, Kyu Han Kim^{1,2}, Ohsang Kwon^{1,2}**

¹Department of Dermatology, Seoul National University College of Medicine, Seoul, Korea

²Laboratory of Cutaneous Aging and Hair Research, Biomedical Research Institute, Seoul National University Hospital, Institute of Human-Environment Interface Biology, Medical Research Center, Seoul National University, Seoul, Korea

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Humanized mice are defined as immunodeficient mice engrafted with human haematopoietic stem cells or tissues, providing an opportunity to study human biological processes in vivo. Allogeneic hair transplantation can be a novel solution for severe permanent alopecia, but generalized immunosuppression cannot be justified for the non-life-threatening condition. Therefore, a new immunosuppressive regimen is necessary for hair follicle allografts with minimal side effects. UVB irradiation is known to make the depletion of dendritic cells within epidermis and upper dermis, resulting anti-inflammatory effects. Here, we investigated whether the combination treatment of UVB irradiation (UVB) and anti-CD154 antibody (Ab) improves the survival of hair follicle allograft in humanized mouse model. UVB irradiation were treated to donor hair follicles before transplantation, and anti-CD154 antibody were treated to humanized mice after transplantation. Hair follicle allografts maintained and survived showing normal hair cycle in UVB+Ab, Ab, UVB groups except control group. On histological examination, the outer root sheath of hair follicle allograft was intact over several weeks in UVB+Ab, Ab, UVB groups, whereas rapidly impaired in control group. In conclusion, UVB irradiation combined with anti-CD154 antibody showed a remarkable immune-tolerant effect in allogeneic hair transplantation in humanized mice.

P05

**Wnt/ β -catenin과 ERK 경로를 통한 발광다이오드의
인간 겉뿌리싸개 세포의 증식 조절**

김정은, 우영준, 손기민, 정관호, 강훈

가톨릭대학교 의과대학 성마오로병원 피부과학교실

Light emitting diode (LED) has been demonstrated to promote hair growth in clinical trials. However, the underlying mechanisms are not fully understood. The aim of this study was to determine the effect of LED irradiation on human outer root sheath cells (hORSCs). The effect of the LED irradiation on hORSCs proliferation was examined by MTT assay. The expressions of Wnt/ β -catenin and ERK pathway in hORSCs were examined by real-time PCR and Western blot assay. LED irradiation at 660 nm and 830nm significantly increased hORSCs proliferation and induced β -catenin, Wnt5a, Axin2, Lef1 and Sox9 mRNA expressions and β -catenin protein expression. Bcl2/bax mRNA ratio increased after various wavelength of LED irradiation. Phosphorylation of ERK, c-Jun and p38 in hORSCs was observed after 660nm light irradiation and PD98059 treatment before irradiation reduced the phosphorylation of ERK and c-Jun. Various wavelength of LED-treated hORSCs showed substantial upregulation of IL-6, IL-8, IL-16, TNF-a, IGF-1, TGF-b1, TGF-b2 and VEGF mRNA expression. 660 and 830nm light accelerated the migration of hORSCs in vitro. These results demonstrate that various wavelength of LED irradiation induced hORSC proliferation and migration and inhibit apoptosis in vitro. The growth promoting effect of LED irradiation in hORSC appears to be associated with the Wnt5a/ β -catenin signaling pathway. Red light also promoted cell proliferation by activating ERK signaling in hORSCs. ERK signaling activation seems to induce expressions of many growth factors and some growth-promoting cytokines.

P06**포토티리코그램을 이용한 안드로겐성 탈모증 환자의
나이대별 피나스테라이드 1mg/d 효과에 대한 비교 연구****우영준, 손기민, 주홍진, 김정은, 강훈**

가톨릭대학교 의과대학 성마오로병원 피부과학교실

Finasteride is a 5 alpha-reductase inhibitor indicated for the treatment of men with androgenetic alopecia (AGA). In Korea, finasteride 1mg/day is only approved for the treatment of men with AGA aged 18 to 41 years by Ministry of Food and Drug Safety and no previous study comparing the efficacy of finasteride on different aged groups. The purpose of our study is to compare the efficacy of finasteride on patients with AGA of two different aged groups. We reviewed retrospectively 40 patients (25 aged 18 to 41 years and 15 aged over 41 years) with AGA receiving finasteride 1mg/day from January, 2010 to March, 2016 at our department. The efficacy was evaluated by comparing phototrichogram results of baseline and 1 year-follow up targeted on six scalp sites, including front (S1), top (S2), back (S3), and the left (S4) and right sides (S5). The mean hair density of S1,S2,S3 and S4 scalp sites at 1 year of treatment showed improved results compared with baseline in both groups and the changes were numerically greater in younger age group than older age group, especially on the S1, S2, and S3. But there were no statistically significant differences between two groups. Slightly increased mean hair thickness was shown on the S1,S2 and S3 scalp sites in young age group and on the S3 and S4 scalp sites in older age group. But there were also no significant differences between two groups. In conclusion, finasteride 1mg daily administration is effective treatment in men aged over 41 years as well as 18 to 41 years to control male pattern hair loss.

P07

**한국인 안드로겐성 탈모증 환자의 평균 모낭 간격과
모낭 당 모발수의 포토트리코그램을 통한 분석**

손기민, 우영준, 주홍진, 김정은, 강훈

가톨릭대학교 의과대학 성마오로병원 피부과학교실

Androgenetic alopecia (AGA) is a common disease in Korean adults, and presents as a non-scarring alopecia under the influence of androgens. Several phototrichogram studies of hair density and thickness in patients with AGA were reported, but analysis of mean interfollicular distances (MID) and mean hair counts per follicle (MHC) to diagnose AGA have not been reported yet. We aimed to investigate MID and MHC as AGA hair characteristics of Korean adults using a PT and compared with normal hair characteristics. A retrospective chart review was performed to identify patients with AGA referred to the Department of Dermatology, St. Paul's Hospital from January 2012 to February 2015. PT results of patients with AGA (n=167) were analyzed to compare with data from our preliminary study analyzed normal population in Korea (n=160). Seven scalp sites, including front (S1), left (S1') and right (S1'') frontotemporal recession, top (S2), back (S3), and the left (S4) and right sides (S5) were targeted. MID were larger and MHC were smaller in patients with AGA than normal population. MID and MHC in patients with AGA were largest in S4, S5 ($S1 \approx S2 < S3 < S4 \approx S5$) and S3 ($S1 < S2 < S3$, $S1 \approx S4 \approx S5$) each. MID and MHC in patients with AGA showed remarkable differences depending on the grade of AGA. Our study suggest phototrichogram analysis of MID and MHC might be helpful to diagnose AGA. The lack of the number of the cases maybe limitation of our study.

P08

Differences in medical comorbidity based on the onset of androgenetic alopecia patients

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Background: Association of androgenetic alopecia (AGA) with increased incidence of metabolic syndrome (MS) has been suggested.

Objective: To verify differences in medical comorbidity based on the onset age of AGA.

Methods: The medical records of 1141 subjects who have visited the department of dermatology and occupational medical clinic in Wonju Severance Christian hospital were analyzed, and classified into early- and late-onset AGA group. The patients with pattern hair loss and younger than 35 years old were defined as “early-onset”, of which the number was 50. For comparison, 50 late-onset AGA patients were selected randomly. To evaluate MS, we analyzed the medical history, blood samples and anthropometric indexes such as BMI or waist circumference of each group. MS was defined on the basis of NCEP-ATP III guideline.

Results: The average age of early-onset AGA group was 33.7 and that of the late-onset AGA group was 46.8 years old ($p=0.244$). Metabolic syndrome was diagnosed in 9 people in the early-onset AGA group, while there was none in the late-onset AGA group. According to the data from anthropometry, blood samples and medical history, there were no significant differences other than the HDL cholesterol level. HDL cholesterol decreased in the early-onset AGA group ($p=0.029$).

Discussion: According to the result, early-onset AGA increase the chance of MS. There can be a selection bias to sort patients. However, this study has its significance in that it is a population-based, large-scale investigation and reports metabolic syndrome to be relevant with early-onset AGA.

P09

**Hair growth stimulation by umbilical cord
blood-derived mesenchymal stem cells**

김순례, 임송이, 박동호, 권태린, 오창택, 최은자, 장유진, 김범준

중앙대학교 의과대학 피부과학교실

Human umbilical cord blood-derived mesenchymal stem cells (UCB-MSC) has been considered a new potential therapeutic medicine for future in regenerative medicine. In fact, UCB-MSC has been a study for the treatment of a variety of incurable diseases, including arthritis already performed in pre-clinical and clinical studies. Hair loss is a common problem in the population that is increasing in women and in young people. In this study, we observed the effects of UCB-MSC on dermal papilla (DP) cells proliferation and hair follicle growth. UCB-MSC significantly increased the proliferation of DP cells and elongation of hair follicle in UCB-MSC and DP cells co-culture systems. Moreover, the DP cells inductions-related gene were upregulated and enhanced the ALP activity, as demonstrated by western blot and ALP activity assay. Our study reveals that UCB-MSC was a potential therapeutic medicine for treatment of hair loss.

P10
**dsRNA induces inflammation through NFkB signaling
and inflammasome in ORS cells**

**Cho-Ah Lim, Jung-Min Shin, Jin-Hyup Lee, Myung Im, Chang-Deok Kim,
Young-Joon Seo, Jeung-Hoon Lee, Young Lee**

Department of Dermatology, School of Medicine, Chungnam National University, Daejeon, Korea

Alopecia areata (AA) is a common cause of nonscarring alopecia that occurs in a patchy, confluent or diffuse pattern and considered to be a cell-mediated autoimmune disease. The inflammasomes are key innate immune system receptors that regulate the activation of caspase-1 and induce pro-inflammatory cytokines such as IL-1b and IL-18. There are several papers showing the relationship of inflammasomes in chronic inflammatory skin diseases such as psoriasis and acne but inflammasomes have not yet been investigated thoroughly in AA. In this study, we investigated whether double stranded RNA activates the inflammasome in human outer root sheath (ORS) cells. We found that IL-1b and caspase-1 expressions were upregulated in hair follicles of AA. After stimulation of human ORS cells with poly (I:C), the activation of caspase-1 and secretion of IL-1b were enhanced significantly. Moreover, poly (I:C) induced inflammation by activation of NFkB signaling pathway and knocking down the NFkB pathway abolished poly (I:C)-induced IL-1b production in ORS cells. Finally, we found that poly (I:C) induces secretion of HMGB1 in ORS cells which acts as a pro-inflammatory mediator and known to be elevated in several autoimmune diseases. These results suggest that human ORS cells are important immunocompetent cells that induce the NLRP3 inflammasome, and give evidence that double stranded RNA-induced inflammasome activation in ORS cells may have a role in AA pathogenesis.

P11

Efficacy and safety of superficial cryotherapy for alopecia areata: Review of 353 cases over 22 years

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Background: Alopecia areata(AA) affects anagen hair follicles, results in a non-scarring hair loss. Since introduced by Huang et al., superficial cryotherapy has been accepted as a considerable primary therapeutic modality for AA.

Objective: To objectively clarify the therapeutic efficacy and safety of superficial hypothermic cryotherapy for treatment of AA.

Methods: Medical records of 353 patients from 1993 to 2014 were retrospectively analyzed. According to the response to the superficial cryotherapy, patients were categorized into 4 groups; Marked, partial, poor and no recovery group. Marked and partial recovery group was considered as responders. The proportions of the responders among patient subgroups which were defined by various patients, disease, and treatment factors were compared.

Result: 60.9% of the patients were classified as responders, with mean treatment duration of 18.6 weeks. The proportion of the responders were higher when the treatment interval was shorter than 2 weeks and in the incipient disease, with statistical significance. No severe side effects other than mild pain and pruritus were reported.

Conclusion: Superficial cryotherapy is an effective and safe therapeutic modality for AA. Especially when the treatment interval is shorter than 2 weeks and in the first occurrence of the disease, the therapeutic outcome is superior.

P12
Effect of lithocholic acid as a ligand of vitamin D receptor on hair growth in alopecia

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Vitamin D receptor (VDR) as a ligand-dependent transcription factor forms a heterodimer with retinoid X receptor (RXR) to activate vitamin D response elements-associated various cellular genes during hair growth. Lithocholic acid (LCA) is known to be a naturally produced VDR ligand to induce VDR-RXR conformation. Previous studies demonstrated that the absence of VDR and RXR α ultimately resulted in alopecia development in mouse. However, since the role of LCA is not clear in hair cycling, we examined the functional mechanism of LCA in human dermal papilla cells (hDPCs). Treatment of hDPC cells with LCA significantly increased cellular proliferation together with the enhanced expression of VDR, RXR α , alkaline phosphatase, β -catenin, and dephospho- β -catenin in a dosedependent manner as well as the acceleration of hair shaft elongation. To elucidate the possibility that the abnormality of hair cycling may be associated with ablation of VDR, we examined the expression of cell cycle control proteins in VDR knockout hDPC cells. Through the result of this study, we suggest that lithocholic acid may play a critical role in hair regeneration through VDR activation in alopecia.

P13

The association between exercise and androgenetic alopecia: Does exercise cause hair loss?

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Background: Androgenetic alopecia (AGA) is the most common type of hair loss. Both genetic and non-genetic factors are known to play a role in development of AGA. Many studies have focused on the non-genetic factors of AGA, but few have investigated the association between AGA and exercise.

Objectives: This study was designed to analyze the association among AGA and exercise-related environmental etiologic factors.

Methods: We performed a survey-based study using the data of 1,182 healthy individuals without any underlying disease in order to analyze the association between AGA and exercise. Subjects were asked to answer questionnaire items about current state of exercise.

Results: The total amount of exercise was larger in AGA group than that of normal group ($p=0.008$). When comparing within each exercise intensity group, no significant difference of the amount of exercise between AGA and normal groups was observed in moderate and high intensity group. However, within the low intensity group, the total amount of exercise was larger in AGA group than normal group, with statistical significance ($p<0.001$).

Discussion: This is the first large-scaled study designed to analyze the association between exercise and alopecia. According to the result, the intensity and frequency of exercise was higher in alopecia patients, especially when it comes to low intensity of exercise. Further study designed to determine the pathophysiology of alopecia is necessary to elucidate its association with exercise.

P14

Efficacy of superficial cryotherapy on alopecia areata of the eyebrow

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Introduction: A few treatment modalities are available for treating alopecia areata (AA) of the eyebrow. However, due to the anatomical proximity of the eyebrows to the eyes, safety issues and side effects should always be taken into consideration when choosing the treatment modality.

Objective: This study was designed to examine the efficacy of superficial cryotherapy on patients with AA of the eyebrow.

Methods: Superficial cryotherapy was performed every other week on the right eyebrow in a total of 20 patients. No specific treatment was performed on the left side as a control. The degree of eyebrow recovery was compared in 15 patients who continued to receive more than 10 superficial cryotherapy treatments (5 months of treatment) on their right eyebrow.

Results: Hair density was significantly increased on both sides after 5 months of treatment compared with the pretreatment density; moreover, the right side exhibited a significantly greater increase in density than the left side.

Conclusion: Superficial cryotherapy is associated with minimal to no adverse events, and exhibits high compliance and relatively good efficacy. Thus, this treatment is an additional important option for patients with AA of the eyebrow.

P15

**AMP-activated protein kinase 활성체인 Metformin의
모발 성장에 미치는 영향에 대한 연구**

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Background: AMP-activated protein kinase (AMPK) is a serine/threonine protein kinase that plays a pivotal regulator in the balancing cellular energy metabolism. Recent studies have been reported that AMPK has numerous roles in physiological conditions and dysregulation of AMPK induces pathological processes and serious diseases. However, AMPK and its activators have not been studied to determine whether they regulate hair growth.

Methods: To investigate the role of AMPK pathway in hair growth, we screened AMPK activators to determine whether they have the promoting effect of hair growth. In addition, to evaluate the molecular and cellular mechanisms, protein levels of AMPK and β -catenin were analyzed using western blot. The growth factors like IGF-1, HGF and VEGF were also examined.

Results: Among the AMPK activators, metformin increased the cellular proliferation without cytotoxicity in human dermal papilla cell (DP) and outer root sheath cell (ORS). Ki-67 expression also significantly increased with metformin treatment in the ex vivo hair follicle organ culture. In further study to investigate the mechanism by which AMPK regulates hair growth, treating DP and ORS cells with metformin led to the significant increase of AMPK phosphorylation, which in turn suppressed β -catenin degradation and enhanced its nuclear accumulation. In addition, metformin restored the AMPK inactivation and β -catenin phosphorylation induced by Compound C, the AMPK inhibitor. IGF-1 also increased by metformin in DP cells, while HGF and VEGF were not altered.

Conclusion: We demonstrated that metformin promotes hair growth via AMPK/ β -catenin signaling pathway in vitro, affecting in DP and ORS cells. The hair promoting effects of metformin have potentially significant and useful roles in treatment of alopecia.

P16

Analysis of microscopic examination of shed hair in telogen effluvium patients

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Background: Telogen effluvium is characterized by massive hair shedding and results from an abrupt conversion of anagen to telogen.

Objectives : To evaluate the morphologic characteristics of shed hair of patient with clinical feature of telogen effluvium.

Methods: We analyzed microscopic examination of shed hair after hair pull test in telogen effluvium patients and their clinical features retrospectively. Morphologic characteristics were classified into two group; typical club hair and atypical telogen hair which was subclassified into club hair with tail, club hair with sheath, combined club hair (with tail and sheath) and unclassified hair.

Results: A total of 44 patients were enrolled and 370 hairs were evaluated. The mean age was 54.4 years. There was female preponderance, with male to female ratio 1:13.7. Hair microscopic examination showed typical club hair 32.7%, club hair with tail 23.5%, club hair with sheath 23.0%, combined club hair 18.9% and unclassified hair 1.9%. In patients with analysis of more than 10 hairs(n=11, mean 19.5(11-34)), atypical telogen hair was 69.0% and club hair with tail was the most common form among them.

Conclusion: Increased atypical telogen in microscopic hair examination might be characteristics of telogen effluvium. Further study is necessary.

P17

Integral hair lipid based barrier in human hair follicles

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Integral hair lipid (IHL) plays an important role in all compartments of hair and skin substructures and also in involvement of hair development and function. In this study, we described the expression profile of lamellar granule-associated proteins, cornified cell envelope (CCE) precursor proteins and IHL based barrier in human hair follicle according to the hair keratinization. Immunofluorescence analysis of lamellar granule-associated proteins (Caveolin-1, Glucosylceramides, Cathepsin V) and CCE precursor proteins (Involucrin, Transglutaminase 5) was conducted on the haired human scalp obtained from 5 individuals. Transmission electron microscopy was performed to observe the ultrastructure of the hair lipid. Lamellar granule-associated proteins and CCE precursor proteins were mainly detected in the inner root sheath region. Ultrastructure of anagen hair follicle at the level where Henle layers are keratinizing, showed the intercellular lipid layer (IL) and lamellar structure (LS). Ultrastructure of anagen hair follicle at the level where the inner root sheath (IRS) is completely keratinized showed multiple LS and lamellar granules (LG). Multitudes of LS and IL are observed between the keratinized cells in IRS. The IHL in the hair follicle may be regarded as hair barrier to be similar to the epidermal lipid layer functioning as skin barrier.

P18

Unhealthy lipid profile in androgenetic alopecia: A meta-analysis

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Background: Many studies have reported that androgenetic alopecia (AGA) might be a risk factor for cardiovascular disorders, and the association of AGA with dyslipidemia has been studied. However, the results were controversial and previous meta-analyses had several critical limitations.

Objective: We performed a meta-analysis to clarify whether AGA patients have abnormal lipid profiles.

Methods: A literature search was performed using the MEDLINE, EMBASE, The Cochrane Library, and KOREA MED databases.

Results: We pooled 19 observational studies and performed a meta-analysis for serum total cholesterol, serum triglyceride (TG), low-density lipoprotein (LDL) cholesterol, and high-density lipoprotein (HDL) cholesterol. The serum total cholesterol, TG, and LDL cholesterol levels were higher in the AGA group than in the control group, and the standardized mean differences were 0.377, 0.426, and 0.450, respectively. In addition, HDL cholesterol level was lower in the AGA group than in the control group, and the standardized mean difference was -0.248. Limitations The diagnostic criteria differed among the studies. There was a lack of representativeness. Additionally, we could not appropriately explain heterogeneity.

Conclusions: AGA patients tend to have unhealthy lipid profiles, and this might partly explain the association between AGA and cardiovascular diseases.

P19
Simvastatin/ezetimibe and alopecia areata: Efficacy and review of literature

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Background: Alopecia areata (AA) is a chronic, organ-specific autoimmune disease, mediated by T cells, which affects hair follicles. The treatment of severe cases, especially alopecia totalis(AT), remains challenging. Simvastatin is a member of the statins or 3-hydroxy-3 methylglutaryl coenzyme A reductase inhibitors. Statins act as immunodulatory agents participating in the repression of MHC class 2 molecule mediated T lymphocyte activation. Ezetimibe has been shown possibly synergetic anti-inflammatory effects when given with simvastatin. It was observed in 3 case reports that simvastatin/ezetimibe successfully treated alopecia areata totalis and universalis. And one prospective pilot study demonstrated the efficacy of simvastatin/ezetimibe.

Objective: To evaluate the efficacy of simvastatin/ezetimibe in patients with AA and review of literature.

Method: Medical records of patients seen between June 2006 and August 2015 with a diagnosis of alopecia areata were carefully reviewed after receiving institutional review board approval. The database search obtained 8 records with a diagnosis of AA, AT or alopecia universalis treated with a simvastatin/ezetimibe. Pre- and post-treatment responses to simvastatin/ezetimibe were evaluated clinically with three categories: responders, partial responders and non-responders and medical records were examined for data on demographics, duration and extent of the disease, duration of current AA episode before starting treatment and treatment period.

Results: Out of 8 patients, there were 6 (75%) women and 2 (25%) men. The hair loss involved the entire scalp in 7 patients (87.5%) and 0-25% of scalp in 1 patient (12.5%). The response rate was 25% after medication of simvastatin/ezetimibe and mean treatment duration of responders were 4 months. Two patients responding to the treatment showed partial hair regrowth and duration of current AA episode before starting treatment was 1 month and 1 year, respectively. Responders showed limited disease duration different significantly with 10 years, a median duration, of

non-responders. There was no significant difference in other characteristics of patients: age, sex, treatment period, treatment agents before treatment and extent of hair loss.

Conclusion: Two patients with limited disease duration showed partial responses and all responders had previous one more episodes of AA repeating regrowth and aggravation. These suggest that short disease duration of AA can be prognostic factors for efficacy of simvastatin/ezetimibe. The remission rate of simvastatin/ezetimibe for AA was unsatisfactory. However, clinicians should not conclude that simvastatin/ezetimibe is not effective for AA as the patients of this study didn't have any response to any other treatments for AA. Simvastatin/ezetimibe can be concerned to another choice of treatment for recalcitrant AA. These findings warrant future randomized placebo-controlled clinical trials in larger cohort study. Keywords: simvastatin/ezetimibe, alopecia areata, efficacy, responders

P20

Role of T-helper 17 cells and T regulatory cells in alopecia areata: Comparison of lesional and serum cytokines between controls and patients

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Background: Alopecia areata (AA) is an organ-specific autoimmune disease characterized by T-cell infiltrates and cytokine production around anagen stage hair follicles. There is evidence for loss of immune privilege coupled with T-cell-mediated attack of hair follicle autoantigens. As T-helper 17 (Th17) cells and T regulatory (Treg) cells are crucially involved in the pathogenesis of some autoimmune diseases, Th17 and Treg cytokines on the pathogenesis of AA has not been studied yet.

Objective: To determine whether AA is associated with alterations in localized Th17 and Treg cytokines, and studied whether they were associated with clinical type.

Methods: Scalp biopsies from 45 cases of AA were studied together with 8 scalp skin biopsies from normal controls. Three-millimeter punch biopsies were obtained from the scalp of each patient for real-time quantitative PCR with Taqman primer specific for IFN- γ , TNF- α , TGF- β , IL-1, IL-2, IL-4, IL-10, IL-12A, IL-13, IL-17, IL-22 and IL-23. Serum samples from 50 cases of AA were studied together with 16 serum samples from normal controls. IL-1, IL-2, IL-4, IL-10, IL-13, IL-17A, IL-22, IL-23, IL-35, IFN- γ , TNF- α , and TGF- β were measured using ELISA.

Results: The mean age for patients and controls were 38.16 and 41.17 years, respectively. According to clinical type, patients were classified into patch AA, acute and diffuse total alopecia, alopecia totalis or universalis. Lesional IL-17 and IL-22 were significantly increased in patients group. Moreover, positive correlations were shown between lesional IL-17, IL-22 and disease severity. Serum IL-1, IL-17, TNF- α , and TGF- β were significantly increased, and IL-2 and IL-13 were significantly decreased in patients group. Furthermore, positive correlation was shown between serum IL-17 and disease severity. The difference of both lesional and serum cytokines according to clinical subtypes and clinical parameters such as disease duration and treatment response was also analyzed.

Conclusion: These results showed significantly high Th17 cytokines in both lesion and serum in AA patients, which may highlight a functional role of these cytokines in the pathogenesis of AA and may provide another valuable insight into the mechanism underlying the pathogenesis of AA.

P21
CD13 is expressed in hair mesenchyme as well as nail mesenchyme

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The hair is comparable with the nail. As there are specialized mesenchymes such as dermal papilla and dermal sheath in the hair follicle, we demonstrated the presence of specialized mesenchyme beneath the nail matrix and nail bed and proposed the terminology onychodermis for the specialized mesenchyme. The purpose of this study was to further characterize hair mesenchyme and nail mesenchyme by CD13 immunohistochemistry. Vertical and transverse sections of the scalp and longitudinal and transverse sections from polydactyly and cadaver samples were used. Immunohistochemistry for CD10 and CD13 was performed. While CD10 was expressed only in the dermal sheath, CD13 was expressed in the dermal sheath as well as dermal papilla of the scalp hair follicles. While CD10 was expressed in the mesenchyme (onychodermis) below the nail matrix and nail bed, CD13 was expressed mainly in the mesenchyme below the nail matrix. These results demonstrate that CD13 is expressed in hair mesenchyme as well as nail mesenchyme, providing another evidence of the similarity of hair and nail.

P22
Two cases of trichotillomania successfully treated with N-acetylcysteine(NAC)

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Trichotillomania(TTM) is a medical condition caused by pulling out of own hair by the patient ownself, resulting in a perceptible hair loss pattern. TTM is associated with other psychiatric processes such as obsessive compulsive disorder, bipolar disorder or etc. Trichotillomania generally has a chronic course in most patients, and a challenging therapeutical management. There are several available options for treatment, but the clinical response is not satisfactory in many patients. Recently, N-acetylcysteine, a glutamate modulator, has shown efficacy in the treatment of trichotillomania and other compulsive behaviors, and is considered a new alternative in the management of TTM. We describe two patients with trichotillomania successfully treated with N-acetylcysteine. A 10-year-old boy patient presented with asymptomatic focal various sized hair loss with different hair lengths on right parietal area for 1 year. The dermoscopic findings were yellow granules, broken hairs, corked hairs and focal erythema. He was successfully treated with N- acetylcysteine after 4 months. Second case was a 14-year-old male adolescent that attended at our outpatient department of dermatology with 12*10cm sized hair loss on vertex. He presented bizarre hair loss appearance with broken and cork-screwed hairs. The hairs had different lengths on dermoscopic examination. Complete regrowth was observed after introducing N-acetylcysteine 800 mg/day during 2 months and 1600 mg/day during 3months.

P23

A case of childhood chronic telogen effluvium

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Telogen effluvium (TE) is a non-scarring alopecia that occurs when there is a shift of hair follicles from the anagen phase abruptly to the telogen phase. More than 20% to 50% of hairs on the scalp can be in telogen, resulting in a large degree of hair loss over a short amount of time. Chronic TE is a diffuse hair loss of scalp that persist for more than six months that is common in middle-aged women and runs a fluctuating course over several years. Herein, we report a case of chronic telogen effluvium occurred in childhood. A 6-year-old girl came to our clinic complaining diffuse hair loss and short hair length since birth. She had a history of atopic dermatitis and height and weight were within normal range in relation to her age and sex. She reported increased shedding during hair washing and the presence of many hairs on the pillow in the morning and after sleeping. Her hair was thin, however otherwise normal and hair pull test was strongly positive. On the laboratory examination, CBC, sex hormone level, thyroid function test, serum ferritin and magnesium levels were within normal range. Dermoscopic findings on the vertex area revealed multiple upright regrowing hairs. Phototrichogram analysis revealed diffuse hair thinning but normal hair density. On the microscopic examination of pulled hairs, most of hairs were telogen hairs. We diagnosed the case as chronic TE.

P24

A remarkable repigmentation of refractory vitiligo using follicular unit extraction (FUE) graft

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Vitiligo is a common acquired depigmenting and psychosocially devastating disorder. To improve a continuous repigmentation, cell-replenishing therapy is needed, for examples, suction blister epidermal grafting, split thickness skin grafting, cell transplantation of cultured / noncultured epidermal cell suspension mixed with melanocytes, and pure melanocytes grafting. The FUE technique is much simpler, suture less and convenient for back-to-work than conventional hair transplantation. By the FUE technique, hair follicles are not dissected and directly transplanted as a whole unit and the well-preserved natural milieu can promote better proliferation of the cells, resulting in improved repigmentation. Herein, we report 1 case of refractory vitiligo treated through the follicular unit extraction (FUE) grafting method. A 68-year-old man who had get burned on his left forehead 30 years before, presented with a depigmented patch on the same site. At first, he received epidermal micropunch graft with NBUB treatment for 18 months, without satisfactory outcome. Next, 5 FUE grafts of \varnothing 1mm were undertaken and subsequent NBUB phototherapy were performed 3 months. He showed an excellent repigmentation about 3.7-fold(2.5~5 fold) in diameter and then second round of FUE grafting with NBUB phototherapy recently was done. We suggested a remarkable repigmentation might occur due to the hair cycle-dependant continuous supply of the pigmented melanocytes from bulge and outer root sheath.

P25
**Anti-tuberculosis drugs-induced anagen effluvium with
generalized drug eruption**

임초아, 이해을, 임명, 서영준, 이증훈, 이영

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Anagen effluvium is an abrupt loss of hair that is in its growing phase due to event that impairs the mitotic or metabolic activity of hair follicle. Anagen effluvium is commonly associated with chemotherapy, radiation, toxic chemicals and drugs. However, alopecia due to anti-tuberculosis drugs has rarely been reported in literature. A 50-year-old female diagnosed to be having intestinal tuberculosis was started on anti-tuberculosis therapy containing isoniazid, rifampicin, ethambutol, and pyranzinamide. After 1 months of medication, she developed drug eruption on her whole body followed by diffuse loss of body hair. On hair microscopic examination, intact inner and outer root sheaths with fully pigmented hair bulb were found. Histopathological examination of scalp biopsy showed vacuolar degeneration in interfollicular epidermis and perifollicular infiltration of mononuclear cells and eosinophils. Even after 3 months of stopping anti-tuberculosis drugs, still hair shedding is observed. Here, we report a rare case of anagen effluvium with generalized drug eruption due to anti-tuberculosis medication.

P26
A case of alopecia caused by gold acupuncture

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Acupuncture with gold is occasionally used for the treatment for pain such as headaches, osteoarthritis and facial rejuvenation in some Asian countries as a adjuvant therapy. Permanent gold acupuncture is believed that insertion of thin sterile gold needle results in continuous stimulation in the body for relief of pain and rejuvenation of face. Although gold is a safe material, permanent implantation of gold may lead to unexpected adverse effects. The patient was a 54-year-old woman who had pruritic erythematous hair loss patches on scalp for 2 years. Excisional biopsy of the lesion demonstrated distorted glandular structures and dense lymphocytic infiltration in the sclerotic dermis with artificial cleft. To determine the cause of the artifact, paraffin block was evaluated and it revealed gold particle. Upon further history taking, thirty years previously, she had undergone illegal gold acupuncture procedure on her scalp as an complementary therapy for relief of headache. Herein, we report an interesting case of alopecia developed after gold acupuncture.

P27
**A familial case of aplasia cutis congenita in two siblings
in Korea**

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Aplasia Cutis Congenita (ACC) is a rare congenital malformation, characterized by a localized defect of epidermis, dermis, and sometimes subcutaneous tissues. Although the condition has been suggested to occur as a result of the disrupted development or degeneration of skin in utero, the pathogenesis and detailed mechanism remains unclear. Few familial cases have been suggested an autosomal dominant, autosomal recessive inheritance, or possibility of mosaicism. There are four familial cases of ACC in Korea, however three cases of them were type 4 ACC localized to legs, the other case was combined with syndromic condition. Herein, we report 18-month-old male and his 8-year-old brother with ACC on their scalps; type1 ACC in two siblings without any associated congenital anomalies.

대한모발학회 회칙

제 1 장 총 칙

제 1 조 (명칭) 본회는 대한모발학회(The Korean Hair Research Society)라 하며 대한피부과 학회의 산하학회이다.

제 2 조 (구성) 본회는 모발 및 모발과 관련된 질환을 다루고 연구하는 사람으로 구성한다.

제 3 조 (목적) 본회는 모발에 대한 연구, 교육 및 학술활동을 수행하고 회원 간의 친목을 도모함을 목적으로 한다.

제 4 조 (사업) 본회는 전항의 목적을 달성하기 위하여 다음과 같은 사업을 수행한다.

1. 총회 및 학술대회 개최
2. 초록집, 학술지 및 소식지의 발간
3. 모발 및 모발질환에 대한 연구, 교육 등 제 문제에 대한 사업
4. 국내외 관련 학술단체와의 교류 및 제휴
5. 기타 본 학회 목적 달성에 필요한 사업

제 2 장 회 원

제 5 조 (자격) 본회의 회원은 모발 관련 진료 및 연구에 종사하거나 관심을 가지고 본 학회의 취지에 찬동하는 자로서 소정의 입회 수속을 밟고 이사회회의 의결을 거쳐 총회에서 인준을 받은 자로 한다.

제 6 조 (구분) 본회의 회원은 다음과 같이 구분한다.

1. 정회원: 대한피부과학회 정회원 자격자로 본 회 목적에 찬동하는 자로한다.
2. 명예회원: 모발 관련 진료 및 연구 업적이 탁월하고 본 회 발전에 공헌이 지대한 자로 한다.
3. 연구회원: 생명과학 관련분야에 종사하는 박사학위 소지자이거나 이에 준하는 경력자로 본 회 목적에 찬동하는 자로 한다.
4. 전공의준회원: 대한피부과학회 준회원 자격자로 피부과 수련병원에서 수련 받는 전공의로 한다.
5. 연구준회원: 정회원 또는 연구회원의 지도를 받거나 생명과학 관련분야에 종사하는 연구원 또는 이에 준하는 경력자로 본 회 목적에 찬동 하는 자로 한다.

제 7 조 (의무) 회원은 본 회의 회칙, 제 규정 및 결의 사항을 준수하여야 하고, 정회원, 및 연구회원은 회비 및 기타의 부담금을 납부할 의무가 있다.

제 8 조 (권리) 모든 회원은 본회에서 발간하는 소식지 및 학회지를 배부 받을 권리가 있으며 정회원은 선거권, 피선거권 및 기타 소정의 의결권을 가진다.

제 9 조 (제명) 본회의 의무를 준수하지 않거나 명예를 훼손한 회원은 이사회를 거쳐 총회의

인준을 받아 제명할 수 있다.

제 3 장 임 원

제 10 조 (임원) 본회는 회장, 부회장 3명 이내, 총무, 학술, 교육, 재무, 홍보, 간행정보, 기획, 의무, 무임소 상임이사, 감사 2명 및 약간 명의 고문을 두며 이사의 정원은 30명 내외로 한다. 무임소 상임이사는 2-5명으로 한다.

제 11 조 (선임)

1. 회장은, 감사는 총회에서 선출한다.
2. 부회장, 상임이사는 회장이 위촉한다.
3. 이사는 상임이사회에서 추천하여 회장이 위촉한다.
4. 고문은 회장이 위촉한다.

제 12 조 (임기) 임원의 임기는 2년으로 하며 연임할 수 있다.

전임자의 유고로 인해 보선된 임원의 임기는 전임자의 잔여 임기로 한다.

제 13 조 (직무)

1. 회장은 본회를 대표하여 업무를 총 관리하고 총회, 이사회의 의장이 된다.
2. 부회장은 회장의 유고시 그 직무를 대행하며, 본 회 운영의 주요한 사항을 심의하고 제반 업무를 집행한다.
3. 총무이사는 본 회 운영의 주요한 사항을 심의하고 제반 업무를 집행한다.
4. 학술이사는 학술 모임에 관한 업무를 집행한다.
5. 교육이사는 회원 교육에 관한 업무를 집행한다.
6. 재무이사는 재무에 관한 업무를 집행한다.
7. 홍보이사는 홍보 및 대중 매체에 다루어지는 업무를 집행한다.
8. 간행정보이사는 간행 및 정보에 관한 업무를 집행한다.
9. 기획이사는 기획에 관한 업무를 집행한다.
10. 의무이사는 의무에 관한 업무를 집행한다.
11. 무임소이사는 특정 사업이나 지속적 업무를 집행한다.
12. 감사는 본 학회의 재산 상황과 사업과 관련된 사항을 감사하고 이를 총회에 보고한다.
13. 이사는 이사회를 구성하여 본 학회 운영의 주요 사항을 심의 의결한다.
14. 고문은 본 학회의 운영 전반에 대한 자문을 한다.

제 4 장 회 의

제 14 조 (구분) 본회에는 총회와 이사회, 상임이사회를 둔다.

제 15 조 (총회)

1. 정기총회는 연 1 회 회장이 소집한다. 단 정회원 5분의 1이상의 요구나 이사회의 요청이 있으면 임시 총회를 소집하여야 한다.
2. 총회는 출석 정회원으로 성립되고 재석 인원 과반수로 의결한다.

3. 총회는 다음과 같은 사항을 의결한다.
 - (1) 회장, 감사 선출
 - (2) 예산과 결산의 인준
 - (3) 회칙 개정의 인준
 - (4) 기타 이사회에서 제출한 사항

제 16 조 (이사회)

1. 이사회는 임원과 이사로 구성하며 회장이 의장이 되어 회의를 진행한다.
2. 이사회는 과반수 출석으로 성립하고 재석 인원 과반수로 의결한다.
3. 이사회는 총회에 제출하여 인준 또는 의결할 사항, 제 규정의 제정과 개정, 회원의 자격과 제명 및 기타 필요한 사항에 대하여 심의 의결 또는 인준한다.

제 17 조 (상임이사회)

1. 상임이사회는 상임이사로 구성하며 회장이 의장이 되어 회의를 진행한다.
2. 상임이사회는 이사회 및 총회에 제출하여 인준 또는 의결할 사항을 포함하여 회무 전반에 관한 사항을 심의 의결 또는 인준하여 집행한다.

제 18 조 (각종 위원회)

1. 이사회의 의결을 거쳐 각종 위원회를 둘 수 있다.

제 5 장 재 정

제 19 조 (재원) 본 회의 재원은 회비, 입회비, 찬조금 및 기타 수입금으로 한다.

제 20 조 (회계연도) 본 회의 회계연도는 매년 정기 총회 일에서 다음 정기 총회 전일까지로 한다.

제 21 조 (임기) 본 회의 수지 결산은 감사의 감사를 거쳐 차기 정기 총회에 보고한다.

제 6 장 부 칙

제 22 조 본 회칙에 규정되지 않은 세칙은 일반 관례에 준한다.

제 23 조 본 회칙의 개정은 이사회의 심의를 거쳐 총회의 인준을 받아야 한다.

제 24 조 본 회칙은 공포일로부터 시행한다.

2004. 7. 1. 제정
2006. 5. 28 개정
2009. 5. 24 개정
2010. 10. 16 개정
2012. 6. 3 개정
2012. 10. 20 개정
2014. 10. 18 개정

대한모발학회 임원명단

(2014년 6월 - 2016년 5월)

- 고 문 노병인, 임철완, 강진수, 김도원
- 회 장 심우영
- 부 회 장 이원수

- 총무이사 강 훈
- 기획이사 최광성
- 학술이사 권오상
- 재무이사 유박린
- 교육이사 이동윤
- 간행정보이사 김문범
- 홍보이사 허창훈
- 의무이사 강광영
- 무임소이사 이양원
- 무임소이사 김범준
- 무임소이사 이 영
- 감 사 김규한, 박성욱

- 이 사 계영철, 김기호, 김도영, 김상석, 김성진, 김정철, 김효진, 민복기, 박병철, 박 진, 서구일, 서수홍, 원종현, 윤태영, 이드보라, 이상훈, 이인준, 임이석, 장승호, 장용현, 조성빈, 조성진, 조성환, 조항래, 최유성, 홍창권, 황성주

대한모발학회 연혁

● 대한모발학회 소개 ●

대한모발학회는 1998년 10월 29일 대한피부과학회 내에 모발연구분과위원회를 설립하기 위한 발기인 모임을 가진 것을 시작으로 하여 태동이 되었습니다. 이후 모발연구분과위원회의 주도로 매년 대한피부과학회 춘추계학술대회 때마다 모발심포지엄을 개최하여 왔습니다. 이후 기존의 모발연구분과위원회를 확대 개편하여 대한모발학회를 창립하기로 하고 2004년 7월 11일 제주도 샤인빌 호텔에서 창립총회를 가졌습니다. 초대회장으로 노병인 교수를 비롯한 임원진이 선출되었고, 이후 본격적인 활동을 시작하였습니다.

현재 대한모발학회는 북미모발학회, 유럽모발학회, 일본모발학회 및 호주모발학회와 함께 세계모발연구학회를 구성하는 5대 학회로서 당당히 어깨를 겨루는 세계 속의 학회로 성장하게 되었으며 2006년 5월 28일 제2대 회장으로 박장규 교수, 2008년 5월 25일 제3대 회장으로 임철완 교수, 2010년 6월 13일 제4대 회장으로 강진수 원장, 2012년 6월 3일 제5대 회장 김도원 교수가 선출되어 임기동안 학회를 훌륭히 이끌었습니다. 현재는 2014년 5월 17일 제주에서 개최된 제8차 세계모발학회에서 제6대 심우영 교수가 회장으로 선출되어 제 6기 집행부를 구성하여 회무를 담당하고 있습니다.

● 학술활동 소개 ●

1. 대한모발학회 학술대회

대한모발학회 학술대회는 1년에 한 번 개최되며, 해외학자 초청강연, 특강 및 교육 강연, 각종 구연 및 포스터 연제 발표 등으로 이루어지는 대한모발학회의 꽃이라고 할 수 있습니다. 제 1차 및 제 2차 심포지엄을 거쳐 2006년 제 3차 대회 때부터 정식 학술대회의 면모를 갖추게 되었습니다.

- 1) 제1차 대한모발학회 심포지엄
 - 2004년 11월 7일 밀레니엄 힐튼 호텔
 - 탈모에서 Mesotherapy 외 9 강좌
- 2) 제2차 대한모발학회 심포지엄
 - 2005년 6월 19일 밀레니엄 힐튼 호텔
 - 탈모증의 진단 외 12강좌

- 3) 제3차 대한모발학회 학술대회
 - 2006년 5월 28일 밀레니엄 힐튼 호텔
 - 원형탈모증의 임상적 특징 외 8강좌 및 일반연제
- 4) 제4차 대한모발학회 학술대회
 - 2007년 5월 27일 밀레니엄 힐튼호텔
 - 원형탈모증의 원인과 발생기전 외 10강좌 및 일반연제
- 5) 제5차 대한모발학회 학술대회
 - 2008년 5월 25일 밀레니엄 힐튼호텔
 - 모낭과 안드로겐 외 15강좌 및 일반연제
- 6) 제6차 대한모발학회 학술대회
 - 2009년 5월 24일 밀레니엄 힐튼 호텔
 - 모낭의 발생 외 12 강좌 및 일반연제
- 7) 제7차 대한모발학회 학술대회
 - 2010년 6월 13일 밀레니엄힐튼호텔
 - New insights into hair biology 외 14 강좌 및 일반연제
- 8) 제8차 대한모발학회 학술대회
 - 2011년 9월 18일 코엑스 회의실 Hall E (3층)
 - Current and new aspects of female pattern hair loss 외 23 강좌 및 일반연제
- 9) 제9차 대한모발학회 학술대회
 - 2012년 6월 3일 백범김구기념관
 - Defining the function of genes in differentiation of hair follicle stem cells 외 13 강좌 및 일반연제
- 10) 제10차 대한모발학회 학술대회
 - 2013년 5월 26일 백범김구기념관
 - Latest news about the genetics of alopecia areata 외 18 강좌 및 일반연제
- 11) 8th World Congress for Hair Research
 - May 14 (Wed) ~ 17 (Sat), 2014 Jeju Island, Korea

12) 제11차 대한모발학회 학술대회

- 2015년 5월 31일 가톨릭대학교 서울성모병원 지하1층 대강당
- Wnt/ β -catenin signaling controls proliferation but not survival of hair follicle stem cells의 14 강좌 및 일반연제

2. Hair Forum

2001년 시작하여 해마다 참석하는 인원이 늘어나고 있는 Hair Forum은 모발학회 회원들 간의 격식 없는 모임입니다. 이는 자유로운 토론과 회원 상호간의 친목도모를 위하여 마련되고 있으며, 주로 진단 및 치료가 어려운 증례에 대한 토론, 그동안 연구했던 내용 발표, 해외모발학회 참관기 소개 등 다른 회원들과의 의견공유를 위해서 밤늦은 시간까지 진행됩니다. 최근에 개최된 Hair Forum 현황은 다음과 같습니다.

- 1) 2004년 8월 28일 대전 유성 스파피아 호텔
모낭유래세포에서의 androgen receptor, estrogen receptor의 발현 양상 외 13건 발표
- 2) 2005년 8월 20일 대전 유성 스파피아 호텔
원형탈모증 환자 400명의 임상적 고찰 외 8건 발표
- 3) 2006년 8월 19일 대전 유성 레전드호텔
Acute diffuse alopecia areata 외 11건 발표
- 4) 2007년 8월 18일 대전 유성 리베라 호텔
모낭유래세포의 특성분석 외 13건 발표
- 5) 2008년 8월 23일 대전 유성 리베라호텔
전두탈모증 환자에서 모반 제거후 모발재생의 치료 경험 외 18 건 발표
- 6) 2009년 8월 22일 대전 유성 리베라 호텔
원형 탈모증 환자에서 스트레스 평가에 대한 예비 연구 외 9건 발표
- 7) 2010년 8월 21일 대전 유성 리베라호텔
Effect of radiofrequency radiation on human hair follicle cells 외 16건 발표
- 8) 2011년 8월 27일 대전 유성 호텔아드리아
Ultraviolet radiation alters lipid metabolism in human hair follicle 외 11건 발표

- 9) 2012년 8월 18일 대전 유성 호텔아드리아
Effects of Mycophenolic acid and Rapamycin on hair growth의 12건 발표
- 10) 2013년 8월 17일 대전 유성 호텔아드리아
How can we enhance follicular penetration? 의 14건 발표
- 11) 2014년 7월 26일 대전 호텔 리베라 유성
털깍질(hair-cuticle)이 모발색조에 미치는 영향 의 6건 발표
- 12) 2015년 8월 22일 대전 호텔리베라 유성
Hair graying: Clinical features & significance 의 8건 발표

3. 대한피부과학회 학술대회 시 모발심포지엄 개최

대한모발학회는 대한피부과학회 산하의 모발연구분과위원회이기도 하므로, 1999년부터 매년 대한피부과학회의 춘추계 학술대회에서 모발심포지엄을 진행하고 있습니다. 2009년부터는 대한피부과학회 춘추계학술대회시 한 번에 한해 분과심포지엄을 개최할 수 있는 대한피부과학회의 새로운 자체 규정에 따라 추계학술대회에서 모발심포지엄을 개최해 오고 있습니다.

대한모발학회 학술대회 전시 및 광고회사

● 전시회사

No.	회사명	연락처
1	한국MSD	02-331-2000
2	갈더마코리아	02-6717-2000
3	글락소스미스클라인	02-709-4114
4	현대약품	02-2600-3899
5	종근당	02-3149-7917
6	대웅제약	02-2059-1884
7	후파르마	02-3444-4064
8	레오파마	02-771-1110
9	에스트라	02-3780-9494
10	코오롱제약	02-2120-8457
11	동화약품	02-2021-9300
12	한미약품	02-410-9173

● 광고회사

No.	회사명	연락처
1	한국MSD	02-331-2000
2	글락소스미스클라인	02-709-4114
3	라로슈포제	02-3497-9819
4	동아ST	02-920-8798
5	바름메디	02-733-2900
6	유한양행	02-828-0313
7	보령제약	02-708-8456
8	한국안센	02-563-1403
9	부광약품	02-8288-114
10	피앤피바이오팜	02-826-9920



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