Scalp Stimulation Utilizing MTS and A New Approach to Hair Regeneration Microneedling Therapy :

A New Approach to Scalp Stimulation and Hair Regeneration

Modumo Clinic

Chief Director Lee Seung-jun

모두모의원

Evolution of Hair Loss Treatment

Existing Approaches

Conventional therapies like hair loss drugs, PRP, and hair transplants have limitations

1

2

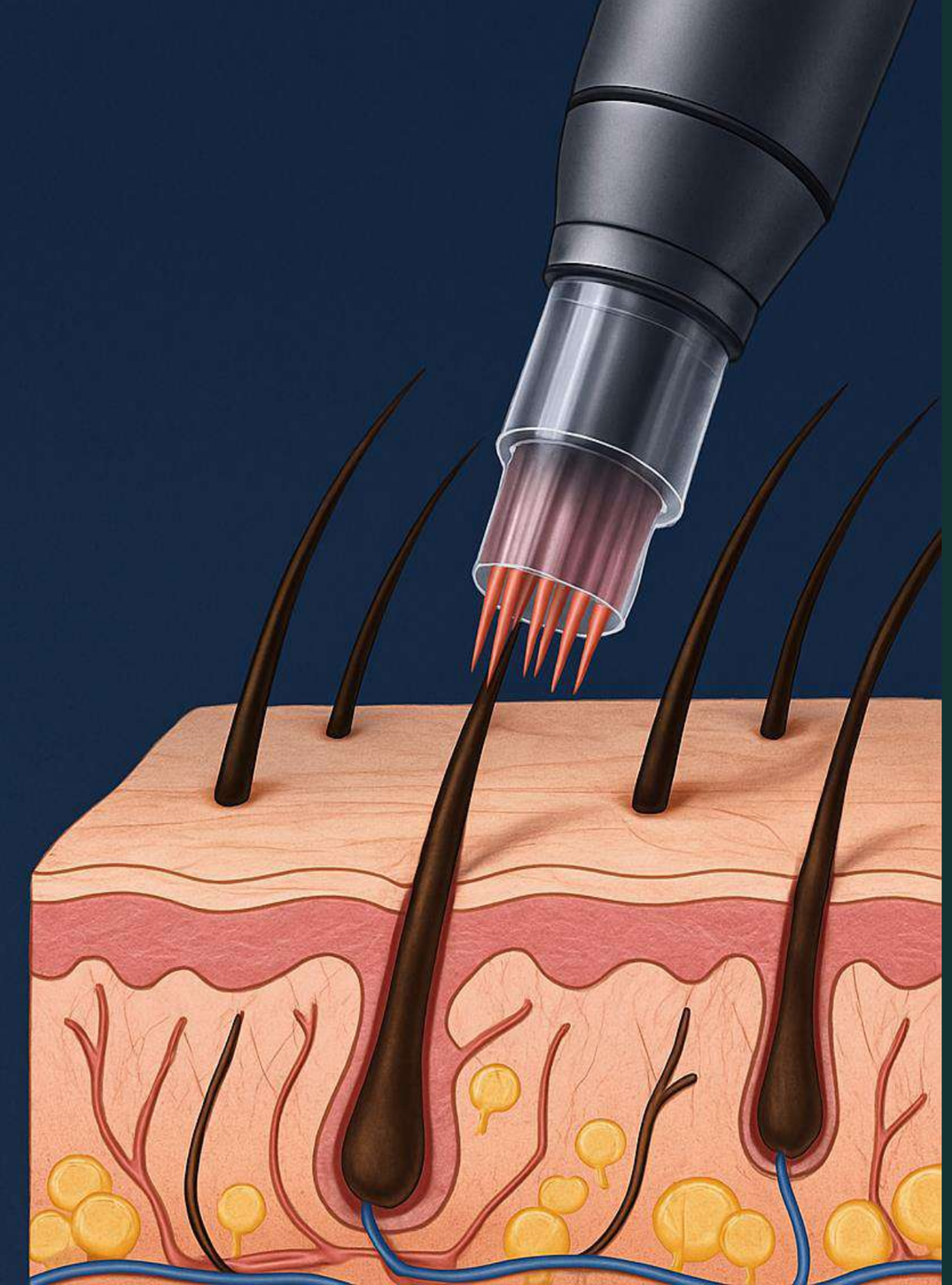
Non-invasive Treatment

Interest in non-invasive treatments with few side effects has greatly increased recently

3

Microneedling

Microneedling suggests a new possibility that is effective yet less invasive



Basic Principles of Microneedling

Micro-stimulation

Induces tissue regeneration by giving micro-stimulation to epidermis and dermis

Increased Blood Flow

Activation of Growth Factors

Activation of Growth Factors

Promotes hair growth as scalp blood flow increases Stem cells

Enhanced Drug Delivery

Drugs like Minoxidil, Exosomes absorb more deeply and effectively

Clinical Effects of Microneedling for Hair Regeneration

Int J Trichology. 2013 Jan;5(1):6-11. doi: 10.4103/0974-7753.114700.

A Randomized Evaluator Blinded Study of Effect of Microneedling in Androgenetic Alopecia: A Pilot Study

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Clinical Effects of Microneedling for Hair Regeneration

Table 1: Change from baseline hair count at 12 weeks

Variables	Mean hair count mean (μ)±SD	Paired *t*-test *P* value
Microneedling treated group (*n*-50)	91.40±49.27	–
Minoxidil treated group (*n*-44)	22.20±19.34	0.039

Table 2: Investigator evaluation of hair growth at week 12

Seven point scale evaluation	Microneedling treated group (*n*-50)	Minoxidil treated group (*n*-44)
0 no change	0	16
+1 mild improvement	10	28
+2 moderate improvement	22	0
+3 marked improvement	18	0

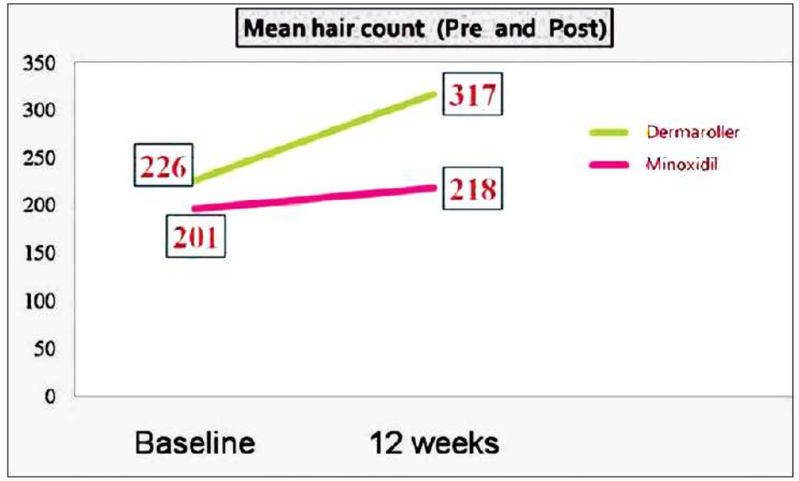

Figure 5: Mean hair counts at baseline and at end of 12 weeks in the Microneedling and Minoxidil treated group

Clinical Effects of Microneedling for Hair Regeneration

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Randomized trial of electrodynamic microneedle combined with 5% minoxidil topical solution for the treatment of Chinese male Androgenetic alopecia

Linlin Bao[a,b], Lin Gong[a], Menger Guo[a], Taoming Liu[a], Anyu Shi[a], Haifeng Zong[c], Xuegang Xu[a], Hongduo Chen[a], Xinghua Gao[a], and Yuanhong Li[a]

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Clinical Effects of Microneedling for Hair Regeneration

Table 2. Changes in hair density after 24 weeks of treatment.

	One-sample *t* test			One-way ANOVA	*P* value Two-sample *t* test		
Hair count/cm^2	Group 1 (n = 18)	Group 2 (n = 18)	Group 3 (n = 20)	*P* value between the three groups	Group 1 vs Group 2	Group 1 vs Group 3	Group 2 vs Group 3
Non-vellus hair count	24.1 ± 7.8 $P < 0.001$	20.5 ± 7.3 $P < 0.001$	34.7 ± 13.2 $P < 0.001$	$P = 0.014$	$P = 0.99$	$P = 0.065$	$P = 0.01$
Vellus hair count	−5.4 ± 3.8 $P < 0.001$	3.4 ± 3.5 $P = 0.002$	4.2 ± 2.1 $P < 0.001$	$P < 0.001$	$P < 0.001$	$P < 0.001$	$P = 1.000$
Total hair count	18.8 ± 9.6 $P < 0.001$	23.4 ± 5.1 $P < 0.001$	38.3 ± 11.1 $P < 0.001$	$P = 0.002$	$P = 0.098$	$P = 0.001$	$P = 0.01$

Data is presented as mean ± standard deviation. Group 1: 5% minoxidil; Group 2: microneedle treatment; and Group 3: microneedle combined 5% minoxidil.

Table 3. Mean change in hair thickness from baseline to Week 24.

	One-sample *t* test			One-way ANOVA	*P* value Two-sample *t* test		
	Group 1 (n = 18)	Group 2 (n = 18)	Group 3 (n = 20)	*P* value between the three groups	Group 1 vs Group 2	Group 1 vs Group 3	Group 2 vs Group 3
Change in Non-vellus hair thickness (μm)	10.7 ± 5.5 $P < 0.001$	3.2 ± 6.2 $P = 0.09$	11.8 ± 3.7 $P < 0.001$	0.005	$P = 0.102$	$P = 0.1$	$P = 0.001$

Data is presented as mean ± standard deviation. Group 1: 5% minoxidil; Group 2: microneedle treatment; and Group 3: microneedle combined 5% minoxidil.

Clinical Effects of Microneedling for Hair Regeneration

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ARTICLE

Randomized trial of electrodynamic microneedling combined with 5% minoxidil topical solution for treating androgenetic alopecia in Chinese males and molecular mechanistic study of the involvement of the Wnt/β-catenin signaling pathway

Linlin Bao[a,b]*, Haifeng Zong[c], Sining Fang[a]*, Lixiong Zheng[a]* and Yuanhong Li[b]

[a]Department of Dermatology, Shenzhen People's Hospital, 2nd Clinical Medical College of Jinan University, Shenzhen, China;[b]Department of Dermatology, The First Affiliated Hospital of China Medical University, Shenyang, China; [c]Department of NICU, Shenzhen Maternity and Child Healthcare Hospital, Shenzhen, China

Clinical Effects of Microneedling for Hair Regeneration

Table 2. Changes in hair density after 24 weeks of treatment.

Hair count/cm^2	One-sample *t* test: Group 1 ($n=23$)	One-sample *t* test: Group 2 ($n=23$)	One-sample *t* test: Group 3 ($n=25$)	One-way ANOVA *p* Value among the three groups	*p* Value Two-sample *t* test: Group 1 vs. group 2	*p* Value Two-sample *t* test: Group 1 vs. group 3	*p* Value Two-sample *t* test: Group 2 vs. group 3
Non-vellus hair count	28.01 ± 7.42 $p=.002$	32.09 ± 4.51 $p=.004$	56.45 ± 7.82 $p=.002$	$p<.001$	$p=.513$	$p<.001$	$p<.001$
Vellus hair count	−13.74 ± 3.41 $p=.014$	−10.56 ± 2.83 $p=.064$	−16.67 ± 6.48 $p=.021$	$p=.578$	$p=.592$	$p=.617$	$p=.297$
Total hair count	14.27 ± 3.24 $p=.046$	21.53 ± 6.19 $p=.074$	39.78 ± 7.79 $p<.001$	$p<.001$	$p=.190$	$p<.001$	$p=.007$

Data are presented as the mean ± standard deviation. Group 1: 5% minoxidil; group 2: microneedling; and group 3: microneedling combined with 5% minoxidil.

Table 3. Mean change in hair thickness from baseline to week 24.

	One-sample *t* test: Group 1 ($n=23$)	One-sample *t* test: Group 2 ($n=23$)	One-sample *t* test: Group 3 ($n=25$)	One-way ANOVA *p* Value among the three groups	*p* Value Two-sample *t* test: Group 1 vs. Group 2	*p* Value Two-sample *t* test: Group 1 vs. Group 3	*p* Value Two-sample *t* test: Group 2 vs. Group 3
Change in non-vellus hair thickness (μm)	18.70 ± 6.17 $p<.001$	10.41 ± 4.83 $p=.058$	22.46 ± 3.87 $p<.001$	$p=.002$	$p=.015$	$p=.259$	$p<.001$

Data are presented as the mean ± standard deviation. Group 1: 5% minoxidil; group 2: microneedling; and group 3: microneedling combined with 5% minoxidil.

Clinical Effects of Microneedling for Hair Regeneration

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DOI: 10.1111/jocd.14525

REVIEW ARTICLE

Microneedling for Hair Loss

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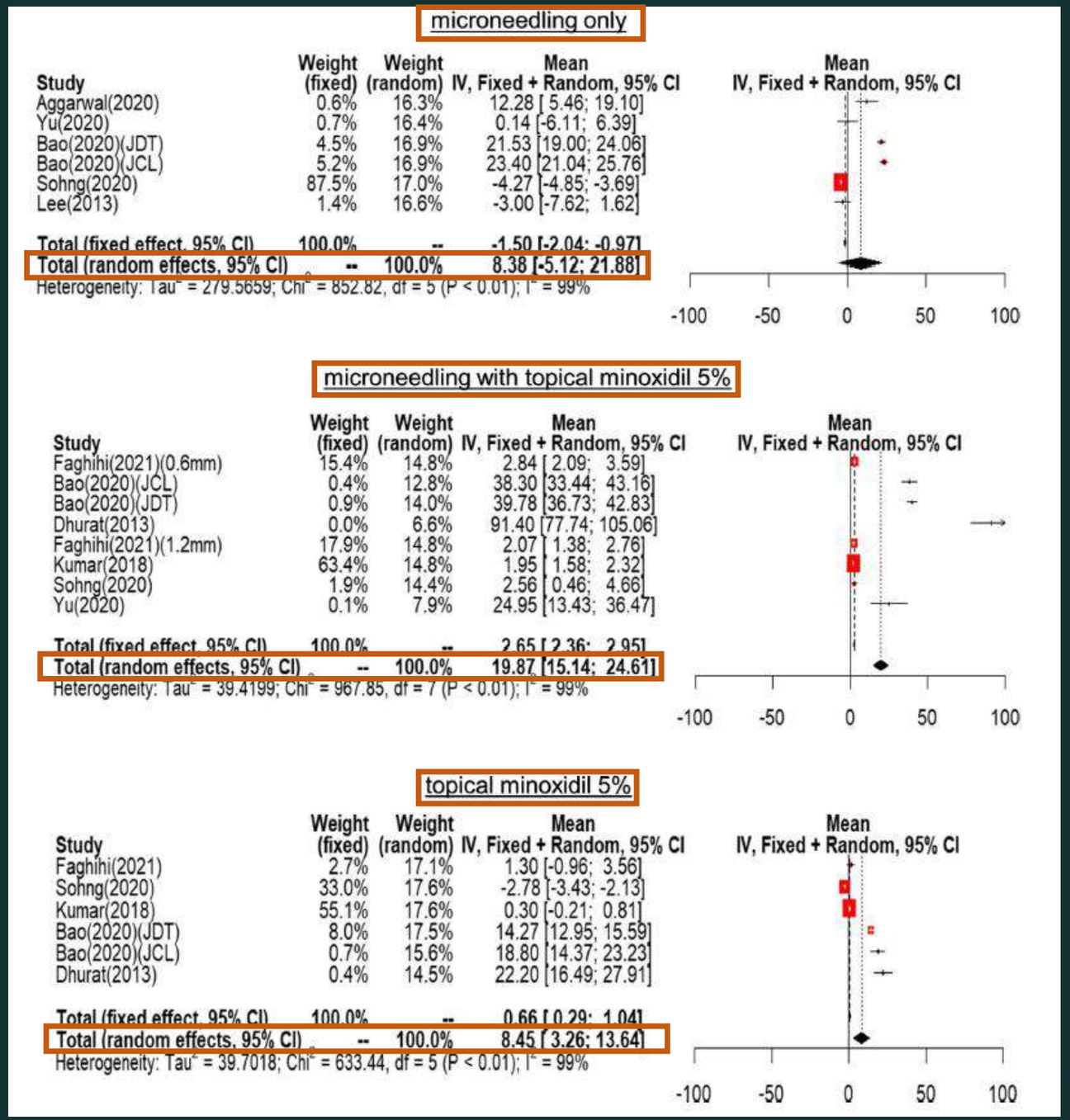

Clinical Effects of Microneedling for Hair Regeneration

Skin Appendage Disorders

Systematic Review and Meta-Analysis

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Relative Effects of Minoxidil 5%, Platelet-Rich Plasma, and Microneedling in Pattern Hair Loss: A Systematic Review and Network Meta-Analysis

Aditya K. Gupta[a, b] Tong Wang[a] Mary A. Bamimore[a] Shruthi Polla Ravi[a] Mesbah Talukder[a, c]

[a]Mediprobe Research Inc., London, ON, Canada; [b]Division of Dermatology, Department of Medicine, University of Toronto, Toronto, ON, Canada; [c]School of Pharmacy, BRAC University, Dhaka, Bangladesh

Table 2. Agents' surface under the cumulative ranking curve (SUCRA) values for network meta-analysis (NMA) on efficacy as per change in total hair density at 24 weeks for patients with PHL

Regimen	SUCRA, %
Microneedling and 5% minoxidil	95.81
PRP and 5% minoxidil	64.68
5% minoxidil	53.925
PRP	34.905
Microneedling	27.78
Microneedling and PRP	22.9

The NMA adjusted for variation to biological sex (i.e., male vs. female) and design of study (i.e., whole-head vs. split-scalp).

Clinical Effects of Radiofrequency for Hair Regeneration

Clinical evaluation of a novel fractional radiofrequency device for hair growth: Fractional radiofrequency for hair growth stimulation

Ines Verner[1,2] | Torello Lotti[2]

Received: 11 November 2017 | Accepted: 14 December 2017

DOI: 10.1111/dth.12590

Abstract

AGA is a common disorder. Different treatments are available to prevent hair loss and achieve hair growth with variable results. The purpose of the present study was to evaluate the efficacy and safety of a novel fractional radiofrequency (RF) device (HairLux, Innogen Technologies Ltd., Yokneam, Israel), to prevent hair loss and induce hair growth. Twenty-five patients received 10 fractional RF treatments every 2 weeks, and were followed up 2 months after the last treatment. All patients were evaluated by global photography. In 10 patients, blinded manual hair counts were performed. Patients demonstrated less hair shedding, fuller hair, and faster hair growth. There was an average increase of 31.6% in hair density (based on hair counts) and 18% increase in hair shaft thickness. All subjects tolerated the treatments well. The HairLux device is effective and safe for hair growth stimulation in AGA. Ten treatment sessions are recommended to maximize results.

Clinical Effects of Radiofrequency for Hair Regeneration

A pilot split-scalp study of combined fractional radiofrequency microneedling and 5% topical minoxidil in treating male pattern hair loss

Clinical and Experimental Dermatology (2018) **43**, *pp*775–781

A.-J. Yu,[1] Y.-J. Luo,[1] X.-G. Xu,[1] L.-L. Bao,[1] T. Tian,[1] Z.-X. Li,[1] Y.-X. Dong[1] and Y.-H. Li[1]

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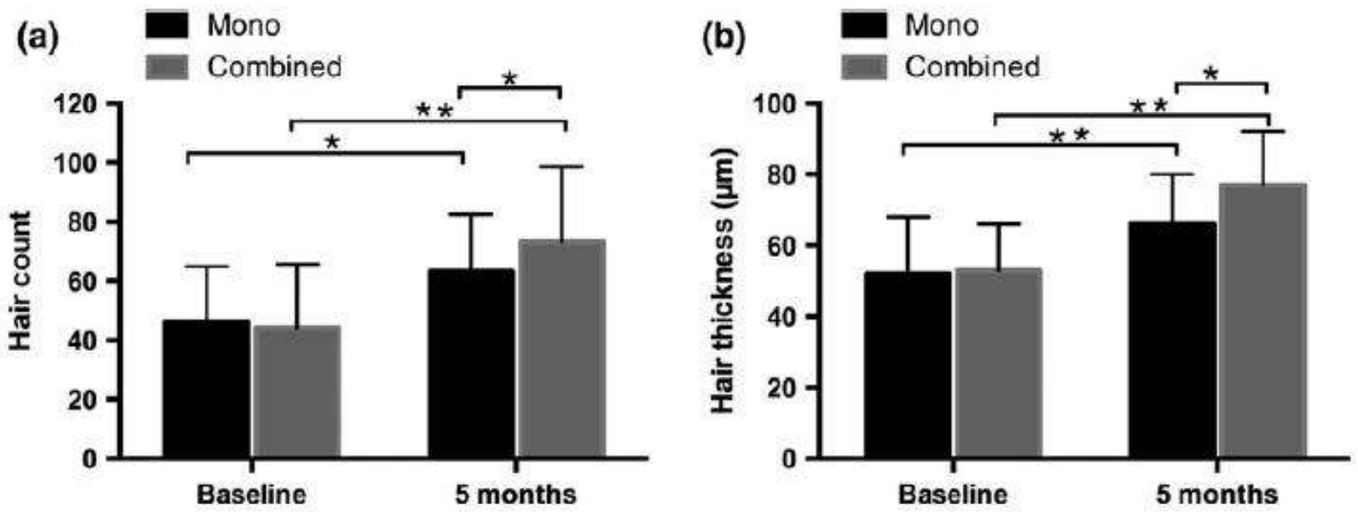


Figure 1 (a) Hair count and (b) hair thickness at baseline and 5 months after monotherapy with minoxidil 5% monotherapy and combined therapy with fractional radiofrequency microneedling and minoxidil 5%. $*P < 0.05$, $**P < 0.01$. The bars on the graph represent standard error.

Clinical Effects of Radiofrequency for Hair Regeneration

Non-ablative radio frequency for the treatment of androgenetic alopecia

Yimei Tan[1], Liu Wei[2], Yiyi Zhang[1], Andy Goren[3,4], John McCoy[3], Andrija Stanimirovic[5], Torello Lotti[4], Maja Kovacevic[6] ✉

Abstract

Introduction: Medical treatment of androgenetic alopecia (AGA) is mainly limited to pharmacological and surgical interventions. Patients' desire for noninvasive and non-systemic treatments has accelerated research into medical devices that can promote hair growth. Low-level laser therapy (LLLT) was the first such device. However, its success has been limited by contradic… controversial efficacy claims. Work previously performed in animal models of AGA has demonstrated the viability … repair mechanism as a potential treatment modality. This study therefore explores the use of a non-ablative radio f… device in the treatment of AGA.

Methods: A single blinded study compared a non-ablative RF device versus a sham device in 24 men with AGA. Ea… ceived four treatments over the 12-week study.

Results: In this preliminary study of 24 AGA patients treated with a novel RF device, we demonstrated that 54% sho… response. Furthermore, among patients that underwent four or more treatment sessions, 40% experienced a 30% or … in hair counts compared to baseline.

Conclusions: If validated in a larger cohort, non-ablative RF may prove to be an important clinical tool in the treatme…

Keywords: radio frequency, androgenetic alopecia, treatment

Received: 24 August 2019 | **Returned for modification:** 9 November 2019 | **Accepted:** 13…

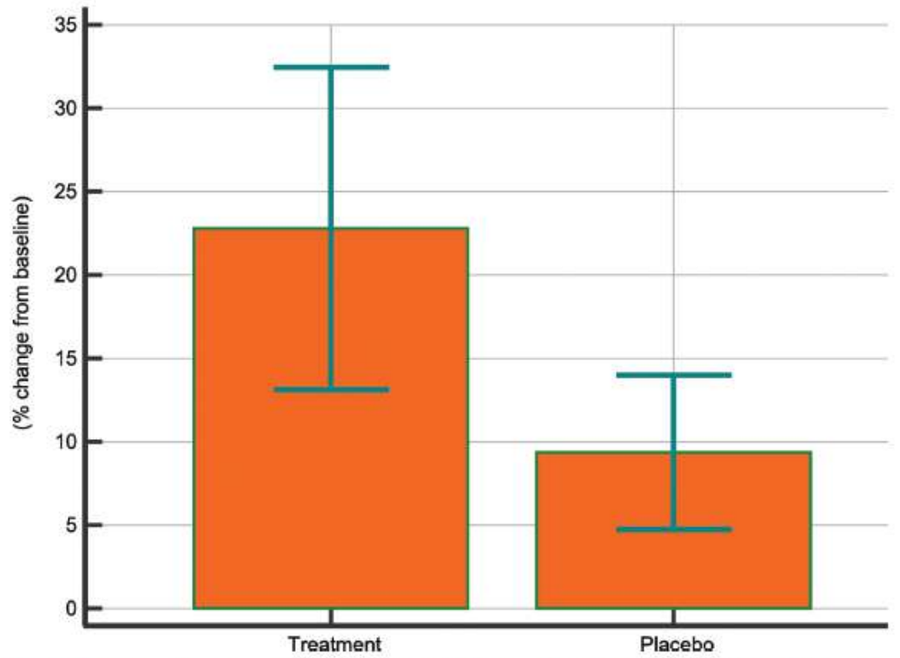


Figure 1 | Average percent change in target area hair counts (TAHC) after treatment with a non-ablative radio frequency device.

Key Mechanisms of Hair Loss Treatment via Radiofrequency Technology

Promoting Growth Factor Secretion

Activation of key growth factors like IGF-1, VEGF

Activating Hair Follicle Stem Cells

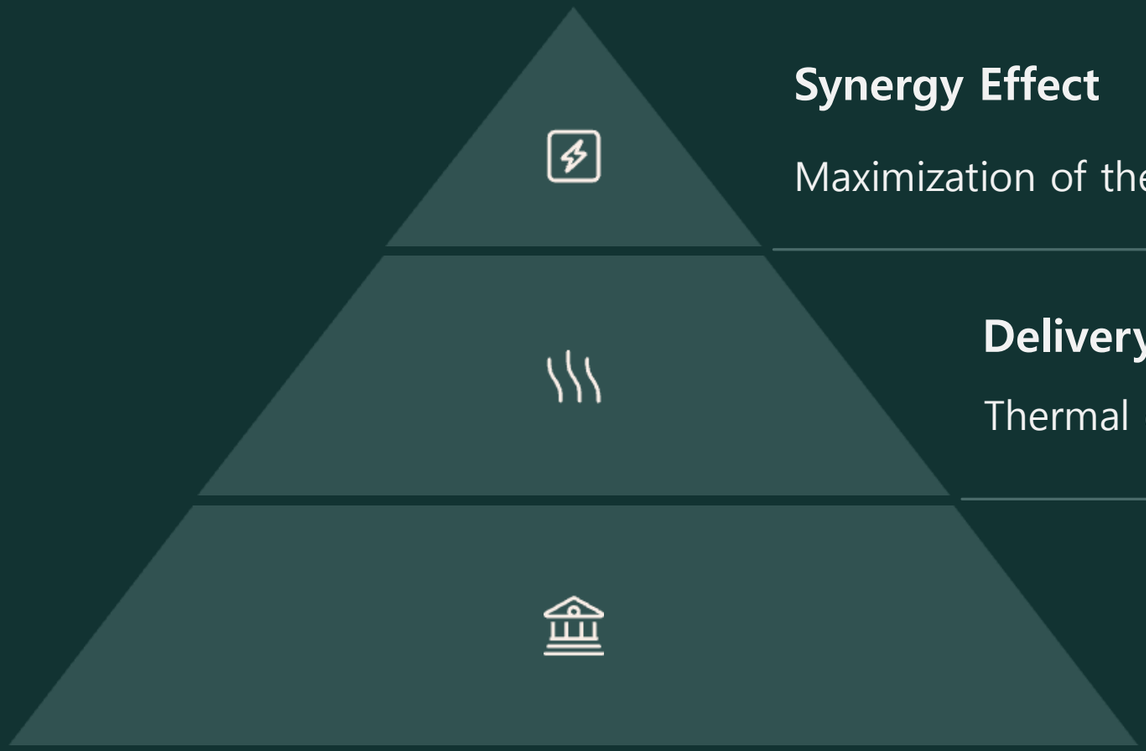
Promotes tissue regeneration and formation of new hair follicles by activating Wnt/ß-catenin signal

Thermal injury

Activation of regeneration of hair follicles and dermal papilla cells

Introduction of Latest Technology :
Fusion of RF + MTS

rm STAR



Synergy Effect

Maximization of therapeutic effects via combination of RF and MTS

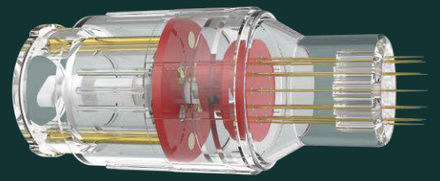
Delivery of Thermal Energy

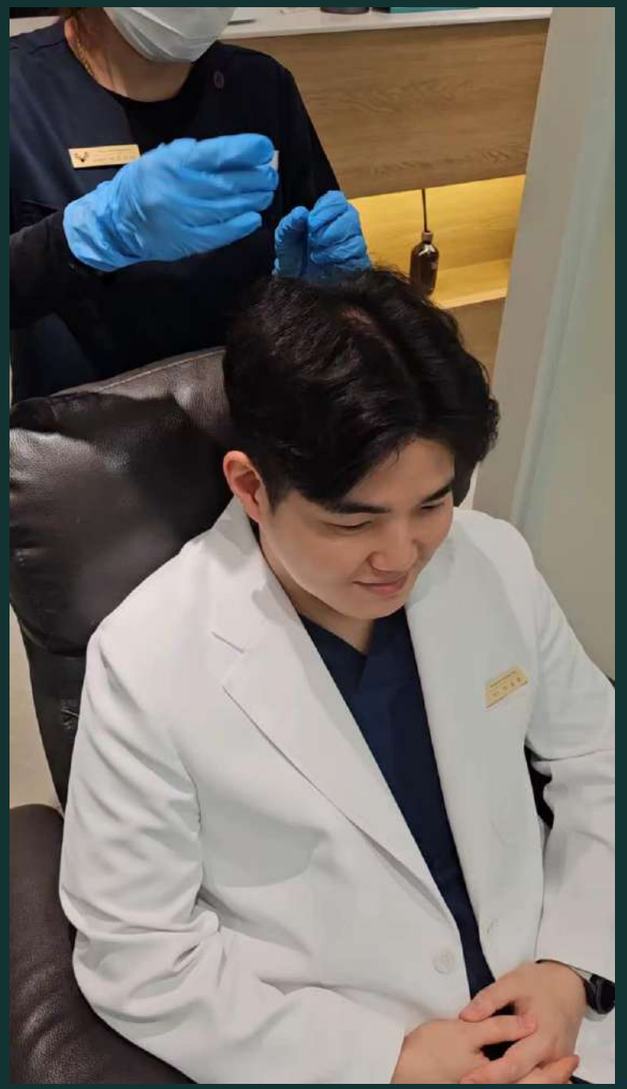
Thermal energy of RF delivers effectively to deep tissues

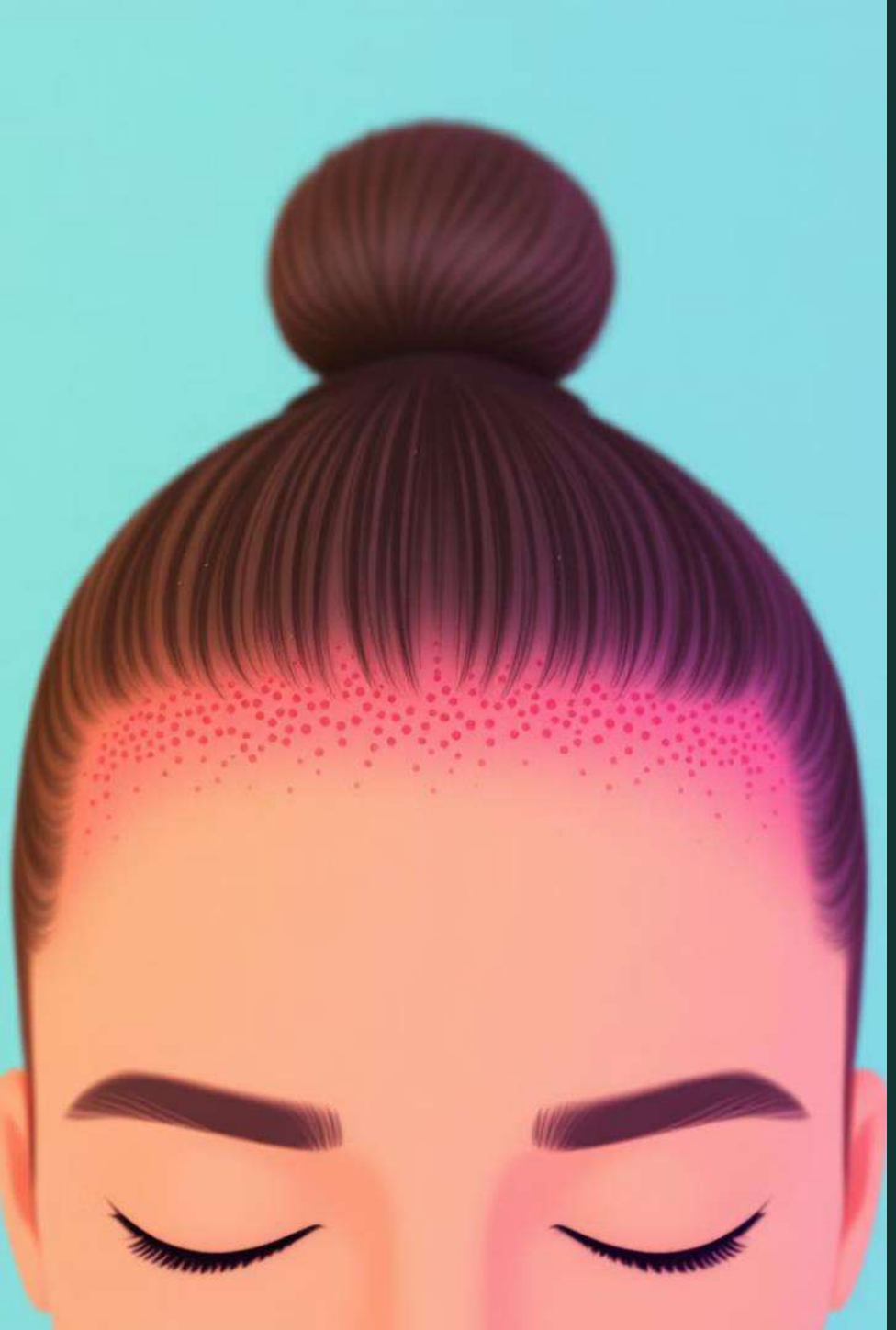
Collagen Remodeling

Stimulates collagen creation and dermal layer by high frequency

Procedure Process







Safety and Precautions

General Side Effects

- Temporary Redness
- Scalp Heat Sensation
- Micro-bleeding

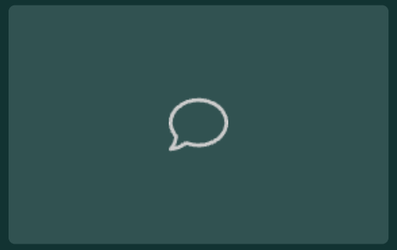
Cautionary Patients

- Metal Allergy
- Inflammatory Scalp Disease
- Blood Clotting Disorder

Advantages of Non-surgical Approach

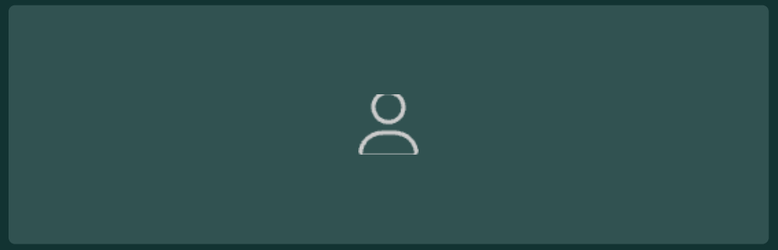
- Procedure time and recovery time are quick
- Repeated procedures are possible
- Immediate return to daily life

Conclusion and Future Prospects



New Axis of Non-invasive Treatment

MTS has positioned itself as an innovative method for hair loss treatment and drug delivery.



Integrated Treatment Synergy

RF-MTS integrated devices further advance the procedural effects.

Future Development Direction

Combination with cutting-edge treatments like Exosomes, stem cells is anticipated.