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Finasteride for Androgenetic Alopecia Is Not Associated with Sexual Dysfunction: A Survey-Based, Single-Centre, Controlled Study

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ABSTRACT

Background: The occurrence of sexual dysfunction side-effects associated with finasteride use in men with androgenetic alopecia (AGA) is thought to be less prevalent than is publicized. There is a need to investigate sexual dysfunction among finasteride users with population-based controls.

Objective: To evaluate the presence of sexual dysfunction in men using finasteride or not using finasteride. **Method:** Adult men visiting a dermatologist's office for any reason were asked to complete a survey including a modified version of the Arizona Sexual Experience Scale (ASEX) to assess the presence of sexual dysfunction with and without finasteride use.

Results: Data from 762 men aged 18-82 were collected: 663 finasteride users and 99 non-finasteride users. There were no significant differences between finasteride users and non-user controls in reporting sexual dysfunction using the ASEX. Regression analysis indicated that self-reporting libido loss and reduced sexual performance, not finasteride use, predict a higher ASEX score.

Conclusion: The use of finasteride does not result in sexual dysfunction in men with AGA. These data are consistent with other large survey-based controlled studies.

INTRODUCTION

Androgenetic alopecia (AGA) refers to pattern hair loss believed to be a result of follicle miniaturization in dihydrotestosterone (DHT) sensitized areas of the scalp.¹ Despite the common occurrence in over 70% of men,² onset has been shown to induce loss of self-esteem, depression, introversion, neuroticism and psychological impairment.³⁻⁷ Thus, with only two Food and Drug Administration (FDA) approved medications available,⁸ the 5-alpha-reductase inhibitor finasteride is generally considered an important contributor to male health and quality of life. Conversely, a small percentage of finasteride users have associated the medication with sexual dysfunction and Post-Finasteride Syndrome (PFS). The term PFS refers to a combination of the former side-effects with a host of additional symptoms including fatigue, muscle weakness and cognitive problems.^{9,10}

Supporting evidence comes from a controlled trial where a slightly higher proportion of finasteride-treated vs. placebo-treated patients reported adverse events related to sexual function.¹¹ Additionally, an increase in reports of sexual dysfunction has been associated with both finasteride¹² and dutasteride¹³ (similar 5-alpha-reductase inhibitor) in an extensive post-marketing database. Moreover, identifying finasteride-related sexual dysfunction may not be straightforward as onset has been described as varied, with reports shortly after drug commencement, during later treatment or after medication discontinuation.^{9,10} There have also been critiques that the clinical trials which promoted finasteride as safe and well tolerated had inadequate safety reporting.¹⁴ A mechanism is unknown but it has been proposed that finasteride may lead to a decreased production of neurosteroids, which may regulate sexual desire and function¹⁵ and that impaired testosterone metabolism might lead to relative oestrogen excess.¹⁶

Nonetheless, it has been stated that observations of finasteride-related sexual dysfunction are less prevalent in the actual clinical experience compared to reports in the literature.¹⁷ Similarly, meta-analysis

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President's Message



Arthur Tykocinski, MD, FISHRS | *São Paulo, Brazil* | president@ishrs.org

Back to the FUTure

The "only FUE" era is heading for a crash. All of the wonders that have been promised on social media in favor of FUE are now

being confronted with so many bad results revealed by mutilated patients/victims. These patients have been left with devastated donor areas and bizarre low hairlines as a result of improper planning and placing. The end result is a loss

of credibility for the physicians who made promises they couldn't keep, and this ultimately will put an end to the "only FUE" golden era. No one can stop it now, as it is impossible to hide the truth indefinitely from the public. It doesn't matter how often it is repeated or how many repeat it: sooner or later, the truth will prevail.

Warning the public now is the only way to regain credibility. The hair transplant (HT) industry is taking a side. Our side is the truth.

This will affect each and every one of us, no doubt about it. But mostly, it will affect the "exclusively FUE" advocates, who depend on social media, and, of course, the black market clinics. However, this is not a total surprise and could have been predicted many years ago—"the bill always comes." But no one could have predicted the size the black market would reach or the degree of damage it would produce. The patients who have been harmed by the black market FUE clinics are starting to talk. More and more, others will be willing to follow and tell their desperate stories. And the world will listen, astonished about what has been done in the past several years, and soon all will start to ruin.

Who will be blamed for this? For sure, it won't be the FUT surgeons who have been trying to alert the public for a very long time about the limitations of FUE, unsuccessfully. In their defense, "exclusively FUE" surgeons would say: "But FUE can be safe as a solo technique if it is properly done and planned." While this can be true, no one knows what will happen in the long term, say 20-30 years from now. We don't know for a simple reason: this future is still very distant. What about body hair transplant (BHT)? We know it's not the same quality; it doesn't grow much—except for beard—and has less integration. Anyway, if you don't spoil the donor area, the beard will be enough, if ever needed.

Please, don't take this wrong: FUE can be wonderful, when properly selected and performed. When I did the scientific program for Polanica Zdröj FUE Immersion, the first ISHRS World Live Surgery Workshop exclusively devoted to FUE, one important session was titled: "All FUE ends in FUT and all FUT ends in FUE." I really mean that.

It doesn't matter who did wrong or who did good; we will

BACKANN TOFUTURE

all pay the same price. Some more and others less; but, as a whole, the industry will suffer. The day after the crash, the public will be skeptical about the social media and their "truth." This shouldn't come as a total surprise to any of us. Even the most religious FUE advocates have known that this day was coming. There is no doubt it will happen, though the degree of damage may vary. But the real question is: What will be next, after the FUE crash?

> The relationship between a doctor and a patient is based on trust. This is the strongest link that we can have, and that we should have. This link will be broken once again: first the FUE radicals blamed FUT for everything, including breaking the patients' trust. Now their beloved technique, performed by the black market

clinics, is chipping away at that trust once again. The public will be confused: who is the bad one and, please, who is the good one? Can FUE alone recover its credibility or will FUT be necessary to save the HT industry, once again? No one knows the answer to this, which, I guess, probably is yes. Not for FUT to stand alone, but to stand alongside FUE. Some years ago, most would laugh about this possibility, but today maybe this deserves consideration. That's exactly what I am proposing here; let's stop and think about it for a while.

FUT has been done for decades with consistent results and management of the donor area. Despite it being reliable, we know it is not perfect. Is anyone perfect, or is there any perfect technique? However, FUE in little more than a decade is about to blow up the HT industry. Of course, the villain here is not FUE itself, but rather the bad use of it. In reality, for advanced baldness, no technique can accomplish this task alone. But by combining them, it is possible to maximise the donor area management and reduce the risks. FUT and FUE are complementary, exploring the donor area with different approaches and covering different spectrums for the baldness treatment.

Yes, FUT did sin in the past: if you imagine it can be done repeatedly, as many times needed, you will end up with stacked or wide scars. In addition, the areas that suffer tension on closure can present fibrosis and thinning hairs. All this can also compromise the donor area resource. Nevertheless, most patients are good candidates for one or two large FUTs, if properly prepared and executed. Therefore, it is possible to move lots of hairs within the two FUT sessions—as many as 7,000-8,000 FUs in total. Probably after the second FUT, the laxity will be gone, increasing dramatically the risk of widening the scar or creating too much tension on a risky third session, which should be avoided.

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Then, if more hair is still needed, it would be wise to harvest with FUE. Turning the coin, the same principle applies to FUE: it can be done properly twice as well-considering large sessions of 2,500-3,000 FUs each. After the second large FUE session, most of the donor capacity will be gone. On the third session, despite that it can be done, there are considerable risks, including donor area depletion. This is precisely what we are trying to avoid—donor area compromise-with any technique. For this reason, we should change approaches and move to FUT.

Performing FUT for 25 years and being proficient in FUE (by removing 3,000 FUs with a 0.85mm hybrid punch, 5% transection rate, in less than 2.5 hours), I can see the potential of combining both techniques to best meet the needs and expectations of the patient. But before the FUE messiahs start their attacks, please hear this: today's FUT technique is not the FUT from 10 years ago. Thanks to the FUE era, the FUT surgeon's goal is to produce great results. Today, FUT is a much more refined technique having adapted and innovated to achieve consistent results. After two FUTs, leaving only a single camouflaged scar, if there is any need to improve it, usually only 200 FUs harvested by FUE can get the job done and cover the remaining scar. This is a cheap price to pay, considering the benefit of preserving the donor area quality for one or two future FUEs, expanding its limits. And don't forget the beard!

Combining FUT and FUE for prime donor area management: welcome to the new gold standard. Believe it or not, you will be back to the FUTure.

HAIR LOSS DIAGNOSIS COURSE FOR THE NON-DERMATOLOGIST What You MUST Know If You Are Performing Hair Transplantation Surgery

Over 3.5 hours of lectures and discussion Recorded at the ISHRS 2017 World Congress Prague No CME credits issued for watching this course Internet/online video files. LEARNING OBJECTIVES Upon completion of this course you will be able to:

- scalp dermatologic conditions that the hair transplant surgeon may encounter.
- Discuss the diagnosis and treatment of many non-androgenetic alopecias.

FREE VIEWING FOR ISHRS PHYSICIANS

Recognize when hair restoration surgery is indicated.

COURSE DESCRIPTION

The course covers all aspects of hair loss diagnoses classification, treatment, and management. An emphasis is placed on understanding the anatomy and the hair growth cycle to better understand the pathologic consequences of hair loss. The course includes an in depth review of male and female pattern hair loss as well as diagnosing and managing cicatricial forms of alopecia. Common inflammatory scalp conditions is also reviewed to insure participants have a better understanding of managing Describe many hair loss disorders as well as common scalp disorders as well as recognizing benign and malignant scalp tumors that may arise in the consultation process. An emphasis on recognizing alopecia areata and managing hair loss in women is discussed as well as understanding PRP and its therapeutic indications.





OURSE OUTLINE	running time
Velcome & Opening Remark icardo Mejia, MD	s 06:01
lair Loss Diagnosis, anatomy and Classification lené Rodriguez, MD	20:01
lopecia Areata, Diagnosis nd Management ran S. Cohen, MD, FISHRS	22:29
icatricial Alopecias icole E. Rogers, MD, FISHRS	29:08
nflammatory Scalp bisorders/Lumps and Bumps ennifer Krejci, MD	24:08 s
&A All Panelists	13:25
ermoscopy/Trichoscopy essons Learned ron Nusbaum, MD	20:12
liagnosing Hair Loss n Women leil S. Sadick, MD	36:01
icalp Cancers icardo Mejia, MD	13:55
RP Basics eil S. Sadick, MD	24:10
	44.04

Co-editors' Messages

Andreas M. Finner, MD, FISHRS *Berlin, Germany* forumeditors@ishrs.org

Our specialty has made tremendous progress over the past several years. I am impressed by the updated, dictionary-type terminology that the FUE research and terminology committees have put together. This is very important and helpful

for the clear communication between surgeons, patients, and device makers, not only in clinical practice but also in studies, advertisement claims, and reports. This is certainly an article that should be accessible to anybody interested.

Last month, I attended the World Congress of Hair Research in Barcelona (https://www.barcelonahair2019.org/). It featured a kaleidoscope of topics including hair transplantation, alopecia diagnosis and treatment, hair care, and, of course, basic and clinical research.

The hair follicle continues to be an exciting object to study and it is a highly complex organ. The elucidation of signals that control hair formation, as described in the Hair Science column, may potentially lead to new hair growth treatments. However, it takes time to translate research into clinical applications. New promising approaches are topical androgen receptor antagonists, prostaglandin D2 receptor antagonists, cell-based follicle rejuvenation, and topical JAK inhibitors for alopecia areata. The popularity of platelet-rich plasma (PRP) is increasing as well as the topical use of finasteride and the use of low-dose oral minoxidil.

In my talk in Barcelona, I spoke about the relevance of linear excision (follicular unit transplantation [FUT]). My take-home message was that in order to act in the best interest of the patient, the hair surgeon should master both techniques (follicular unit excision [FUE] and strip-FUT) and recommend the most suitable method based on individual criteria. A combination of both techniques can yield large graft numbers while avoiding overharvesting or a wide linear scar.

At the Latin American FUE workshop in Buenos Aires, Bob True took a similar stance. In addition, in this issue's President Message, Arthur Tykocinski emphasizes that it is time to reconsider the crucial role of FUT, especially in combination with FUE.

I applaud the results of the study by Bob Haber et al. on finasteride side effects, an important piece of evidence in these times of increasing hysteria around this valuable drug.

As always, dear members, we need your input for our upcoming issues, so please send your articles for consideration to forumeditors@ishrs.org.



Bradley R. Wolf, MD, FISHRS *Cincinnati, Ohio, USA* forumeditors@ishrs.org

We appreciate the important article by Bob Haber et al concerning finasteride and sexual dysfunction. This well-constructed study is rich with information supporting finasteride to treat androgenetic alopecia (AGA). We have been treating patients with

finasteride for 27 years; it was approved by the FDA for treating benign prostatic hyperplasia in 1992 and for AGA in 1997. It is surprising that reported sexual dysfunction was greater in the untreated control group than the finasteride treated group! Why is this? Prior to prescribing finasteride, I always ask if patients have existing sexual dysfunction for any reason and find the incidence is low, certainly lower than the control group in this study. I would hypothesize our patients are healthier than the general population, especially our older patients. Testosterone decreases not just due to aging but due to concomitant diseases often seen with aging. These diseases aren't as common in our patients.

Arthur Tykocinski gives a very accurate assessment of the state of our specialty. I couldn't agree more. The days of pitting FUT against FUE should be over. Marcelo Gandelman first described excising a single 8-10mm-wide strip in the Forum in 1991 (Vol. 1, No. 6). In the succeeding 28 years, the procedure has been refined, and much has been learned to make FUT scars extremely narrow, with hair growth in the scar (trichophytic closure). Plus, FUE grafting and pigmentation now exist to make wide scars less visible. But due to the less technical, less "surgical" FUE, the pendulum has swung away from FUT. It takes a larger staff, microscopes, and greater surgical skill and experience to perform FUT well. It's not easy to get an imperceptible scar with hair growing in it, but the responsibility of being a surgeon is to know how to perform surgery. There are absolute and relative indications and contraindications for FUE and FUT. These need to be identified, documented, and taught. The FUE Advancement Committee (FUEAC) could do this for FUE and FUT. Live surgery workshops should concentrate on FUT also. It is imperative that modern hair transplanters be proficient performing FUT and FUE. If two topics are to dominate our discussions and literature, it should be the donor and recipient areas, not just FUE and FUT.

Congratulations to the FUEAC, James Harris, and Bob True for their updated and important terminology reference article. This and other articles will soon be at the fingertips of all ISHRS members via the new, upcoming Forum ePub website, which will have current and past *Forum* issues in an easily assessible format. It is an immense improvement over the currently available Forum information and is the result of the hard work of Victoia Ceh, Bob True, and the ISHRS support staff. It will make researching Forum content much easier for all of us.

If you have a presentation planned for the Bangkok meeting, consider submitting an article on your topic to the *Forum* for publication prior to the meeting. There are two more issues prior to the Bangkok meeting. It's difficult to remember every 7- to 10-minute lecture. An article in the *Forum* will help expose your topic to a larger audience.

and systematic review of the literature found a lack of significant association of finasteride use for AGA treatment and sexual dysfunction.¹⁸ To address the discrepancies, the International Index of Erectile Function (IIEF) questionnaire (standardized method for assessment of sexual dysfunction¹⁹) was employed to specifically investigate sexual side-effects of finasteride use in the treatment of AGA. In three large studies (n = 186,²⁰ 236,¹⁷ 586²¹), no difference was observed in comparison with age-matched controls.

The Arizona Sexual Experience Scale (ASEX) is an additional survey that has been shown to be a reliable, valid and sensitive tool for measuring sexual dysfunction.²² Benefits include short, easy to understand questions that are less intrusive and are easy to score and interpret while covering five major global aspects of sexual dysfunction.²² Therefore, the ASEX was used to further investigate claims of finasteride-associated sexual dysfunction in AGA patients and compare this to sexual dysfunction in non-users.

METHOD

This was a survey-based study in a single-centre setting. Adult men visiting a dermatologist's office in Ohio, USA, for any reason were asked to complete a survey about sex. The survey included a modified Arizona Sexual Experience Scale (ASEX) and additional questions related to duration of finasteride use, reduced sexual performance and loss of libido during finasteride use (yes/no), and steps taken if sexual dysfunction was reported. Non-finasteride users completed the same survey, but questions did not refer to finasteride.

The ASEX consisted of 5 questions, with possible responses on a Likert scale ranging from 1 (extremely affirmative) to 6 (extremely negative) on each question. For example, the question "How easily can you reach an orgasm?" is scored from 1—extremely easily to 6—never reach orgasm. Scores on the ASEX were summed for a total score with possible scores of 5-30. A score of 19 or higher was considered indicative of sexual dysfunction,²² 15-18 mild sexual dysfunction and 14 or less indicative of no sexual dysfunction.

A one-way analysis of variance (ANOVA) was used to compare ASEX scores of finasteride and non-finasteride users. Chi-square tests were used to determine whether there were differences between finasteride and non-finasteride users for categorical variables (e.g., libido loss). A multiple regression was performed to determine whether finasteride use, age, libido loss and reduced sexual performance predicted ASEX scores. Analyses were performed using SPSS Statistics 20 (IBM, New Orchard Road, Armonk, New York, USA) with significance set to a = 0.05.

RESULTS

A total of 762 men completed the study, with 663 men reporting they were taking finasteride for varying lengths of time. There was no significant difference between the finasteride and the control group in mean age (P = 0.832; Table 1). The percentage of men self-reporting loss of libido (P = 0.805) or reduced sexual performance (P = 0.332) did not significantly differ between men taking finasteride and the control group (Table 2).

However, a one-way ANOVA showed an effect of finas-

TABLE 1. Demographics of sample (N = 762 men)

	Finasteride	Control
# Participants	663	99
Age (Mean \pm SD)	42.3 ± 13.2	42.0 ± 17.2
Age groups:		
18–29	137 (20.7%)	29 (29.3%)
30–49	286 (43.1%)	35 (35.4%)
50+	229 (34.5%)	34 (34.3%)
Missing	11 (1.7%)	1 (1%)
Total	663 (100%)	99 (100%)
Duration of use		
No finasteride	0	99
12 months or less	103 (15.5%)	0
1–5 years	299 (45.1%)	0
5+ years	259 (39.1%)	0
Missing	2 (0.3%)	0
Total	663	99

Missing data refer to survey respondents who did not complete the item in question.

TABLE 2. Summary of survey results (N = 762 men)

	Finasteride	Control
ASEX score (Mean \pm SD):†	11.9 ± 3.5	13.4 ± 4.7
No dysfunction (14 and below)	502 (75.7%)	61 (61.6%)
Mild dysfunction (15–18)	143 (21.6%)	26 (26.3%)
Sexual dysfunction (19+)	18 (2.7%)	12 (12.1%)
Total	663 (100%)	99 (100%)
Self-report measures		
Libido loss:		
No	495 (74.7%)	77 (77.8%)
Yes	151 (22.8%)	22 (22.2%)
Missing	17 (2.6%)	0
Reduced sexual performance:		
No	527 (79.5%)	75 (75.8%)
Yes	118 (17.8%)	24 (24.2%)
Missing	18 (2.7%)	0

Missing data refer to survey respondents who did not complete the item in question; ASEX, Arizona Sexual Experience Scale (modified). †Range of possible scores on ASEX is 5–30.

teride on total score of the modified Arizona Sexual Experience Scale (ASEX), F(1,760) = 14.69, P < 0.001. The mean score on the ASEX was slightly lower in the finasteride group of men compared to the control group of men (Table 2). Men were further divided into three categories: no sexual dysfunction (score of 14 or less); mild sexual dysfunction (score of 15-18); and sexual dysfunction (score of 19 or higher). The number of men with ASEX scores of 19 or higher was significantly lower than the number of men with ASEX scores indicating no or mild sexual dysfunction in both the finasteride and the control group, $v^2(2) = 22.53$, P < 0.001. There was no difference between finasteride and control in the number of men with ASEX score of 19 or higher.

To address the question of what factors may predict scores on the ASEX, a multiple regression was performed using the independent variables of age, finasteride use (four levels: no use, <1 year, 1–5 years and 5+ years), self-report of libido loss and self-report of reduced sexual performance. The regression model was significant, with independent variables predicting ASEX score, F(6, 723) = 58.28, P < 0.001, adjusted $R^2 = 0.32$.

Table 3 shows the regression coefficients and standard errors. All four of the independent variables significantly added to the prediction of the ASEX score. An increase in age of 1 year is associated with an increase in ASEX score of 0.063. If men self-reported a decrease in libido or sexual performance, ASEX score was predicted to be, on average, 2.64 and 2.03 points higher, respectively, than men that did not self-report libido loss or reduced sexual performance. Duration of finasteride in our model was compared to not using finasteride at all. Thus, for all durations of finasteride use, ASEX score was predicted to be, on average, less than that of no finasteride use. This does not mean that using finasteride results in lower scores on the ASEX. Rather, for two individuals of the same age with libido loss and reduced sexual performance, the individual taking finasteride is predicted, on average, to have a lower ASEX score (better sexual performance) by 1.2-1.6 points compared to the individual not taking finasteride.

DISCUSSION

Using the ASEX survey, sexual dysfunction reports in a population of 762 men were not significantly associated with finasteride use. Between the control group and finasteride-experienced patients, there was no difference in loss of libido, reduced sexual performance or the number of men with an ASEX score indicating sexual dysfunction. In contrast, results showed that increased age and selfreporting a decrease in libido or sexual performance were indicators for predicting a higher ASEX score. Therefore, the use of finasteride is not believed to be the cause of sexual dysfunction in AGA patients.

TABLE 3. Summary of multiple regression analysis, N = 730

Variable	В	SE	β
Intercept	9.740	0.480	
Age	0.063	0.009	0.232**
Loss of libido	2.642	0.356	0.297**
Reduced sexual performance	2.029	0.384	0.212**
Finasteride use:			
<1 year	-1.216	0.445	-0.111*
1–5 years	-1.521	0.361	-0.199**
5+ years	-1.612	0.371	-0.205**

P* < 0.01; *P* < 0.001.

B, unstandardized regression coefficient; SE, standard error of the coefficient; β , standardized coefficient.

The association of sexual dysfunction and AGA patients might be explained through another aspect of the disease. Sexual dysfunction has previously been linked to both depression²³ and a negative body image²⁴ such as the possible impact of hair loss, especially in young men.²⁵ In a recent study, an increased risk of sexual dysfunction was observed in men 18-40 years of age with moderate to severe AGA and psychosocial impairment accredited to body image changes due to hair loss.²⁵ Likewise, an investigation of PFS patients revealed major depressive disorder in 50% (n = 16) of the population.²⁶ It has also been pointed out that an increased risk of sexual dysfunction may be inherent to alopecia-diagnosed men due to a modified conversion of testosterone to dihydrotestosterone observed in these patients.²⁷ Similarly, it

has been suggested that prescribing guidelines have resulted in finasteride treatment arm populations that are naturally more susceptible to the development of sexual dysfunction vs. comparator populations. This scenario is illustrated in benign prostate hyperplasia trials where the former have been diagnosed for a longer duration and are often less healthy because alpha blockers are the preferred first-line treatment with finasteride recommended once the disease has progressed.²⁷ Once this variable is controlled for, no significant increase is observed in patients prescribed finasteride.²⁷

In addition, there is evidence of a nocebo effect²⁸ (an adverse side-effect that is not a direct result of the specific pharmacological action of the drug). Consequently, patients counseled on potential sexual side-effects are more likely to experience them.²⁸ It is also important to examine the AGA studies which suggest that sexual dysfunction symptoms from finasteride use worsen with time and persist after medication is discontinued.^{10,29,30} Key aspects to consider are the use of a retrospective design; a targeted patient population recruited from biased websites; and lack of placebo controls. Therefore, the results are subject to selection bias, possible placebo effects due to unknown prior counseling and recall bias as many had been experiencing sexual side-effects for more than 3 years.³¹ Additionally, care must be taken when selecting a study population; for example, the prevalence of sexual dysfunction in the general population should be considered. Studies investigating prevalence in various regions and age groups have reported a high likelihood, from approximately 5-50 percent,³²⁻⁴⁴ stressing the requirement for age-matched controls in the research of drug-induced sexual side-effects.

Overall, the use of the ASEX survey to investigate sexual dysfunction in 752 men aged 18-82 resulted in no connection to finasteride use. This reflects recent research which suggests that men with alopecia may be inherently more susceptible to sexual dysfunction regardless of treatment and that sexual dysfunction is not uncommon in the general population regardless of alopecia status. Therefore, as one of only two FDA-approved medications, it is recommended that finasteride continue to be prescribed for the treatment of AGA.

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Hair Sciences



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Wnt Inhibition by Dkk2 Controls Determination Between Hairless versus Hair-Bearing Skin

The study reviewed is titled, "Regional Control of Hairless versus

Hair-Bearing Skin by Dkk2." In their December 2018 publication in *Cell Reports*, Song and colleagues showed that a secreted Wnt inhibitor Dkk2 is responsible for regulating the development of hairless versus hairy skin.¹ Also, evolutionary changes in Dkk2 regulation may be responsible for species specific differences in hair formation patterns.

BACKGROUND

While most areas of the human body are covered with hair of varying thickness, length, and density, there are a few areas such as the palms, soles, or ventral wrists that are completely hairless. The study authors used a laboratory mouse model for their experiments in which the hairless areas are the plantar epidermis (corresponding to the human wrist) and the eccrine sweat-gland bearing footpads. By contrast, the planar epidermis in rabbits and polar bears is furred, suggesting an evolutionary adaptation between various species in the regulation of the development of hairless versus hair-bearing skin. Activation of the Wnt/β-catenin pathway is a tightly controlled cellular signaling cascade responsible in the initiation and growth of hair follicles. Key inhibitors of the Wnt/β-catenin pathway include the Dickkopf (Dkk) family of secreted proteins.² Deletion of the Dkk2 gene results in the transformation of the cornea to a stratified epithelium that develops hair follicles,³ suggesting a role for Dkk2 in hair follicle formation and determination between hairless and hair-bearing epithelium. To further address the role of Dkk2 in hair placode induction and spacing, the authors used a Dkk2 null mouse model to conduct loss of function experiments.

KEY FINDINGS

The key findings of the study included the following:

- 1. The mutant Dkk2 null mice have a normal density, spacing, and development of hair follicles in their hair-bearing skin. By contrast, the Dkk2 null mice developed ectopic hair growth in the normally hairless plantar skin.
- 2. In situ hybridization of wild type mouse embryos showed intense expression of Dkk2 in the developing cornea and limb digits and low expression in areas of hairy skin. Using both *in situ* hybridization and quantitation of Dkk2 mRNA, Dkk2 was shown to be elevated in hairless plantar skin of wildtype mice as compared to the dorsal hairy paw skin. Interestingly, quantitative PCR of Dkk2 mRNA in rabbits showed no differences between plantar and dorsal paw skin during embryogenesis. This finding may explain the species difference

between the haired plantar skin in rabbits and the hairless plantar skin in mice.

- 3. The invagination of the placode, a local thickening of epidermis, into the dermis is the first sign of hair follicle development in embryogenesis. Placodal cells proliferate to form the hair germ and also send signals to the underlying dermal cells to form the dermal papilla. The dermal papilla subsequently gets enveloped by the hair follicle epithelial cells in late embryogenesis. The formation of ectopic plantar follicles in Dkk2 null mice occurred in late embryogenesis.
- 4. Ectopic plantar hair follicles in Dkk2 null mice expressed the stem cell marker KRT15 and regenerated external hair following depilation, indicating that they contained a functional stem cell component.
- 5. In wild-type mouse embryos, Dkk2 secreted from the upper dermal cells inhibited the Wnt/ β -catenin pathway in the papillary dermis and adjacent epidermal cells. In contrast, β -catenin signaling was activated in the plantar skin of Dkk2 null mice, driving the formation of ectopic hair follicles.

Collectively, the data presented in this publication showed that Wnt inhibitor Dkk2 is responsible for regulation of hairless versus hairy skin in mice. The authors showed that in Dkk null mice, ectopic hair follicles formed in the normally hairless regions of the mouse paw. Although this ectopic hair was shorter and finer than the normal hair, it expressed a stem cell marker and regenerated upon depilation, suggesting that it contained a functional stem cell component. Given that the role of the Wnt/β-catenin pathway is evolutionary conserved, it is likely that these findings may also explain the regional differences in hairless and hair-bearing skin in humans. An intriguing future direction of investigation is whether this pathway can be modulated in skin regeneration following severe injuries such as burns. Namely, can we promote the regeneration of fully functioning skin with normal hair follicle appendages during the healing of injuries such as severe burns?

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A 2019 Guide to Currently Accepted FUE and Implanter Terminology

FOREWORD

In 2013, the ISHRS committee on FUE terminology established standard terminology for the practice of follicular unit extraction (FUE). Since its publication, this terminology has become standard among hair restoration surgeons worldwide. The terminology provides clear definitions of various techniques, steps of FUE, graft quality and patterns of graft injury, and ways to measure the quality of FUE surgery. In 2018, the International Society of Hair Restoration surgery formally changed FUE terminology from Follicular Unit "Extraction" to Follicular Unit "Excision" in order to more accurately define FUE as a surgical procedure. Excision is the combination of "incision" followed by "extraction." This overall change necessitated change in some other standard terminology. In writing this revision of the Standard FUE terminology, we have fully adopted the use of "excision" throughout the definitions. By utilizing this terminology, practitioners can communicate effectively with one another in day-to-day practice and in academic presentations and investigations and convey to the public the true nature of the procedure.

The ISHRS would like to acknowledge the work of the members of the FUE Research Committee (FUERC) and the

members of the Terminology Sub-committee who created the initial terminology document, and the members of the FUE Advancement Committee (FUEAC) who have contributed to this updated version. Robert H. True, MD, MPH, FISHRS is the primary author and editor of the material added subsequent to the original terminology publication. The following physicians were involved in the creation and editing of the initial and current terminology document: Flavia Barsali, MD, Christian N. Bisanga, MD, John P. Cole, MD, Márcio Crisóstomo, MD, FISHRS, Jean Devroye, MD, FISHRS, Kapil Dua, MD, FISHRS, Koray Erdogan, MD, Bijan Feriduni, MD, FISHRS, Alex Ginzburg, MD, FISHRS, Aditya Gupta, MD, PhD, FISHRS, James A. Harris, MD, FISHRS (Chair, FUEAC), Chiara Insalaco, MD, PhD, Ali Emre Karadeniz, MD, Melike Kuelahci, MD, Jose Lorenzo, MD, Jennifer H. Martinick, MBBS, FISHRS, Parsa Mohebi, MD, FISHRS, Maria Angelica Muricy, MD, Osman T. Oguzoglu, MD, FISHRS, Jae Pak, MD, Paul T. Rose, MD, JD, FISHRS, Ronald L. Shapiro, MD, FISHRS, Mauro Speranzini, MD, FISHRS, Robert H. True, MD, MPH, FISHRS, Arthur Tykocinski, MD, FISHRS, Sanusi Umar, MD, FISHRS, Conradin von Albertini, MD, FISHRS, Ken Williams, DO, FISHRS, and Bradley R. Wolf, MD, FISHRS.

Revised Standardization of the Terminology Used in FUE: Part I

ANATOMY

The definition of follicular units, according to Headington (1984), is: "The follicular unit (FU) of the adult human scalp usually consists of two to four terminal follicles and one or rarely two vellus follicles, the associated sebaceous lobules, and the insertions of the arrector pili muscles of the terminal follicles. At superficial dermal levels follicular canals may or may not join each other, although it is common to find two or three hair shafts within a single canal at the level of the infundibulum. The vellus follicle of the follicular units may remain separate or may be joined to the confluent infundibula ula of the terminal follicles."



Follicular Group, Follicular Family, Follicular Cluster or Follicular Bundle (Figure 1): These are defined as clusters of hair in the scalp that exit the skin in close proximity to each other and are separated by a gap from other clusters of hair. The follicular group may consist of more than one follicular unit in a tightly packed distribution on the surface of the skin. In complex donor areas consisting of multiple large bundles or closely aligned bundles, the number of separate

bundles obscures individual interpretation and leads to variable individual assessment.

Splay (Figure 2a): This describes divergence of follicles from one another, typically occurring at the lower one-third of the follicular unit. The degree of splay is widely varied from no splay to substantial splay. Splay may involve one follicle within a group or all follicles within a group. Dr. Robert True recently introduced the concept of structural splay and iatrogenic splay. Structural splay exists anatomically in the tissue and iatrogenic splay (Figure 2b) is splay produced by the method of FUE. FUE techniques in which the punch insertion is superfi-



cial may produce extreme splay of the bulb portion of the follicles as a consequence of stripping away the perifollicular tissue during extraction.

Sub-Follicular Group Graft: This is a graft excised from a follicular group where a portion of the follicular group remains in the donor area.

CTS: Connective tissue sheath; **ORS**: outer root sheath; **IRS**: inner root sheath

DP: Dermal papilla

Tethering: This term is used to describe the attachment

of the connective tissue sheath and outer root sheath to the surrounding adipose of a follicle. In most individuals, the strength of this attachment is very weak, so we can extract the graft once we cut the superior anchor system, but in others, it is quite strong, requiring more tension during extraction.

Hypopigmentation: This is the name given to the loss of skin color caused by loss of melanin, loss of the hue from individual follicles, and the interruption of vascular circulation from the skin surface during the healing process. Following the harvesting process from the scalp or body, the excision sites often heal by secondary intention. The surface area of hypopigmentation (commonly named "white dots") can be extremely variable depending on different factors, such as skin or hair color, and the tools used for the excision. Based on experience, hypopigmentation is more common in the inferior part of the donor area of the scalp, chest, and abdomen, and less noticeable on the traditional recipient area of the balding scalp, legs, and beard.

Anchor System of the Follicular Units: This defines the structures that impede the excision of the follicular group from the surrounding tissue. The follicular adherence includes the sebaceous gland, the insertion of the arrector pili muscle, the attachment of the dermis, and the connections between the CTS and the surrounding adipose tissue.

FIGURE 3. Capping/topping



TRANSECTION

Capping or Topping (Figure 3): This occurs when, after incising a targeted graft and attempting to remove it with the forceps, we obtain a small cap or top of tissue (epidermis and dermis) with no terminal hair follicles, which remain

in the donor site. In most cases, this is due to not having achieved sufficient depth with the punch to liberate the graft. In other instances, this may occur when sub-optimal force or when improper forceps placement is applied to the graft during the extraction process. On occasion, a telogen or vellus hair may be removed within the cap during this process.

FIGURE 4. Pluck



Pluck (Figure 4): This is removal of one or more terminal hairs by pulling them out with forceps with the aim of the removal of viable follicles from the donor area that can

be inserted into the recipient area. A pluck could comprise one or more naked follicles devoid of all components of the connective tissue sheath (CTS), outer root sheath (ORS), and inner root sheath (IRS) and dermal papilla (DP), or a fraction of the CTS, ORS, and IRS. In some instances, only the IRS remains. Generally, when the distal portion of the ORS is

FIGURE 5. Broken/fractured follicle



left in the donor area as a result of a pluck, the DP also remains in the donor area.

Broken or Fractured Follicle(s) (Figure 5): Broken or fractured follicle(s) are follicles that are broken into two or more pieces. Such

FIGURE 6. Paring/ de-sheathing



excised graft will contain fewer follicles than are in the group. Splitting can be produced deliberately or unintentionally.

FOLLICULAR UNIT EXTRACTION

(now outmoded terminology) The concept of FUE was first observed in a newspaper advertisement in Australia in 1995 by Drs. Woods & Campbell (Figure 8). The advertisement described the FUE harvesting technique as "Hair Follicle Single Unit Extraction." FUE was officially introduced in the medical literature in 2002 by Drs. Bill Rassman and Bob Bernstein. They were the first physicians to describe the term FUE in 2002 as "the removal of individual clusters of follicles from the donor area us-

breakage typically results from excessive force applied with forceps during the extraction phase of FUE.

Paring or De-sheathing (Figure 6): These are grafts where the CTS, ORS, and perhaps the IRS are slashed in a longitudinal fashion by the cutting edge of a sharp punch.

Splitting (Figure 7): This is the action of separating with the punch *in vivo* (or in situ) a portion of the follicles from a

FIGURE 7. Splitting

group (follicular family or follicular unit). The



FIGURE 8. First ad for FUE



ing a sharp dissecting punch or trephine." In the original article, the grafts were harvested using a 1.0mm sharp trephine.²

In strict terminology, the term "follicular unit extraction" is inappropriate and misleading because it is a histological term rather than an accurate anatomical surgical term. More appropriate would be the term Follicular Isolation Technique (FIT).

FOLLICULAR UNIT EXCISION

In this revised version of the Standard FUE Terminology, the new terminology approved by the International Society of Hair Restoration surgery in 2018 for FUE is Follicular Unit Excision rather than the previous common usage Follicular Unit Extraction. The "E" in FUE is redefined as Excision as excision is defined as the "act of removing by cutting out." The purpose of this culture and name change is to be more scientifically, clinically, and academically correct with our procedure and terminology.

Definition

Follicular Unit Excision is the surgical technique that refers to circumferential incision of the skin around the follicular unit bundle or group of hair follicles for the purpose of extracting a full-thickness skin graft containing hair follicle(s), intradermal fat, dermis, and epidermis.

Since its introduction early in this century, FUE has been referred to as extraction, and the term "extraction" is firmly established in our field. However, in common usage, "extraction" has a non-surgical implication. This has unfortunately led to a perception and exploitation that FUE is not surgery and can be performed by lay people.

The ISHRS Board of Governors has reviewed this new terminology and agreed that the above definition more accurately reflects the true nature of the procedure. It also prevents any type of misleading or fraudulent information that may be conveyed to the public.

FIGURE 9. Trimming



Trimming (Figure 9): This refers to the removal of the dermis and other undesired perifollicular tissues from an FUE graft under the microscope with the aim of making the graft slimmer. The advantage of trimming is to make a graft fit into a smaller recipient site or to reduce the volume of tissue inserted into recipient sites so that volumetric expansion of the recipient area or ridging is minimized.

Different Techniques Employed

Partial Follicular Family Harvesting (Figure 10): This involves the entire process of harvesting (i.e., splitting and then extracting) a fraction of a follicular unit such that one portion of the follicular unit is harvested from the donor area while the other portion of the follicular unit remains in the donor area. It's also called "vertically split harvesting," "vertically cut harvesting," or "fractional family harvesting."

FIGURE 10. Partial follicular family harvesting



FIGURE 11. Individual group harvesting



Individual Group Harvest-

ing (Figure 11): This involves harvesting an intact group of follicles based upon their proximity and position as they exit the epidermis consisting of one or more than one follicular unit at a time.

Transection (Figure 12): Term used to report any microscopically visible breakage of a follicle anywhere along its entire length. A graft is considered

FIGURE 12. Transection

transected when all of the follicles are cut transversally or partially transected when one or more follicles are cut leaving

completely

one or more intact follicles.

External Dissection (Figure 13): This action details how a graft is divided under the microscope into singles or groups containing fewer follicles than the original intact group, for example, to be used in or near the front hairline.

Graft Cleaning: This refers to the removal of the transected part of a follicle from an FUE graft under the microscope.



FIGURE 13. External dissection



Follicular Isolation Technique: Also known as FIT, Dr. Paul Rose derived this term to more appropriately describe the procedure commonly referred to as FUE in 2002. The term FIT includes the possibility that a graft does not always get all the follicles of a follicular unit or it might include follicles in more than one follicular unit. It is possible that during removal the surgeon may extract, intentionally or not, one or several follicles, leaving behind a viable hair in the donor site. Alternatively, the surgeon might excise more than one intact follicular unit. Therefore, the preferred term by the early pioneers in FUE was "follicular isolation" rather than "follicular unit extraction."

Cole Isolation Technique (CIT): Developed by Dr. John Cole, CIT is a follicular excision technique that incorporates a variety of highly sharpened, thin wall punches along with a precise depth control mechanism. The goal of CIT is to minimize the follicle transection rate by varying the punch diameter, limiting depth, modifying punch geometry, and altering tangential forces. The objectives of CIT are to match donor harvesting methods to the individual physical characteristics of each patient along with overall goals of both short- and long-term patient planning. CIT may involve harvesting a portion of a follicular group or intact follicular groups.

Harris Safe Technique: The method introduced by Dr. James Harris in 2004 is both a manual and a mechanical method of graft harvesting. Initially, the method consisted of using a sharp punch to score the dermis of the skin followed by deeper dissection with an unsharpened dull, or blunt, punch developed by Dr. Harris, which he called a two-step method. Following the second step, the graft is removed with a pair of forceps. Subsequently, Dr. Harris attached his unsharpened punch to a rotating drill. With the mechanical version, the surgeon may perform the procedure in a single step.

Body Hair Harvest: Donor follicles are harvested from any region of the body except the traditional scalp donor area. Body hair has an unpredictable and variable yield.

Beard Hair Harvest: Donor follicles are harvested from the beard area on the face and neck of a patient. Beard hair,

transplants have a higher mean yield and a much faster rate of growth than other sources of body hair. Beard hair has the greatest hair shaft diameter.

Woods Technique: This is the original term given to Follicular Unit Excision by Drs. Ray Woods and Angela Campbell. Even though they never published their results or shared their experience with other physicians, they can be considered an essential part in the development of the FUE technique based on their Internet publications.

Fox Test: This refers to a test procedure performed when a physician wants to confirm that a patient is a good candidate for FUE. Drs. Bill Rassman and Bob Bernstein coined the term in their 2002 paper that described the FUE procedure.

MOTORIZED AND ROBOTIC DEVICES

FIGURE 14. PCID



FIGURE 15. Harris System



FIGURE 16. NeoGraft



Programmable Cole Isolation Device (PCID) (Figure 14): This programmable device developed by Dr. John Cole allows for a more precise control of rotation, oscillation (and the duration of both), speed, rate, and arc of oscillation.

Harris Safe System (Figure 15): Developed by Dr. James Harris, this follicular excision device uses an unsharpened, dull, or blunt punch (0.8-1.2mm) with full rotation at variable speeds and a fixed depth stop.

NeoGraft[®] (Figure 16): This is a motorized rotating excision device using a sharp punch with both negative and positive pressure mounted on a right-angled handpiece. Negative pressure allows the

surgeon to suck the graft into a collection chamber and keep the operating field clear of blood. A deep incision is required to loosen the graft enough to allow the weak suction to remove the graft from the donor site. Grafts may also be removed using a pair of forceps. The grafts can be inserted in the recipient area using positive pressure.

The NeoGraft is similar to the Calvitron, originally conceived by Dr. Pascal Boudjema. The term Omnigraft is primarily used in Asia for this device.





Several newer similar devices include the SmartGraft, Atera, and FUETOR. True Device (Figure 17): Aseptico Porta-Tip - AEU-03SS and Osada SH28S handpiece. This is a recharge-

able rotary hand engine with variable speed control and autoclavable handpiece that Dr. Robert True uses. He employs Cole Instruments SerroundedTM punches varying in size from 0.8-1.25mm.

A silicone collar is fitted onto the punch and adjusted for precise control of incision depth.

Alphagraft (Figure 18): This is another FUE device that uses a rotating sharp punch to harvest follicles from the donor area.

Devroye Device (Figure 19): Developed by Dr. Jean Devroye, this FUE battery powered device uses an oscillating flat punch controlled by a very sensitive foot pedal. The device allows very short arc punch oscillation.

Trivellini Device (Figure 20): Developed by Dr. Roberto Trivellini, the Mamba FUE Device is a multifunction programmable motor that incorporates in-line suction, full rotation, oscillation, and vibration. The device also uses a unique flat punch design called the "Edge-Out" punch.

Shiao 4-D Device (Figure 21): Developed by Dr. T.K. Shiao, like the

Mamba, the device incorporates programmable multifunction controls. Punch movement is touch activated (also true of the Mamba device). The system uses sharp punches. The handpiece is disposable and printable at low cost with a 3-D printer.

ARTAS® System (Figure 22): Developed by Restoration Robotics, this robotic FUE device uses a two-step process where a prong-shaped sharp punch (Figure 23) first pierces the skin followed by an unsharpened rotating punch, which penetrates deeper into the tissue to liberate the graft. This is an "automated" system that evaluates follicular unit density, hair angle, and proper depths of sharp and unsharpened punch insertion based on the physician input data. With that information, the device has the capability to suggest the target units and align the system with the proper direction for dissection. Grafts are harvested while using a tension device developed by Restoration

FIGURE 22. ARTAS

FIGURE 21. Shiao 4-D Device



FIGURE 23. Prong-shaped sharp punch



Robotics. The graft is then removed with a pair of forceps.

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FIGURE 20. Trivellini Device





Revised Standardization of the Terminology Used in FUE: Part II

CHARACTERISTICS OF THE TECHNIQUES

Rotating Excision: The punch is rotated a full repetitive 360-degree cycle during penetration of the skin. This is usually done by motor.

Oscillating Excision: The punch is moves back and forth through different arcs and repetitions per minute (RPMs) during penetration. This may be done by hand or by a motor.

Rotating and Oscillating Excision: When rotation followed by oscillation is employed during penetration of the punch. Rotational speed, arc of rotation, ramp (amplitude from starting position to ending position) of rotation, ramp of arc, and duration of each individual cycle may be controlled.

Step Methods: These methods relate the steps that need to be applied, with a punch or other cutting tool, to release the graft from the surrounding tissue. All methods take a last step common to all the techniques, which is the collection of the follicle with forceps or suction:

- 1. **One Step Method** uses an excision punch that is inserted to the desired depth in a single incision using a rotational force, oscillating force, axial force, or combination of rotation and oscillation forces.
- 2. *Two Step Method* uses a sharp punch to score the skin using a rotational, oscillating, or axial action. Then either the same sharp punch or a different punch is inserted through the epidermis via the same incision to the desired depth using a rotating or oscillating action. The second punch may be a different sharp punch or a dull punch.
- 3. **Three Step Method** uses a sharp punch to score the skin followed by a sharp or unsharpened punch to penetrate as in the two-step method. Then a needle or other sharp device is used to cut the graft free at the base while traction is applied with forceps to remove the graft.

Sequential Method: The surgeon holds the punch and the forceps in both hands at the same time. The grafts are cut with the punch in one hand and then removed with the forceps held in the other hand, one graft at a time and in rapid sequence.

Coring Method: A sharp punch is inserted with a single axial force applied along the axis of hair growth without rotation or oscillation. Following the initial axial force a tangential force may be applied to help loosen the graft prior to removal with forceps.

Open Method: Also called *Lift and Look*. The skin is cut using a punch to score around the graft. Next, the cluster is pulled from the surface of the skin so that the surgeon can see the direction of hair growth and splay. Then a series of maneuvers may be used to dissect along the follicular unit. The process may be assisted using suction to clear the visual field.

Sharp Dissection: This is when a punch with sharp edges is inserted along the course of the follicle to facilitate its excision.

Blunt Dissection: This is when an unsharpened punch is inserted along the course of the follicle to facilitate its exci-

sion. Blunt dissection uses a punch with no sharp edges that has a wide wall to allow a wedge-like configuration with the aim of separation of the follicles from the surrounding tissue.

Hybrid Dissection: Uses the sharp outer edge of a flat punch to dissect the skin and the blunt edge along the course of the follicle to facilitate its dissection.

Pulling: This is the traction away from the skin used for the removal of the graft, after it has been punched. Grafts may be pulled with a one-hand pull with single forceps, a two-hand pull with two forceps, with an ATOE (see below), or with suction.

Scoring: This is a superficial cutting of the epidermis and dermis with a punch to produce a superficial circumferential or semicircle incision around a follicular grouping.

Depth Control: This refers to the utilization of different accessories on or around the punch to precisely control the depth to which the punch can be inserted.

Limited Depth Excision: The punch is inserted only to a depth of 2-3mm in order to release the follicles from the surrounding tissue for extraction with the help of forceps or suction. Limited depth excision minimizes follicle transection when using sharp punches.

Full Depth Excision: The punch is inserted the full length of the follicle (from 4 to slightly more than 6mm depending on the patient) to meet or exceed the level of the bulbar region of the follicular group and completely free the follicle(s).

Follicle Distortion: This is the physical movement of the follicle in reaction to the axial and tangential forces resulting from the physical process of follicular unit excision.

Axial Force: This is the force applied parallel down the center line of the hair follicles during graft excision. When the force is evenly distributed, the force is concentric. When the force is unevenly distributed, the force is termed eccentric. Because the inferior margin of the punch touches the skin first due to angle of hair growth, the force is often greater on the inferior aspect of the tissue during graft removal. This uneven force often causes follicle displacement.

Tangential Force: This is the force applied through rotation or oscillation of a punch around a follicle or group of follicles.

Donor Tension or Traction: Tension may be applied to the donor area to stabilize the fluidity of the tissue. Tension may be applied by a variety of means including the following: tumescence, clamps, or manual or stretching forces applied through other means such as tensioners or stapling a latex material from one side of the scalp to the other.

Bulls Eye: This is when the follicles being excised within
a follicular group are perfectly centered in the punch during
its insertion.FIGURE 24. ATOE

ATOE (Aide to Extraction) (Figure 24): This is forceps with a specialized design, created to facilitate a rapid extraction of the previously dissected grafts.

Delay in Extraction: This is the temporal difference between the time when the punch incises the grafts, in both single and multiple step processes, and when the grafts are physically removed from the donor area. Following the delay, the grafts may be placed into holding solution or reinserted into the scalp immediately.

Follicle Depth: Determined by the distance from the surface of the skin to the full length of the follicle below the hair bulb.

Time Out of Body (TOB): This is the time between the removal of the graft from the donor area and its reinsertion into the recipient area. The graft may go into a holding solution or it may be immediately placed into a recipient site.

DONOR AREA

Donor Area Regions: This defines the zones of the safe donor area from which grafts should be excised.





Safe Donor Area (SDA) (Figure 25): The portion of the scalp that contains follicles presumed to be the permanent hair within the donor area. The concept of the "safe donor area" is based on a study by Dr. Walter Unger and on experience. It is clinically difficult to be completely accurate in

defining this area. In some individuals, the SDA may be greater, while in others, it may be less. Furthermore, there is no guarantee that all follicles within a "safe donor area" are permanent. This is a very difficult area to define, especially in young patients.



Donor Area Template (Figure 26): This is a template that allows the margins of the presumed safe donor zone and excision zones to be marked. Major Donor Regions are within the presumed safe donor zones of the occipital and temporal regions. Minor Donor Regions are zones of secondary use and include the nape of the neck and areas located inferior to the major donor regions. Hair in these

regions is less reliably presumed to be in the safe donor zone in patients who do not have extreme degrees of hair loss. Individuals with higher degrees of hair loss will often lose hair in these regions as they age. Often hairs in these regions contain a higher percentage of hair in the telogen phase. Additional Donor Regions include the temporal areas in front of the ears, the supra-auricular areas, and lateral humps.





Handle (Figure 27): The tool by which the punch is held, carried, and depth controlled. There are some different handles for the manual FUE technique, the most popular are the Versi

handle and the CIT manual punch handle.

PUNCH CLASSIFICATION

A wide variety of punch types have been developed for performing FUE. New designs are being created continuously. Punch designs are categorized by four main categories: 1) tip type, 2) shape, 3) position of dissecting edge, and 4) diameter of the dissecting edge. Each category has subtypes.

In describing a punch, the order of categories would be 1. Tip, 2. Shape, 3. Position of dissecting edge, 4. Diameter of the dissecting edge. Thus, this is the "TSPD" punch classification system.

T Classification by Type of Dissecting Edge or Tip: (Tip):

T.1 Sharp T.1.1 Regular – Cannula T.1.2 Serrated T.1.3 Bifurcated T.1.4 Pronged T.1.5 Coated T.2 Blunt T.3 Flat (hybrid)

S Classification by Shape (Shape)

S.2 Concave (inverted or hour glass)
S.3 Lipped
S.3.1 e.g., – Regular
S.3.2 Serrated
S.4 Hexagonal
S.5 Open (slot)
S.6 Window
S.7 Tissue Port

P. Classification by Position of Dissecting Edge (Position)

P.1 Internal P.2 Middle

P.3 External

D. Classification by Punch Diameter (Diameter)

D.1 Small < 0.8 mm D.2 Medium 0.8 – 1.0 mm D.3 Large - > 1.0 mm

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DEFINITIONS BY TYPE OF TIP

FIGURE 28. Sharp punch



FIGURE 30. Flat/Hybrid punch

FIGURE 31. Serrated tip

FIGURE 32. Bifurcated tip

FIGURE 33. Pronged tip

(Figure 29): This punch has edges that are not sharpened.

> Flat or Hybrid Punch (Figure 30): This punch has an internal edge that is blunt and an external dissecting edge. Serrated Tip (Fig-

ure 31): This tip has a wavelike contour that

reduces the amount of cutting edge in contact with the skin.

Sharp Punch (Figure 28): This punch

has a sharpened cutting edge.

Blunt or Dull Punch

Bifurcated Tip (Figure 32): This tip has two dissecting projections.

Pronged Tip (Figure 33): This tip has two more elongated projections.

Coated Tip (Figure 34): This tip has a coating on the surface of the steel punch.

DEFINITIONS BY THE SHAPE



FIGURE 36. Tissue port (Ertip)



external surface of the punch just above the tip.

FIGURE 38. Lipped punch



FIGURE 40. Open punch

Single slot Double slot

Straight Punch (Figure 35): This punch has the same external diameter throughout its length.

Tissue Port (Figure 36): An opening along the shaft of the punch through which tissue drawn into the punch can be extruded or extracted. Concave Punch (Figure 37): This

punch has a concave inversion of the



Lipped Punch (Figure 38): This

punch has a projection outward from the external surface of the punch at the tip; this may be regular or serrated.

Hexagonal Punch

(Figure 39): This punch has a hexagonal shape of the punch just above the tip.

Open Punch (Figure 40): This punch has a slot or slots in the punch wall that allows for long hair to be protected during graft excision.



Window Punch (Figure

41): This punch has an opening above the tip of the punch that allows for the grafts to be visualized as



they enter the punch during excision.

DEFINITIONS BY POSITION OF THE DISSECTING

EDGE (FIGURE 42) Inside Diameter Punch (or outside bevel punch): This punch has the dissecting edge of the bevel located on the inside



face or at the inner part of the wall of the punch.

Middle Diameter Punch (or middle bevel punch): This punch has the dissecting edge of the bevel located on the middle of the wall of the punch. The location of the cutting edge is not always EXACTLY in the middle wall of the punch.

Outside Diameter Punch (or inside bevel punch): This punch has the dissecting edge of the bevel located on the external surface of the wall of the punch. The external diameter of the punch is the diameter from the external surface on one side of a punch to the external surface on the opposite side of the punch.

Internal Diameter of the Punch: This punch has the diameter from the internal surface on one side of a punch to the internal surface on the opposite side of the punch. Some punches have an internal diameter that is larger at the cutting edge and narrower in the body of the punch.

Dissecting Edge Diameter of the Punch: This punch has diameter from the dissecting part of the punch (end of the bevel) on one side of the punch to the cutting part on the opposite side of the punch. For the same external diameter, the dissecting edge diameter may vary depending on the position of the bevel. The dissecting edge diameter is the main measurement of the punch and it should be used as the main point of reference for all companies that manufacture punches. Currently, the most widely used reference is, incorrectly, the inner diameter. The dissecting edge diameter is equal to the external diameter in an inside bevel punch and is equal to the internal diameter in an outside bevel punch and is between the internal and external diameter in a center bevel punch. Attention should be paid to the specifics of the size of the punch as different manufacturers vary in their production standards.

DEFINITIONS BY THE DIAMETER OF THE **DISSECTING EDGE (FIGURE 43)**

Small Punch: This punch has a dissecting edge diameter that is equal to or less than 0.8mm.



Medium Punch: This

punch has a dissecting edge diameter that is greater than 0.8mm and less than 1mm.

Large Punch: This punch has a dissecting edge diameter that is equal to or greater than 1.0mm.



FIGURE 29.

Blunt/dull

punch

FIGURE 34. Coated tip





HAIR TRANSPLANT FORUM INTERNATIONAL

Standardization of the Terminology Used in FUE: Part III

INTRODUCTION

The terms in this part of FUE standard terminology focus on the measurement of quality in excision. Utilizing these measurements in daily practice allows the practitioner to fully assess the quality of his or her technique. In order to perform these calculations, the following must be observed, counted, and recorded in all surgeries: 1) the number of punch insertions; 2) all pieces of tissue removed regardless of appearance; 3) the number of partially and completely transected follicles in all removed tissue; 4) the number of follicles intact and transected per graft, and 5) pre-operative densitometry.

Total Number of Punch Insertions (or **Punch Attempts**): The total of all punch insertions made, whether the insertions yield a graft or not.

Total Number of Grafts Available for Transplant: The total number of intact grafts or partially transected grafts available for insertion.

Total Number of Grafts Unavailable for Hair Transplant: This is the difference between the total number of graft(s) extracted and the total number of graft(s) available for transplantation. Unavailable grafts include capped, completely transected, and empty grafts.

Total Number of Grafts Excised: The number of grafts available for transplant plus the number of grafts unavailable for transplant.

Missing Graft Rate (MGR): The number of missing grafts divided by the number of punch insertions. MGR equals: Number of missing grafts × 100/Number of punch insertions.

Graft Transection Rate (GTR): The result obtained when the number of grafts containing one or more transected follicles is divided by the total number of grafts excised. GTR equals: Total number of transected grafts (partially + completely) \times 100/Total number of excised grafts.

Completely Transected Graft Rate (Total Transection Rate, TTR): The result of the total number of grafts completely transected divided by the total number of grafts excised. TTR equals: Total number of completely transected grafts × 100/Total number of excised grafts.

RESULTS



Intact Graft (Figure 44): This graft is comprised of the entire structure of a healthy terminal follicular unit, including intact structures of the infundibulum, isthmus,

and bulbar structures, FIGURE 45. Partially transected graft

and has not suffered any trauma during the process of excision.

Partially Transected Graft (Figure 45): Refers to a graft that contains one or more follicles that have been transversally cut, but that still contains intact follicles.

Completely Transected FIGURE 46. Completely transected graft

Graft (Figure 46): Refers to the amputation of all the follicles within a graft so that there are no intact follicles in the excised tissue.



Buried Graft: A graft

that is pushed and remains under the skin surface during an attempt to cut and isolate with a circular punch.

Empty Graft: A graft of skin lacking hair follicles resulting from the insertion of a punch into bald skin.

Missing Graft (MG): Any graft (intact, complete or partial transection, capped, buried, or empty) that cannot be located because it is misplaced during the surgery. It's the difference between the total number of punch insertions and the total number of grafts available for hair transplant, plus the number of grafts unavailable for transplantation. MG equals: Total number of punch insertions – (grafts available for HT + graft unavailable for HT).

Partially Transected Graft Rate (Partial Transection Rate, PTR): The result obtained by dividing the number of grafts partially transected by the total number of grafts excised. PTR equals: Total number of partially transected grafts × 100/Total number of excised grafts.

Follicle Transection Rate (FTR or **TR**): The result obtained when the number of transected follicles is divided by the total number of follicles that have been excised, both intact and transected. FTR equals: Total number of transected follicles × 100/Total number of excised follicles (intact + transected).

Calculated Follicles per Graft Expected (CFGE): The number of intact follicles excised plus the number of follicles transected divided by number of grafts available for transplant plus the total number of completely transected grafts. CFGE equals: Intact follicles + transected follicles excised / Total number of grafts available for transplant + completely transected grafts.

Calculated Follicles per Graft Achieved (CFGA): The number of intact follicles excised divided by the number of excised grafts available for transplant plus the total number of completely transected grafts. CFGA equals: Intact follicles / Total number of grafts available for transplant + completely transected grafts.

Pared Follicle Rate (PFR): The number of follicles pared (or de-sheathed) divided by the total number of follicles (intact and transected) that have been excised. PFR equals: Total number pared follicles / Total number of excised follicles (intact + transected).

Donor's Area Calculated Density (Hairs per Follicular Group): The number of follicles counted in the donor area divided by the number of follicular units or follicular families counted in the same donor area (typically performed with a dermatoscope or trichoscope).

Implantation of Grafts: Part IV

INTRODUCTION

Although the use of implanters to place grafts is common practice with both FUT/ strip excision and FUE/punch excision, the FUEAC has decided that this version of the Standard FUE terminology should include standard terminology for graft placement devices. Most implanters, whether sharp or blunt, have a plunger that when depressed pushes the graft out of the device into the skin.



FIGURE 48. Blunt implanters



to describe sharp needle implanters that allow simultaneous recipient site making and graft placement. Sharp implanters of varying designs are available from many manufacturers (most from Asia). Blunt Implanters: Blunt implanters

Sharp Implanters (Figure

47): In 1992, Choi was first

are used to place grafts into premade recipient sites. Dr. T.K. Shiao was first to manufacture such tools in 2012 and Dr. Mauro Speranzini was first to publish on the creation and use of blunt implanters in 2016. (Figure 48) The first blunt implanters were made

by modifying sharp implanters, but blunt implanters from several manufacturers are now available.

FIGURE 49. Keep Implanter



and Dr. Devroye's WAW Implanter (Figure 50) can hold seven grafts at a time and have blunt tips but are different from most blunt implanters in that there is no plunger. Thus, for these graft implanter devices, for-



ceps must be used to push the graft out of the needle into the recipient site. Erdogan prefers to categorize

Placers and Inserters: Devices such as Dr.

Erdogan's Keep Implanter device (Figure 49)

his graft implanting device as a "graft placer," rather than an implanter. With the Keep and WAW implanters, only the tip of the placer is inserted in the recipient site.

Another type of graft implanting device is Dr. Mohebi's "Graft Inserter" (Figure 51). It is loaded in a similar manner as the Keep by rolling the open slot of the tip of the needle over



the graft. The tip of the needle is inserted to the full length of the site and the graft inserted via a plunger. All implanters, other than the Keep and the Mohebi Graft Inserter, are loaded with forceps.



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Medical and Professional Ethics

Gregory Williams, MBBS, FISHRS | London, England, UK | dr.greg@farjo.com Spotlight on Whistleblowing

A whistleblower is defined in the Oxford dictionary as "a person who informs on someone engaged

in an illicit activity." However, since informing can result in negative outcomes for the whistleblower, it can often be easier to turn a blind eye, especially when the illicit activity does not directly affect the whistleblower. Sometimes the illicit activity is a single occurrence, sometimes it is recurrent but limited in frequency, but sometimes it is part of a persistent trend. The #MeToo movement is an example of whistleblowing on a widespread scale that has gathered momentum because it has been legitimised and because a serious problem that had remained unaddressed is now openly viewed as unacceptable in the United States and other Western societies. Another reason why people don't want to whistleblow is because of the hassle involved in doing so including the time required in giving or writing official statements, filling in forms, being called to hearings or tribunals. It is possible that the person who the whistleblower has concerns about is someone they get on with socially and they don't want to jeopardise that relationship. Lastly, along the lines of "why beholdest thou the mote that is in thy brother's eye, but not considerest the beam that is in thine own eye?", whistleblowers can become targets for criticism themselves for similar or other transgressions and so may be hesitant to raise their heads above the parapet.

The current ISHRS Position Statement on Qualifications for Scalp Surgery is as follows.

"The position of the International Society of Hair Restoration Surgery is that any procedure involving a skin incision for the purpose of tissue removal from the scalp or body, or to prepare the scalp or body to receive tissue, (e.g., incising the FUE graft, excising the donor strip, creating recipient sites) by any means, including robotics, is a surgical procedure. Such procedures must be performed by a properly trained and licensed physician*. Physicians who perform hair restoration surgery must possess the education, training, and current competency in the field of hair restoration surgery. It is beyond the scope of practice for non-licensed personnel to perform surgery. Surgery performed by non-licensed medical personnel may be considered practicing medicine without a license under applicable law. The Society supports the scope of practice of medicine as defined by a physician's state, country or local legally governing board of medicine.

Adopted by the Board of Governors, 11/15/2014

*or in countries where it is allowed, a licensed allied health professional practicing within the scope of his or her license."



Reflective Question

What would I do if I had firsthand or good faith objective evidence of an ISHRS member practicing hair restoration surgery in an unethical way?

By "licensed," the ISHRS means "medically licensed," that is, licensed by a governing healthcare authority of which the individual is a member.

Furthermore, the membership agreement that is signed with annual renewal prohibits false statements, copyright infringement, and use of inappropriate, misleading, or inaccurate terminology. Members' websites are periodically reviewed by the ISHRS team when concerns are raised about non-compliance.

Paragraph 8 of the Code of Ethics states: "A member with knowledge of an illegal or improper act(s) by another physician should report such activity to the appropriate agency." ISHRS members who are aware of other members that are not complying with the its policies and position statements, such as those above, have a moral duty to whistleblow, provided they have firsthand knowledge or good faith objective evidence that the individual is practicing or advertising hair restoration surgery in an unethical way. The primary intent here is to protect the patient, as written on the home page banner on the ISHRS website.

On the other hand, one of the core principles of the ISHRS is collegiality as is also written on the home page banner of the ISHRS website. Making and maintaining friendships with colleagues around the world, and supporting each other in times of stress and hardship, whether professional or personal, is one of the bonuses of being an ISHRS member. We certainly do not want to be a society of backstabbers and double-crossers. However, the saying "one bad apple spoils the barrel" can be aptly applied to our society, and several "bad apples" will spoil the barrel even more. Members who publicly endorse the ISHRS tenets but privately flaunt them should be held accountable. Otherwise, if it is common knowledge within and outside the society that a member, senior or junior, is not abiding by the Code of Ethics, then the credibility of the Society, and therefore all its members, can be called into question. Nobody wants to be the bad guy or girl and be responsible for getting somebody else in trouble, but if that somebody is knowingly acting inappropriately, then they can hardly feel aggrieved by being called out on their bad behaviour, can they?

Concerns about inappropriate practice are made by completing the forms found on the ISHRS website at https://ishrs. org/filing-an-ishrs-complaint/. The Complainant must agree for their name and the concern to be made known to the Respondent. Concerns about misleading advertising by an ISHRS member can be addressed to info@ishrs.org. However, paragraph 7 of the Code of Ethics states: "Members will not denigrate their colleagues using false or misleading information with the intent of injuring the reputation or business of an ISHRS member." Making an accusation about another member based on hearsay or falsely accusing another member of an illegal or improper act will not be tolerated by the society.

In my last column, "Spotlight on Dealing with Complications," I discussed conflict resolution between patient and doctor. But what about conflict resolution between colleagues? Clearly, if a member becomes aware that a colleague has filed a complaint against them, then it is likely that their relationship will be fractured, possibly permanently. Worse yet, friends of each individual might rally around them causing fissures within the society. This is best avoided. If one becomes aware of another colleague behaving in an inappropriate way professionally, a good approach is to privately have a word with them and discuss the matter in a friendly way, giving them the reasons why you are concerned, seeing what their response is, and suggesting they alter their behaviour.

Members who do not feel that they can comply with the ISHRS governing policies and documents should reconsider their memberships and certainly should not sign the annual membership renewal attestation agreeing to abide by the ISHRS's rules and then failing to do so.

Whistleblowing is never an easy thing to do, but when patients are potentially being put at risk, any doctor has to decide what to do with knowledge they are in possession of regarding illegal or improper acts by a physician colleague.

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Hair's the Question

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*The questions presented by the author are not taken from the ABHRS item pool and accordingly will not be found on the ABHRS Certifying Examination.

Being the surgeon in a hair transplant surgery clinic often means you are in charge of your protocols for graft care. No standardized set of rules exist, and, more importantly, few robust medical studies are done that can guide a hair surgeon's practice. In the case of graft preservation, con-

troversy has bubbled for years about what might be the best way to handle grafts in order to ensure their optimal survival and growth. New questions about the optimal temperature, storage solution, and out-of-body time are in vogue once more. Here are some questions related to graft storage meant to challenge you and stimulate your curiosity.

Graft Preservation and Storage Solutions

- 1. Early studies by Limmer, Kim, and Hwang demonstrated which of the following?
 - A. A graft storage solution of normal saline at 4°C AND normal saline at room temperature will yield similar survival rates up to 24 hours out of body.
 - B. All grafts die after 48 hours out of body no matter what storage solution they are kept in.
 - C. Any time >2 hours out of body results in >10% reduced graft survival no matter in what temperature storage solution the grafts are kept
 - D. Grafts stored in saline can survive out of body up to 8 hours at temperatures ranging from 4°C up to room temperature.
- 2. Which of the following is a benefit of normal saline as a graft preservation solution?
 - A. It is readily available and inexpensive.
 - B. It contains low levels of sodium relative to the graft's own cells.
 - C. It is not buffered.
 - D. It functions well at both low and high temperatures.
- 3. Which of the following is a benefit of impermeant molecules in a storage solution meant for tissue preservation?
 - A. They close the cell membrane's Na+/K+ channels.
 - B. They prevent the movement of water and electrolytes across the cell membrane.
 - C. They protect the cells from acidosis.
 - D. They prevent cell damage due to cold storage.
- 4. Which of the following potential graft storage solutions does not contain impermeant molecules or buffers?
 - A. HypoThermosol[®] +ATP
 - B. HypoThermosol[®]
 - C. Platelet-Rich Plasma (PRP)
 - D. Lactated Ringers and Plasma-Lyte (both)

- 5. Most graft preservation strategies try to increase/decrease which of the following?
 - A. Increase energy (ATP) and decrease oxygen to suppress metabolism
 - B. Increase temperature (metabolism) and decrease energy (ATP)
 - C. Increase free radicals and decrease temperature (metabolism)
 - D. Increase energy (ATP) and decrease temperature (metabolism)
- 6. Graft preservation is threatened at several points in the transplantation process in both strip and FUE surgery. Which of the following is a common issue of equal risk for all hair transplantation surgeries?
 - A. Graft dessication if using normal saline as a storage solution
 - B. Graft warming from surgical lighting
 - C. Ischemia/hypoxia and enzymatic decay
 - D. Graft transection at the time of removal
- The most commonly used protocol methods for cellular therapies and regenerative medicine are cryopreservation (slow freezing, -1°C/min freezing rate) AND:
 - A. Hypothermia of 0°C
 - B. Hypothermia of 2-8°C
 - C. 98°F (body temperature) as long as reimplantation happens within 2 hours
 - D. Any temperature as long as tissues are kept moist and re-implanted within 6-8 hours
- 8. Why is sudden immersion of hair-bearing tissue in any solution with a temperature of 0°C suboptimal for graft preservation?
 - A. Cold shock protein formation is highest at 0°C.
 - B. There is a risk of water crystal formation that would damage the cells.
 - C. The cells of the grafts would have a slightly higher metabolism at 0°C thus causing eventual acidosis.
 - D. Graft re-warming from 0°C damages grafts if placed on a gloved finger before implantation.

- 9. Which of the following cellular injuries would be of highest concern for grafts removed from the body and immersed for 4 hours in chilled (2-8°C) normal saline alone?
 - A. Cellular swelling and lysis due to the osmotic effects of the cellular ion gradients (Na⁺, K⁺, H⁺, and Ca⁺² ions)
 - B. ATP pump activity cessation due to the lower temperature of the holding solution
 - C. Intracellular acidosis (and tissue acidosis) due to buildup of waste products from lactic acid production
 - D. Water crystal formation that would damage the cells
- 10. Although all important considerations, which of the following factors is most critical to ensure graft survival in a hair transplant surgery?
 - A. Out-of-body time
 - B. Graft hydration
 - C. Avoiding transection
 - D. Keeping grafts cold in an optimal storage solution like HypoThermosol[®] with ATP

- 11. Why is hypothermia considered an advantage in graft preservation for hair transplantation?
 - A. Hypothermia suppresses metabolism and thus avoids acidosis and tissue damage.
 - B. Hypothermia preserves graft rigidity for transplantation.
 - C. Hypothermia preserves ATP levels within the storage solution by shutting down ATP pumps within the cell membranes.
 - D. Hypothermia generates Cold Shock Proteins.
- 12. Which of the following is a potential disadvantage of hypothermia (2-8°C) for hair graft storage solutions?
 - A. Hypothermia suppresses metabolism and thus avoids acidosis and tissue damage.
 - B. Hypothermia preserves graft rigidity for transplantation.
 - C. Hypothermia shuts down ATP pumps within the cell membranes.
 - D. Hypothermia generates Cold Shock Proteins.
- 13. Which of the following injuries to the graft is most common AFTER reimplantation?
 - A. Ischemia-reperfusion injury
 - B. Enzymatic degradation
 - C. Neovascularization (within 72 hours)
 - D. Lactic acid buildup causing cellular and tissue acidosis

> ANSWERS PAGE 112



Answers

1. D. For years, this table from Dr. Jerry Cooley guided all



resolve guided and my intraoperative graft preservation protocols.¹ Our understanding of these subjects has certainly advanced, but this basic knowledge can still inform our practices today.

- ractices today.
- **A.** For why the other answers are wrong, you have to follow this short logic trail... Normal saline actually contains more Na⁺ than inside the cells of the graft so soaking grafts in saline would cause an influx of Na+, which would then cause cellular swelling and osmotic imbalance, potentially damaging the grafts, so B is wrong. When the grafts lose ATP (their energy source) after being removed from the body, they resort to the lactic acid cycle to cope, potentially leading to acidosis, which would damage the cell. Buffering protects against this, but normal saline does not have buffering agents, so C is not correct. Normal saline mimics the extracellular conditions at normal temperatures (i.e., 37°C or 98°F), but is not well-suited to the hyperosmosis of lower temperatures, so D is not correct either, leaving A the "last man standing!" (But "A" does not get to drink a shot at the IAHRS Gala!)^{2,3}
- 3. **B.** Hypothermia (and lack of ATP) closes the Na+/K+ pumps. Buffering protects the cells from acidosis. Impermeant molecules, an intracellular-like osmotic balance, and ATP all help to prevent cell damage during cold storage.
- 4. **C.** Lactated Ringers and Plasma-Lyte are both buffered, but only HyperThermosol contains impermeant molecules as well.
- 5. **D.** Overall, we are looking to INCREASE energy (ATP) and oxygen, and DECREASE temperature (in most cases) and free radical creation.
- 6. **C.** Grafts should not become dessicated if immersed in normal saline! Sorry, trick answer there. Graft warming from surgical lighting used to be discussed as a significant risk for linear harvested surgeries, but the advent of LED lighting for both types of surgery means that this is really not a risk factor at all anymore. All hair surgeries have transections, but FUE has a higher RISK at the time of removal due to the blinded nature of the excision process.
- 7. **B.** I had to learn this one so I would not be surprised if any other readers got it wrong. B is the answer, even outside of hair transplantation! (What? There is medicine outside of hair transplantation...?) I made everything else up just to have answers that would confuse people.
- 8. **B.** Basically, if you freeze tissues or thaw tissues slowly, it does less damage. Cold shock protein formation would not happen if the grafts were nearly instantly frozen, and metabolism is lower at lower temperatures, so C is incorrect. Grafts warmed by being placed on a gloved finger before implantation are at risk mostly for dessication, but it sounded plausible so I included it as an answer to see if I could get some of you readers out there to "bite."

- 9. A. This one took a bit of reading, so let me tell you why the other answers are wrong. Obviously, water crystal formation would damage the cells but at 0°C, not 2-8, so D is not correct. B is wrong because pump activity cessation at the lower temperatures actually helps to preserve the cells in the graft because it stops using up the energy (i.e., the ATP) in the cell, which makes the energy last longer and allows the cell to avoid switching to the lactic acid cycle to compensate. Following the same logic thread, lactic acid production happens later in the process if the holding solution is chilled, so C is incorrect.⁴
- 10. B. In the final analysis, hydration is key. Out-of-body time will affect graft survival, but the grafts will not survive at all if left unhydrated for several minutes. Transected grafts can grow at low rates depending on where the transection takes place (40-60% [Unger text reference]). Chilled grafts in optimized storage solutions for 5 days (HypoThermosol ± liposomal ATP) have been shown to grow at rates between 44% and 72%.⁵
- 11. **A.** This is the reason tissue preservation science has historically resorted to hypothermia (since the 1930s!). Graft rigidity, while funny to think about, has little actual relevance. Hypothermia preserves ATP levels within the CELLS of the graft, not the storage solution! Finally, cold shock protein formation is a disadvantage for tissue viability.⁵
- 12. **C.** Just to see if you learned your lessons in the last question, this is the same information asked in reverse!
- 13. **A.** Enzymatic degradation and lactic acidosis cause graft injury during storage and neovascularization is one of the initial stages of a graft's recovery.

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(Thank you to Dr. Aby J. Mathew for help with references, Dr. William Parsley for his insights and pre-editing, and Dr. Marco Barusco for his 2013 lecture on this topic!)

Literature Review



Aditya K. Gupta, MD, PhD, FISHRS | London, Ontario, Canada | agupta@execulink.com

Genetic Indicator for Frontal Fibrosing Alopecia

Tziotzios, C., et al. Genomewide association study in frontal fibrosing alopecia

identifies four susceptibility loci including HLA-B*07:02. *Nature Communications*. 2019(Mar 8); 10(1):1150.2019(Mar)

Frontal fibrosing alopecia (FFA) is an inflammatory scarring alopecia that was first described in 1994. FFA primarily affects women, typically of post-menopausal age, and is presently understudied. A recent work by Tziotzios et al has shed light on the potential genetic predisposition to the disease.

The study conducted genome-wide genotyping with Illumina deep sequencing array technology to analyze roughly 8 million common gene variants per patient. Two cohorts were utilized consisting of 844 FFA female cases and 3,760 female controls, and 172 FFA female cases and 385 controls, respectively. They identified four genes, each containing a single nucleotide polymorphism (SNP) common to women with confirmed FFA. The first gene identified, CYP1B1, encodes the cytochrome P450 1B1 enzyme responsible for metabolizing drugs, synthesis of cholesterol, some lipids, and steroids. The second was ST3GAL1, which encodes a galactoside sialyltransferase that plays a role in T-cell homeostasis. The third was SEMA4B, which encodes semaphorin-4B, related to axon growth restriction. The fourth gene they identified was HLA-B*07:02. HLA-B is one of the three MHC class I molecules in humans. The MHC class I molecule is responsible for presenting self-antigens to the immune system permitting identification of potential intracellular infection. Strikingly, HLA-B*07:02 conferred a five-fold increase in the risk of FFA. The authors speculate that HLA-B*07:02 may be causing the hair follicle to incorrectly present autoantigen resulting in auto-inflammatory lymphocytic attack of the hair follicle bulge and associated stem cells, effectively killing the follicle.

Comment: Immunological and genomic work, as presented here, greatly improves our understanding of these difficult to treat autoimmune-mediated alopecias. Understanding the dysfunction at a genetic and biomolecular level facilitates the design of inhibitory biologic inhibitors (i.e., antibodies) for the treatment of autoimmune disease. The determination of the molecular mechanism for FFA and other autoimmune alopecias are greatly facilitated by this work. The results presented in this study open up the potential for early screening for the illness prior to the onset of symptoms, and thus the initiation of treatment improving outcomes.

Postchemotherapy Alopecia

Freites-Martinez, A., et al. Assessment of quality of life and treatment outcomes of patients with persistent postchemotherapy alopecia. *JAMA Dermatol*. 2019(Mar 6). doi: 10.1001/jamadermatol.2018.5071. [Epub ahead of print]

Treatment-induced alopecia for severe diseases such as cancer can have a detrimental effect on patients further harming their psychological well-being. Patients undergoing cancer treatment either by chemotherapy or by endocrine therapy can experience alopecia. However, endocrine therapy–induced alopecia (EIAC) is generally more moderate than persistent chemotherapy-induced alopecia (pCIA) in severity of hair loss. The effect on the quality of life (QOL) of patients experiencing EIAC and pCIA has not been directly compared.

Freites-Martinez et al. performed a retrospective study on 98 women with pCIA and 94 women with EIAC. They found

that, of the patients experiencing pCIA, 82% had been treated with taxanes while the patients experiencing EIAC had, most frequently, been treated with aromatase inhibitors (62%). Diffuse alopecia was associated with pCIA in 41% of patients and 25% with EIAC. Grade 2 hair loss severity was more frequent in the pCIA patient group than the EIAC group (39% versus 13%). Both pCIA and EIAC had subgroups that received topical minoxidil 5%, which resulted in an improvement of negative emotional effects in 67% and 76% of pCIA and EIAC patients, respectively.

Comment: Hair remains a crucial component of one's self-identity. The physician's role in the treatment of alopecia comorbid to systemic treatment of cancer should not be underestimated. The data here reveal how important hair is to patients facing otherwise life altering disease. The finding that taxanes are most associated with pCIA may not influence use but may require more extensive management. Comprehensive management of these cases includes not only dermatologic follow-up of alopecia but also psycholog-ical care.

Maintaining Healthy Hair and Scalp to Improve Growth: Are Sulfate Surfactants Harmful?

Lawrence Samuels, MD | Chesterfield, Missouri, USA | samuelsmd@aol.com

Disclaimer: The author declares that he has developed a commercially available shampoo that is pH adjusted based on the available science.

I feel it is important for the hair transplant surgeon to understand the real science behind sulfates and the claims made by the all-organic, natural, sulfate-free shampoos with no science to support their claims. I am a board-certified dermatologist and have learned not to attribute to malice what is adequately explained by a lack of knowledge. This one is a misunderstanding, and below are the facts.

Media pressure has created the mystique of "sulfate-free" shampoos as being healthier and organic even when that is not the case. An unfounded rumor that sulfates cause cancer and sulfate-free shampoos promise softer, cleaner hair by means of more natural ingredients continues to perpetuate incorrect information with no scientific support. What you can really expect from a sulfate-free shampoo is a higher price tag and inferior cleansing ability. Let's take a closer look at this controversy.

The scalp and hair create more dead skin cells, oil, dirt and bacteria than other body areas due to the large number of hair follicles, glands, and surface area. It is important for your shampoo to cleanse the scalp of dead skin cells, dirt, bacteria, oil, and metabolic toxins. Daily cleansing that maintains the normal acidic scalp and hair pH is essential for a healthy scalp and normal hair growth.

The scalp and hair have a pH of 4.5 ± 0.5 . Maintaining the normal pH of the scalp and hair is important for normal structure and function of the scalp skin and hair follicles with the associated matrix cells and glands. Most shampoos contain derivatives of sulfates, namely sodium lauryl sulfate (SLS) and sodium laureth sulfate (SLES). Both are derived from coconut oil and are lathering agents. Shampoos containing these types of surfactants give a nice foamy lather when you use the products. Yes, they contain sulfate. However, there is no scientific evidence that sulfate surfactants are harmful. There is no data identifying harmful quantities of sulfates, and reputable companies use the FDA-approved levels of sulfates.

Sodium lauryl sulfate is a chemical called a surfactant. SLS has emulsifying properties that allow it to bind with dirt and oil in your hair, and foaming properties that create lather. Careful and thorough rinsing is essential to make sure no shampoo remains in your hair.

Sulfates are responsible for the actual cleansing action of shampoo. Sulfate-free shampoos will not have this level of cleansing and could lead to dandruff and other associated problems. Therefore, a small amount of sulfate is important in your shampoo. This way, any irritation is minimized and cleansing is maintained. As noted earlier, for a shampoo to lather, it has to contain sulfates. Lauryl sulfate is made by joining sulfate and lauric acid.

Immediately after shampooing, the scalp and hair begin ac-

cumulating dead skins cells, dirt, oil, and bacteria. High-quality shampoos and conditioners containing sulfate surfactants can be easily formulated into pH-adjusted aesthetically pleasing products that perform well, cleaning the scalp and hair without skin irritation or dryness. The selection of appropriate surfactants and their concentrations are important for optimizing the health of the scalp and the growth of the hair.

These natural ingredients, sodium lauryl sulfate and its derivatives, are produced from natural coconut and palm oils; it is 100% safe for our skin. This plant-derived ingredient effectively helps to remove oil, dirt, and bacteria, without drying or irritating even the most sensitive skin. SLS and its sulfate relatives are also hydrophilic, meaning they are attracted to water, which enables them to dissolve more readily in water, thus providing superior rinse-ability!

To break this down even further, we need to discuss basic soap science. To make soap, you need vegetable oil or fat to be mixed with an alkaline ingredient. When this happens, a product that likes oil and water is created. Many surfactants are anionic, which means that they have a negatively charged ion. The soap molecule needs to be balanced by a positively charged molecule such as a sodium ion. Here is the breakdown of the ingredients in SLS:

- **Sodium** is what is called a counter ion, an ion that has the opposite charge to that of another ion in the same solution.
- **Lauryl** simply refers to a type of oil from the coconut that is 12 carbon units long (olive oil is made of oleic acid that is 18 carbons long).
- **Sulfate** refers to the water loving part of the molecule. Sulfur helps the portion of the molecule create more stable bubbles and softer lather.

I know it can be hard to know the difference between some of the ingredients in the shampoos and conditioners when you can't even pronounce half of them.

All of the sulfate surfactants mentioned above (including sodium lauryl sulfate) can be easily formulated into products that are aesthetically pleasant, perform well (clean without stripping or leaving residue), be very mild and non-drying, and have low irritation potential. The selection of appropriate surfactants is important, but low irritation products can only be achieved by optimized formulas.

On social media sites, you may read about SLS as a potential carcinogen. Unfortunately, social media has no editorial review before dissemination of information but carries the same weight if not more than our scientific publications. According to the National Institute of Neurological Disorders committee of The National Toxic Encephalopathy Foundation (NTEF), this is false. The NTEF reports that the Cosmetic Ingredient Review Committee, an independent review committee comprised of industry experts, performed a thorough investigation and published an opinion disputing this claim (https://www.cir-safety.org/ sites/default/files/imports/alerts.pdf).

Furthermore, a search of the NIH database shows no evidence that sulfates cause cancer. In addition, there is no substantiation of this information in referenced literature. In fact, most of the referenced material either does not exist or is more than 10 years old. The material available certainly does not support the fact that a simple sulfate molecule has mutagenic properties and any comments may have been based on misinterpretation as the author must be someone who did poorly in basic science courses. Your body itself produces sulfates from daily cell metabolism. Either someone misunderstood the work or someone is willfully deceiving the public. Several anti-sulfate sites offer sulfate-free products for sale and seem to have started the anti-sulfate propaganda. You are free to draw your own conclusions. However, it is my belief that there really is no sulfate debate. Rather, there is a plethora of misinformation and falsification of the facts. Unfortunately, our online world is full of this, and the consumer needs to recognize false information. One needs to be careful and consult those educated in the field and, in the case of sulfates, this would be physicians with a background in hair, scalp, and basic science.





Dear ISHRS Colleagues,

We're excited to announce that the project initiative that will drive the Awareness Campaign is underway! We are working with Ryan Saniuk of SAUCE Marketing Inc.

We have a tight timeline with many steps and deadlines that we have to adhere to for this campaign to be successful. In the beginning phase, **your support is of utmost importance** especially in items 2 and 3 in the list below (content submission and names of social media influencers).

The initial phases in the months of May and June are:

- 1. Development of branding, design, and messaging.
- 2. **Content submission**: We must receive pictures and videos of patients who have been negatively impacted by a bad hair transplantation procedure due to the unlicensed practice of medicine.
- 3. **Social media influencers**: We need to gather a list of your friends or colleagues who are in the hairstyling, fashion, personal fitness, or other similar "appearance"-focused industries as well as individuals who have a personal connection with a hair transplant. The criterion is that they have a minimum of at least 1,000 followers (micro-influencers) on Facebook, Instagram, Twitter, YouTube. (Not collectively)

WE NEED YOUR SUPPORT

- Submit your case studies of patients who had bad hair transplantation procedures due to the unlicensed practice of medicine. It could be the case (or not) that you are now repairing them. Send us just the pictures and unedited footage as we may use this content for aspects of the campaign for educational purposes or other.
- Submit to this link: ishrs.org/submit. Note: Maximum file size is 128 megabytes. If it is larger than that, please use https://wetransfer.com/ where you can submit up to 2 gigabytes for free. WeTransfer will ask for an email recipient. Please use awareness@ishrs.org. Make sure to include a note with your name so we know who it is coming from.



- Submit your signed patient release form with a copy of the patient's government issued identification. Download blank form here: https://ishrs.org/waiver/
- Send us names of potential social media influencers who you have a personal relationship with only. Do *not* send influencers to review who you cannot create a direct introduction to. You can do this by sending an email to awareness@ishrs.org with subject line "Potential ISHRS Influencer" and include in the body of the email links to their social media profiles.

NEW AWARENESS CAMPAIGN TAB IN MEMBER AREA

We created a new section in the member area that details all of the information in this newsletter including content submission guidelines, social media influencer guidelines, and social media tips. We made it easier for you with just one click. Log in and look for the tab titled "Awareness Campaign." Stay tuned for more!

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IMPORTANT INFORMATION ABOUT PATIENT AND PHOTOGRAPHER CONSENT FORMS & WAIVERS

Currently, our waiver is in paper form, but we will most likely move towards an electronic document with an e-signature where some type of additional identification will be needed. These will be distributed in the coming weeks.

Releases are critical when using or publishing patient photographs, even when the full face is not shown. Patients could argue that their injuries are so unique and identifiable that even though their face is not being shown, their injuries alone are recognizable. They could decide to sue the ISHRS and the doctor or staff member who took the photo, as well as the doctor's practice, for using their picture without compensation or authorization. Therefore, a signed release/waiver is essential to protect everyone involved (especially if you want to use a picture for advertising or commercial purposes).

A NOTE ABOUT THE CONTENT YOU SUBMIT

Quality and consistency of the type of content you get in today's content-driven world is vital. Therefore, to enhance the likelihood of you capturing the best content you can, Ryan may produce a video, with a micro-influencer, that would outline the best angles to take imagery from, how to properly position your patient, and more. If produced, this will be available soon in the member area.

A NOTE ABOUT THE SOCIAL MEDIA INFLUENCERS NAMES YOU SUBMIT

All submissions will be added to our micro-influencer list and vetted against the others based on industry, content quality, engagement, area of the world, etc. Then, depending on which campaign concepts are activated, we may look to you for a direct connection to the influencer you supplied.

We look forward to your involvement in this critically important project.



Sincerely,

Arthur Tykocinski, MD, FISHRS, President

Ricardo Mejia, MD, Chair, Ad Hoc Committee on Issues Pertaining to the Unlicensed Practice of Medicine Sharon Keene, MD, FISHRS, Chair, Communications and Public Education Committee Ken Washenik, MD, PHD, FISHRS,Vice-Chair, Communications and Public Education Committee Victoria Ceh, MPA, Executive Director

In Loving Memory of Joseph C. Gallagher, DO



I am saddened to report the death of our colleague, Dr. Joseph Gallagher, who died peacefully this past November. When I think of all of my interactions with Joe at innumerable ISHRS meetings and events over many years, I think of laughing. He had an incredible sense of humor, which was always turned on. Joe never made fun of anyone, but he found humorous things about people and situations that he described with a twinkle in his eye!

Joe had a long and distinguished career in medicine. He graduated from the Philadelphia College of Osteopathic Medicine (PCOM) and continued his training at the New Jersey College of Medicine and at Thomas Jefferson University Hospital. During the Vietnam War, Joe served as an Army Captain treating burn and trauma victims at the Brooke Army Medical Center. He was board certified in orthopedic surgery. He held positions of Director of Residency Training and Chief of Orthopedic Surgery for PCOM. He was elected President of the American Association of Osteopathic Surgeons (AAOS) in the early 1990's. In 1993, he was awarded Orthopedic Surgeon of the Year by the AAOS.

Joe loved his work as an orthopedic surgeon, but he felt that it was an enormous time commitment and he wanted to find something that would allow him to spend more time with his family. In 1994, he took an opportunity to do a one-year hair transplantation surgery fellowship under Dr. Michael Elliott in New York. He loved the creative and artistic nature of hair restoration surgery; this field would become his new professional passion.

Joe was a proud member of the International Society of Hair Restoration Surgery from 1994 until last year. He practiced in the Philadelphia area for the majority of his career and then moved his practice to Fort Myers, Florida. He never fully retired. He loved his work and continued working part-time as long as he could manage it alongside the cancer treatments.

Joe enjoyed life to the fullest. He loved telling stories and making people laugh. He considered friendships invaluable, called his profession his "hobby," and treasured his family. Joe was a patriotic and passionate man of faith who loved his work, his country, and his family.

Our sincere condolences go out to his family. May his memory be eternal!

Robert T. Leonard Jr, DO, 71SHRS

Warwick, Massachusetts, USA

Developments at the American Board of Hair Restoration Surgery

Daniel G. McGrath, DO | Austin, Texas | www.mcgrathmedical.com

Partnering with the ISHRS has always been a top priority for the American Board of Hair Restoration Surgery (ABHRS). A few years ago, we moved our examination process from Houston to the location and time of the ISHRS annual meeting to support and promote the meeting as best as we could. The ABHRS cherishes this relationship. We realize that our partnership is focused on setting the highest standards for hair surgeons, a goal that both organizations strive to achieve.

Along those lines, as president of the ABHRS, I thought it would be good to periodically inform the ISHRS readership of important developments at the ABHRS. Last year, we were able to raise approximately \$250,000 in our Capital Campaign, which has allowed us to elevate the ABHRS examination to the most rigorous level possible through the auspices of the National Board of Osteopathic Medical Examiners (NBOME). For more than 83 years, the NBOME has been recognized for international excellence in the arena of physician testing and evaluation such as the ABHRS certifying and re-certifying examinations. The NBOME provides competency and high-stakes assessment services in partnership with numerous health professions, specialty colleges, and certifying boards. We are pleased to announce that, starting in 2019, the ABHRS and the NBOME will work together diligently to protect the public by assessing competencies for hair restoration surgeons throughout the world. There is no other examination for hair transplant certification at this high a standard that possesses the potential to withstand legal and academic scrutiny.

In addition, the ABHRS stands arm in arm in the areas of academic focus that the ISHRS has striven to advance, such as the Black-Market Initiative (https://ishrs.org/bewarehtblackmarket/). We are actively promoting these important bilateral goals on our website and through other channels. We believe that maintaining the ABHRS standard at the highest level will translate into greater success for the ISHRS and vice versa. I would more than welcome any conversation, questions, or thoughts that you may have about the ABHRS and how we can continue to foster our relationship with the ISHRS and also how we can serve you, the public, and our diplomates.



The 2019 Exam will be held November 12 at the 27th ISHRS World Congress, Bangkok, Thailand *Application deadline August 1, 2019 | ABHRS.org



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Message from the ISHRS 2019 World Congress Program Chair

Robin Unger, MD | New York, New York, USA | drrobinunger@yahoo.com

The Bangkok meeting plans are underway. We had many excellent abstracts submitted

by physicians across the globe.

Confirmed invited speakers thus far include Drs. Grimalt, Dawson, Westgate, and Kwon. They will cover topics ranging from platelet-rich plasma (PRP) to adipocyte stem cells, to managing adrogenetic alopecia with medical therapy to hair cosmetics. We will present a balanced program aimed at both new and established hair restora-





tion surgeons, able to present their patients with options that are reflective of our growing and evolving field. Kapil Dua has created an amazing lineup for the live surgery workshop. And Brad Wolf is putting his finishing touches on the workshops.

This meeting offers a wonderful opportunity to expand your knowledge base, meet with good friends, and explore a new region. We hope to see a great turnout at this next ISHRS World Congress!

Wireless Follicular Dermatoscope New model now works on the iPad! Wirelessly Capture Pictures: \$450.00* Twelve distinct levels of polarization. Observes and records in real time (30 FPS). *When you mention this Forum ad. Transmits within a range up to 20ft. Built-in snapshot button. 126-FS-11 Real Personna Plus scalpel blades are back! 0 \bigcirc **Kenny Moriarty** Vice President top Cell: 516.849.3936 Kenny@georgetiemann.com www.atozsurgical.com

May/June 2019

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Getting to Bangkok: Advice from an Aviation Expert

A patient of mine is a nationally known aviation expert. I asked him some questions about international flights and buying tickets in general. -BW

Should reservations be made directly with the airline or through a third party?

I always prefer making reservations directly with the airline. Many times, the airline will make a mistake and load the wrong fare (one MUCH cheaper) and if you snag it, they will normally honor it. That will not happen with a thirdparty site. Plus, if there are any problems with the itinerary, having the reservation booked directly with the airline is a benefit. When booking through a third-party site, often seat assignments can get messed up and there is not much you can do about it.

Are seat assignments important?

When traveling internationally, it is very important to make certain your seat assignment is secured before you arrive at the airport. More people are flying now than ever before and the demand for travel is expected to double in the next 20 years meaning more oversold flights (when more passengers show up for a flight than the airline has a seat for). When this happens, passengers with no seat assignments are placed on standby until the gate agents can clear the passenger, so be sure you have some seat—any seat—reserved before the flight departs. Many travelers think they can simply have the gate agent "fix it," but if the flight is oversold, that will not work-so be sure to get any seat! This is especially true during times involving holiday travel. While you might think having a reservation is enough, this is no longer the case. To see all the seats on your airplane, go to seatguru.com. This website list the pros and cons of each seat.

How far in advance should a ticket be purchased?

Domestic tickets should be purchased at least 6 weeks in advance and international tickets at least 3 months before departure. But the sooner the better as the low fares often go fast and some reservations can be made 11+ months in advance.

What type of ticket is best to purchase?

I book our tickets well in advance and prefer the discount (nonrefundable) first class tickets. They are a big-time money saver and when we fly internationally, we spend much less. When we buy our tickets well in advance, we can snag one of the few discounted (nonrefundable) tickets for as much as half price round trip per person. You need to spend a number of days at the destination to qualify for these traveling internationally.

Do you have specific advice for tickets to Bangkok or Asia?

The best advice I have is to check the State Department website at travel.state.gov for travel advisories on any airlines or parts of countries that need to be avoided. They do a very good job keeping the site current.



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Review of HAIRCON 2019 AHRS 10th Annual Congress, India



Rachael Kay, MBChB | *Manchester, UK* | rach.kay80@gmail.com *Contributing author:* Anil Kumar Garg, MBBS, MCh, FISHRS | *Indore, India*

The Marriot Hotel, Indore, hosted HAIRCON 2019 from 8-10 February 2019. Indore, well-known as the heart of Madhya Pradesh, is a smart city with a royal past, and is reputedly one of the cleanest Indian cities. The conference was preceded by a morning live surgery workshop at Dr. Anil Garg's Rejuvenate Hair Centre, with 60 delegates in attendance.

Dr. Ramachandran, president, led the conference, supported by Drs. Garg (Organizing Chairman), Anil Dashore (Organizing Secretary), and Sandeep Sattur (Chairman of the Scientific Committee). The Scientific Committee consisted of Dr. Kapil Dua (Secretary) and members Drs. Mayank Singh, Sukhbir Singh, and Muthuvel Kumaresan.

Hair Restoration Beyond Scalp was the theme of the conference. The Scientific program was designed to explore newer vistas in augmenting donor capabilities, whilst simultaneously consolidating the basics.

The scientific program was brought to life by great contributions from the local and international faculty. Drs. Sanjiv Vasa, Ramachandran, Manoj Khanna, Rajesh Rajput, Mysore Venkatram, Sandeep Sattur, Narendra Patwardhan, Kapil Dua, Anil Garg, Aman Dua, Puli Reddy, Arvind Poswal, Pradeep Sethi, Arika Bansal, Sajal Halder, Mayank Singh, Sukhbir Singh, Muthuvel Kumresan, Seema Garg, and others were aided by their visiting counterparts: Drs. Robert True, Márcio Crisóstomo, Sanusi Umar, Roberto Trivellini, and Asim Shahmalak.

DAY 1

Aimed at all levels, the live surgery workshop focused on different harvesting techniques for both scalp and non-scalp areas, and how combining these can optimize the donor yield. It also showcased graft handling and implantation techniques.

Facilitators enabled the exchange of questions and answers between three operating theatres and delegates observing in the auditorium. Delegates were able to visit the operating rooms (ORs) so that they could observe the procedures in close quarters. Patient assessment, surgical planning, scalp FUT and FUE harvesting, along with body hair harvesting and implantation techniques were demonstrated.

The take home messages included the value of detailed patient assessment, patient counseling, method of surgery, choice of donor, graft handling and most importantly the ability to perform all types of donor harvesting necessary to be a complete hair surgeon.

The first afternoon reviewed the basics of hair restoration starting with hair biology and how it differs in scalp and body areas, the aesthetics of transplanting into non-scalp hair regions such as eyebrow and eyelashes, and finishing with how to assess a hair loss patient. Dr. Rachita Dhurat, our invited speaker, elaborated on the benefits and scope of using trichoscopy in patient evaluation. The second session touched upon the role of pharmacology in hair restoration. It reiterated the value of known agents like minoxidil and finasteride but also touched upon newer agents being inducted in the armamentarium of tackling hair loss. This was followed by the basics of surgical hair restoration including hairline planning and vertex restoration. Medical emergencies complicating hair surgery were also discussed.

The day concluded with the panel discussion "Will you prescribe Finasteride to your patients?" moderated by Dr. Sandeep Sattur and with panelists Drs. True, Rajput, Khanna, Dhurat, and Venkataram. The discussion noted that finasteride is indeed an effective drug, however, proper education and counseling is imperative. It was reiterated that more studies need to be conducted to ascertain whether persistent adverse effects do really occur and if so, why.

The conference was then formally inaugurated by Dr. Ramachandran by lighting the traditional lamp. The highlight was the oath taken by everyone present—including the international faculty, national faculty, invited speakers, and delegates— stating that we would adhere to the highest standard of ethical practice and would not support or indulge in ghost surgery by technicians

DAY 2

Dr. Sanjiv Vasa started the day. He emphasised the links between stress and hair loss, and the importance of holistically managing a patient when stress remains a factor. An entire session was then dedicated to strip (FUT) surgery. Dr. Khanna provided tips and tricks to improve outcomes with FUT, while Dr. True indicated the relevance of this technique in hair restoration practice today. Dr. Mayank discussed how yield can be optimized by combining both surgical methods, FUE and FUT. All surgical procedures have complications and Dr. Atodaria mentioned those associated with strip harvest. One of the complications is a wide donor scar and Dr. Soni talked about various methods of dealing with this.

Dr. Venkataram explained the physics of FUE. Dr. Kapil Dua then educated the delegates on how, when, and why to select FUE punches. Not all patients may be ideal candidates for FUE, and the FOX test helps reveal this subset of patients. Dr. True spoke on dealing with those cases that were FOX negative. Dr. Aman Dua provided an overview of various motorized and robotic devices as well as cases where FUE would be contraindicated. Harvesting with FUE is one part of the story but handling of these delicate grafts, and implanting them atraumatically, is equally important in achieving a good outcome. Dr. Anil Garg spoke on this aspect of hair transplantation. Next was a detailed discussion on the use of beard hair, including practical harvesting tips, anaesthesia, and strategies to improve coverage of larger areas with beard follicles.

The other commonly used non-scalp area for hair restoration is the torso. This requires a proper understanding of cutaneous nerve supply to this region and also the orientation of hair in this region. The speakers for this session were Drs. Sanusi Umar, Arika Bansal, and Arvind Poswal. They spoke on techniques for anaesthesia in this region, tips and tricks for better yield, and complications associated with chest hair harvesting.

The talks then focused on restoring hair to facial areas, such as eyebrows, eyelashes, beard, and moustache. This session had the following speakers: Drs. Poswal, Mayank Singh, Sukhbir Singh, Crisóstomo, and Aman Dua.

An interesting session on managing difficult cases followed. In our practice, it is not uncommon to see a patient with depleted scalp donor area (hair transplant cripple) or with medical co-morbidities, female patients with advanced hair loss, or a young patient with a large area of vertex hair loss. The speakers for this session—Drs. Sajal Halder, Kapil Dua, Anand Joshi, Kumarasen, and Agarwal—threw light on how they manage these difficult cases. The session concluded with an invited lecture on using

hairpieces and their place in the treatment armamentarium. The invited speaker for this talk was Dr. G. Govindraj, an Oncologic Surgeon from India.

The ISHRS Black Market statement was reiterated by the AHRS, the India pledge taken on the preceding evening, saying no to using technicians to perform steps of hair transplantation that they are legally not allowed to do. This talk was delivered jointly by Drs. True and Kapil Dua.

The scientific session proceeded towards an advanced level. This session provided a window to the possibilities in restoring hair in advanced cases of hair loss. Combining FUT with FUE (or scalp FUE with non-scalp) to optimize coverage in cases of advanced hair loss was discussed. Long hair transplantation and its advantages and place in hair restoration were integrated into this session. Speakers included Drs. Anil Garg, Crisóstomo, Trivellini, Pradeep Sethi, Sanusi Umar, and Ramachandran.

The concluding session of the day was a panel discussion, "Poor Results—Dissecting Causes and Suggesting Solutions to Avoid the Same," moderated by Dr. Mysore Venkataram and with panelists Drs. Kapil Dua, Ramachandran, Crisóstomo, Sanusi Umar, and Anil Garg. The panel brought about a stimulated discussion on causes of poor results and how to deal with them. More importantly, the virtues of proper patient assessment, patient counseling, a good









sense of aesthetics in planning, and use of proper technical skills were highlighted.

The second day ended with the Gala dinner. This was an opportunity for the delegates to mingle with faculty and speakers and discuss a variety of hair restoration topics in an informal setting.

DAY 3

Breakfast with Experts opened the day. Topics included Scalp FUT, BHT, FUE, Combination of FUT + FUE, recipient area planning and management, punches and instrumentation for FUE, nutraceuticals, hair cosmetics, medical management, stem cell therapy, optimizing growth in hair transplant, PRP, complications, and hairline design. Members of the national and visiting faculty were available for discussion.

Next was the free paper session, which gave a platform for young hair restoration surgeons in the country to present their work and innovations.

This was followed by a sponsored session by Dr. Poswal on instrumentation in FUE.

Platelet rich plasma (PRP) and low level laser therapy (LLLT) have become very popular in the field of hair restoration. The next session attempted to analyze the scientific basis and evidence for PRP treatment, assess how optimizing the holding solution can optimize graft growth, and

how LLLT can help patients. Speakers included Drs. Rajesh Rajput, Vasan, Sukhbir, Seema Garg, and Shuken Dashore.

Managing a patient with hair loss requires some knowledge of scalp pathology. Objectives of this session were to familiarize the hair surgeon with hair loss disorders and dermatological conditions of the scalp, including non-androgenetic causes of hair loss, and more importantly, how to recognize when hair restoration surgery is indicated and contra-indicated. Speakers were Drs. Manjot, Patwardhan, and Mysore Venkatram.

The conference ended with the Quiz program, which was sponsored by the pharmaceutical company IPCA. The quiz was planned with preliminary rounds conducted in the medical colleges with 307 groups and 614 postgraduate students registered. The final 4 teams were shortlisted and the quiz took place on 10 Feb 2019. Dr. Mayank Singh organized the quiz and conducted it as the quiz master in 6 rounds comprising of trichoscopy, histopathology, instrumentation, FUE hair transplant, complications, and rapid fire round. Winners of HAIRCON 2019 Final PG quiz 2019 were Drs. Sumneet Sandhu and Anwita Sinha.

2019 Meetings Calendar

Please follow this link to a listing of upcoming HRS meetings: https://ishrs.org/upcoming-events/

2019 ISHRS directly sponsored/supported meetings:

August 2-4, 2019

Hair Transplant 360 Cadaver Workshop & FUE Hands-on Workshop In collaboration with the International Society of Hair Restoration Surgery *St. Louis, MO, USA* http://pa.slu.edu For more information: pa@slu.edu

September 7-8, 2019

International Trichology Congress Sponsored by: International Trichology Congress with support of the International Society of Hair Restoration Surgery Museum of Science and Industry *Manchester, UK* For more information: info@trichologycongress.com November 13-17, 2019

27th World Congress & World Live Surgery Workshop of the ISHRS Bangkok, Thailand For more information: www.27thannual.org



The ISHRS is the leader in high-quality education for hair restoration surgeons. The ISHRS has achieved the highest level of accreditation to organize education for physicians from the renowned Accreditation Council for Continuing Medical Education.

Plan your 2019 meeting schedule!

2019 Qualifying Meetings for Member Educational Maintenance Requirement

As a reminder, there is an educational maintenance requirement for the membership categories "**Member**" and "**Fellow Member**." This does not apply to membership categories Associate Member, Resident Member, Emeritus Member, or Surgical Assistant Member.



EDUCATIONAL MAINTENANCE REQUIREMENTS

ISHRS Member and ISHRS Fellow Member membership categories must attend one ISHRS-approved meeting every 3 years, otherwise that member will be changed to Associate Member. The impacted member may revert back to their previous category after attendance at an ISHRS-approved meeting.

2019 QUALIFYING MEETINGS

August 2-4, 2019 Hair Transplant 360 Cadaver Workshop & FUE Hands-on Workshop St. Louis, Missouri, USA http://pa.slu.edu November 13-16, 2019 27th World Congress & World Live Surgery Workshop of the ISHRS Bangkok, Thailand www.27thannual.org

The qualifying meetings are also listed at

https://ishrs.org/physicians/list-ishrs-approved-meetings-meet-additional-minimum-educational-requirement/







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New start up clinic in St. Louis, MO is seeking an experienced hair transplant surgeon. Must be eligible for a Missouri medical license and willing to travel to our clinic 2-5 consecutive days per month. This is a great source of supplemental income to your existing practice. Please email your résumé to gakreyling@hotmail.com.

Seeking Experienced Hair Transplant Physician

Busy Hair Transplant practice is seeking Hair Transplant Surgeon experienced in FUT and FUE procedures for our New York location. We provide an excellent compensation and benefits package with equity and ownership opportunity. Please send CV to gillian@zieringhair.com and anthony@zieringhair.com.

Seeking Experienced FUE Harvester

Busy Hair Transplant Practice in Beverly Hills and Newport Beach seeking experienced Nurse Practitioner to perform FUE harvesting. Must be proficient in hand-held non-robotic SmartGraft, NeoGraft and SAFE system FUE harvesting and willing to travel between locations. We provide excellent compensation and benefits package.

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Calendar of Hair Restoration Surgery Events

http://www.ishrs.org/content/upcoming-events

DATES	EVENT/VENUE	SPONSORING ORGANIZATION(S)	CONTACT INFORMATION
* AUG 2-4, 2019	11th Annual Hair Transplant 360 Cadaver Workshop & FUE Hands-On Workshop <i>St. Louis, Missouri, USA</i>	Saint Louis University School of Medicine, Practical Anatomy & Surgical Education In collaboration with the International Society of Hair	pa@slu.edu
		http://pa.slu.edu	
AUG 9-11, 2019	4th Annual Congress of the CAHRS Guangzhou, China	Chinese Association of Hair Restoration Surgery (CAHRS)	www.cahrs.com.cn cahrs_info@126.com
SEP 7-8, 2019	International Trichology Congress Museum of Science and Industry <i>Manchester, UK</i>	International Trichology Congress With support of the International Society of Hair Restoration Surgery	info@trichologycongress.com www.trichologycongress.com
SEP 11, 2019	Second Cairo Hair Transplantation Course Nile Ritz Carlton Hotel Cairo, Egypt	Arab Association of Hair Transplantation (AAHT)	esprs@hotmail.com
* NOV 13-17, 2019	27th World Congress of the ISHRS &	SHRS & International Society of Hair Restoration Surgery	www.27thannual.org
NOV 13-16, Congress NOV 16-17, WLSW	Bangkok, Thailand	www.27thannual.org	
MAR 19-22, 2020	ISHRS Regional Workshop: Cowgirl Hair Loss Workshop—Art & Perfection, Female Hair Loss <i>Houston, Texas, USA</i>	International Society of Hair Restoration Surgery Hosted by Carlos J. Puig, DO, FISHRS	cpuig@hairdoctexas.com

* 2019 meetings that qualify for the ISHRS member educational maintenance requirement

REMINDER

ISHRS full **Members** and **Fellow Members** are required to attend 1 ISHRS-approved meeting every 3 years to maintain their member category.

ISHRS WORLD CONGRESS SCHEDULE

27TH WORLD CONGRESS

November 13-17, 2019 Bangkok I Thailand

28TH WORLD CONGRESS

October 21-25, 2020 Panama City I Panama 29TH WORLD CONGRESS

October 2021 Europe

INTERNATIONAL SOCIETY OF HAIR RESTORATION SURGERY

Vision: To establish the ISHRS as a leading unbiased authority in medical and surgical hair restoration.

Mission: To achieve excellence in medical and surgical outcomes by promoting member education, international collegiality, research, ethics, and public awareness.

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Editorial Guidelines for Submission and Acceptance of Articles for the *Forum* Publication

- 1. Articles should be written with the intent of sharing scientific information with the purpose of progressing the art and science of hair restoration and benefiting patient outcomes.
- If results are presented, the medical regimen or surgical techniques that were used to obtain the results should be disclosed in detail.
- 3. Articles submitted with the sole purpose of promotion or marketing will not be accepted.
- 4. Authors should acknowledge all funding sources that supported their work as well as any relevant corporate affiliation.
- 5. Trademarked names should not be used to refer to devices or techniques, when possible.
- 6. Although we encourage submission of articles that may only contain the author's opinion for the purpose of stimulating thought, the editors may present such articles to colleagues who are experts in the particular area in question, for the purpose of obtaining rebuttal opinions to be published alongside the original article. Occasionally, a manuscript might be sent to an external reviewer, who will judge the manuscript in a blinded fashion to make recommendations about its acceptance, further revision, or rejection.
- 7. Once the manuscript is accepted, it will be published as soon as possible, depending on space availability.
- 8. All manuscripts should be submitted to forumeditors@ishrs.org.
- A completed Author Authorization and Release form—sent as a Word document (not a fax)—must accompany your submission. The form can be obtained in the Members Only section of the Society website at www.ishrs.org.
- 10. All photos and figures referred to in your article should be sent as *separate* attachments in JPEG or TIFF format. Be sure to attach your files to the email. Do NOT embed your files in the email or in the document itself (other than to show placement within the article).
- 11. Images should be sized no larger than 6 inches in width and should be named using the author's last name and figure number (e.g., TrueFigure1).
- 12. Please include a contact email address to be published with your article.

Submission deadlines:

June 5 for July/August 2019 issue

August 5 for September/October 2019 pre-meeting issue October 5 for November/December 2019 issue

December 5 for January/February 2020 issue

Please note submission address: forumeditors@ishrs.org

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Submit your Classified Ad to: cduckler@ishrs.org



NOV 13-16 27TH WORLD CONGRESS



WORLD LIVE SURGERY WORKSHOP | NOV 16-17

Plan to Attend

General Outline, so you can plan your travel		
TUESDAY November 12, 2019	Ancillary Meeting: ABHRS Exams	
WEDNESDAY November 13, 2019	Pre-Congress Courses: Basics Course Advanced/Board Review Surgical Assistants Program Half-Day Course	
THURSDAY November 14, 2019	I General Session I Live Patient Viewing I Welcome Reception	
FRIDAY November 15, 2019	I Discussion Table Topics I General Session I Workshops I M&M Conference	
SATURDAY November 16, 2019	General Session until noon World Congress ends at noon WLSW: Triple Crown begins (SMP) at the hotel when the World Congress ends Gala! in the evening	
SUNDAY November 17, 2019	WLSW: Triple Crown hospital all day	

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