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Scalp Micropigmentation: Semantics, Terminology, and Standards

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*Disclosure: Dawn Forshaw is founder of the Finishing Touches Group and has financial interests in companies that manufacture SMP needles, machines, and pigment colours as well as in SMP training.

Scalp Micropigmentation (SMP) is a procedure that is used to create the illusion of shaved hair, stubble, or greater density in hair-bearing areas that have lost hair or require augmentation. It is becoming more popular around the world, and its value to hair restoration surgeons is demonstrated by the ISHRS including it alongside Follicular Unit Excision (FUE) and Follicular Unit Transplantation (FUT) at the Triple Crown World Live Surgery Workshop.

SMP is a relatively new technique and along with the methodology, the terminology is evolving. Although it is different from Permanent Makeup (PMU) and Semi-Permanent Makeup (SPMU), it has evolved from these procedures. Similar to what is happening with the FUE black market, new terms are continually being coined to try and create a business advantage in a competitive market. Therefore, it would be prudent for ISHRS members to educate themselves on the semantics involved in this field and to agree on terminology.

As in other parts of the world, the number of practitioners and salons/clinics offering SMP in the United Kingdom is rapidly increasing. In March 2019, the British Association of Hair Restoration Surgery (BAHRS) recognised the importance of these professionals by creating a specific affiliate membership category for Scalp Micropigmentation Practitioners (SMPPs).¹ In doing so, it was recognised that there were no professional standards for SMPPs in the UK and, even amongst experts in the field, there was confusion about semantics and terminology. A document was therefore required to provide guidance to the BAHRS membership so that communication could be standardised.

The first item to clarify was the relationship between the terms “scalp micropigmentation” and “tattoo” since both are used to identify the same procedure—the implantation of ink or pigment colours into the scalp skin; however, differences have been suggested based on the equipment and medium used.

People use the terms “semi-permanent micropigmentation” and “micropigmentation tattooing” even though the word “micropigmentation” does not yet exist in the Oxford Dictionary and “pigmentation” is classified as a mass noun and defined as “the natural colouring of animal or plant tissue.” Since the words “pigment” and “tattoo” can be used as either a noun or verb, could the word “micropigment” also be used as a noun or a verb? The Oxford Dictionary defines the verb “tattoo” as “mark (a part of the body) with an indelible design by inserting pigment into punctures in the skin.” Although the Oxford dictionary defines “indelible” as “making marks that cannot be removed,” we know from clinical practice that tattoos are not, in fact, indelible because they can be removed with laser treatment. So is it still a contradiction to say “semi-permanent tattoo”?

In the UK, different insurance coverage is required to perform SMP than to tattoo, and insurers make the differentiation based on the equipment used according to the manufacturer’s instructions. This separation will become more difficult with the development of hybrid machines.

In English vernacular, tattooing (as done for artistic body adornment) tends to imply a permanent procedure whereas micropigmentation can be performed to achieve a short-, medium-, or long-term result.

Matters are further confused as tattoo mediums are often called “inks” whereas micropigmentation mediums are called “pigments” or “pigment colours.” However, there is no scientific basis to this. The

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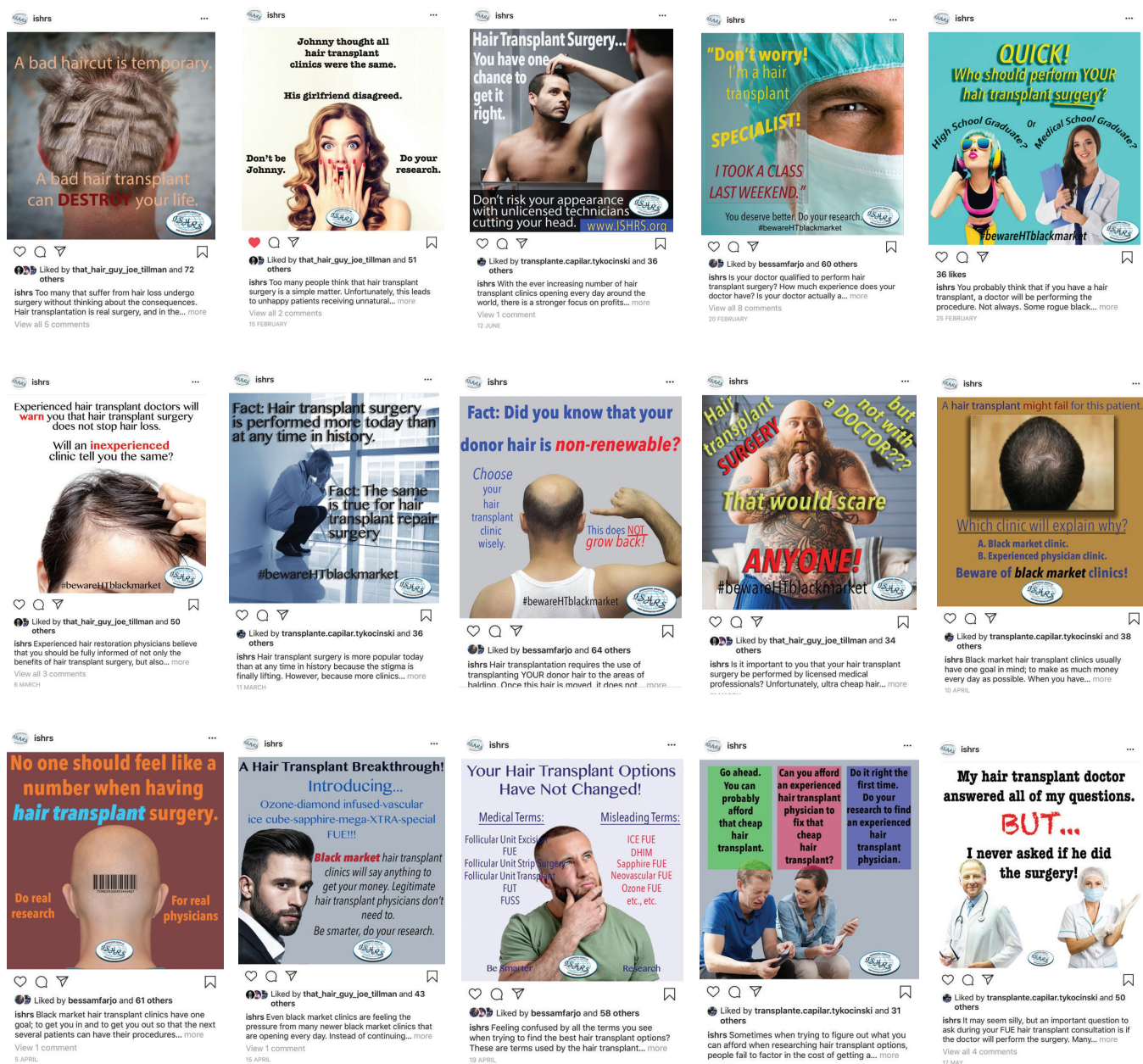
President's Message

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Have you seen these Instagram posts? Please, share them.

If you did, we hope you liked them. But if you didn't, it's OK: these posts are not targeted for you, but for young guys around 25-35 searching for a budget hair transplant. These young men are being massively trapped by unscrupulous clinics and fake influencers...and they are being harmed. Getting their attention is not an easy

task. They live in a different world than most of us! So to get their attention, we have to be innovative, bold, and provocative. It is always risky to get out from the comfort zone, but we decided it was necessary to reach this segment of the public. This is not about my taste or your taste, but rather, the "young" taste. In my opinion, Joe Tillman did a great job creating these Instagram posts. ■



Co-editors' Messages

Andreas M. Finner, MD, FISHRS |
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Nobody said it was easy. This phrase describes our current situation in hair surgery in several ways.

It applies to the medical part of our specialty. Harvesting viable follicles and transplanting them in a natural, long-lasting fashion remains a challenge. This issue includes the carefully prepared ISHRS's FUE Advancement Committee's submission, "FUE Clinical Practice Guidelines" (page 139). This popular harvesting technique requires a highly skilled hair surgeon to avoid follicle damage and donor area depletion. Several new instruments allow for individual adjustments to hair and scalp characteristics.

But let's keep in mind that FUE alone may not be the optimum solution for all of our patients. A combination with linear excision and microscopic graft dissection (FUT) may increase hair yield and help to avoid overharvesting. This is especially true in patients with a limited safe donor area, fine hair, or fanned-out FUs who require large graft numbers and have no desire to wear their hair short. Every hair surgeon should counsel their patients about the pros and cons of both established harvesting techniques and ideally master both methods.

It is also not easy for us to get our message out: hair restoration requires professional knowledge. A hair transplant done wrong may lead to complications, poor growth, and unaesthetic results—and it will be difficult to correct. Minimizing scars is possible; some hints can be found in Sara Wasserbauer's quiz. Scalp micropigmentation may help to camouflage the scalp and scars, if done correctly.

Let's not forget that androgenetic alopecia is a progressing hair disorder, as outlined in Russell Knudsen's Controversies column. Therefore, hair surgery is only one part of a concise master plan involving hair medications and procedures to stabilize the alopecia. PRP is gaining popularity and there is a scientific base for it, as mentioned in Nicole Roger's literature review. If we want to be more than just hair mechanics, we should provide combination treatments and long-term care.

How do you communicate to the public and patients? What experience can you share with your colleagues? Do you want to publish an article about a talk that you are about to give in Bangkok? Send your contributions to forumeditors@ishrs.org. ■



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Congratulations to the ISHRS FUE Advancement Committee, chaired by Jim Harris, for its submission, "FUE Clinical Practice Guidelines" (page 139). In the 15 years I've been performing FUE, I've moved from a crude Miltex biopsy punch, to sharp

punches, then to dull, hybrid, and trumpet punches. Sharp punches are the least forgiving and require exact aim and depth, while unsharp punches are gentler to the follicles. Because this is a blind procedure, the most important sensation guiding the physician is RESISTANCE. With sharp punches, there is little to no sensation of the resistance that is felt with the non-sharp punches. Minor differences in resistance allow me to make the minute adjustments that guide me to the correct angle and depth. With experience, you can feel the smooth, lack of resistance—like an arm going through a well fitted sleeve—and know you have the correct angle. Angles and depths change in different areas of the scalp and from patient to patient. Small corrections must constantly be made. FUE is certainly the most difficult procedure a hair restoration surgeon performs, and it will continue to be a challenge until a zero transection rate is achieved.

The crucial issue we face is unlicensed assistants performing surgery. The Ohio Administrative Code of the State Medical Board states that "to delegate" means "to transfer authority for the performance of a medical task to an unlicensed person." However, it is illegal to delegate the practice of medicine. There may be jurisdictions where it has been construed that FUE can be delegated, but this has been rightly deemed unethical.

While perusing the internet, I came upon the website of a plastic surgeon who offers NeoGraft hair transplants. He states on his site that his procedure is done by a "certified NeoGraft provider." He also states the procedure will "grow perfectly natural hair," "there is no scarring," and "NeoGraft is non-surgical." In addition, he says that "with NeoGraft, there's no incisions so there's no healing and no hair loss." It's amazing that such misinformation (and poor grammar) is tolerated from a well-trained board-certified plastic surgeon in a major metropolitan U.S. market, who obviously knows very little about hair transplantation. This showcases how the Black Market comes in many forms and is a plague that is rapidly spreading everywhere and to all levels of our specialty.

In Hair's the Question, Sara Wasserbauer tackles another important issue: scarring. It has been my experience that "surgical hair loss" created from hair transplant procedures is the most common type of hair loss, after AGA. Wide donor scars from strip excision (FUT) helped lead to the popularity of FUE. We should all be dedicated to creating as little scar tissue as possible anytime we invade the scalp. We thank Sara for her continued well-written and timely contributions.

Congratulations to Jeff Epstein and Aditya Gupta who will succeed Andreas and me as co-editors beginning in 2020. ■

medium used, that is, the ink or pigment colour, may affect the permanency of the treatment although depth of insertion and particle size can also affect whether the scalp colour will fade. Mediums referred to as “inks” are often carbon-based products that can be diluted to the required shade for the particular patient treatment. They are more resistant to ultra-violet (UV) light, so might remain visible in the scalp longer. Carbon-based mediums are referred to as “organic” and they are generally thought to have smaller particle sizes compared to “inorganic” mediums. Both organic and inorganic mediums are taken up by macrophages resulting in retention in the skin. In this context, organic versus inorganic has nothing to do with healthy lifestyle choices but is related to the chemical constitution of the medium used in SMP and tattooing. The majority of mediums referred to as “pigments” are metallic-oxide-based products with multi-layered colour compounds to generate the different tones. The mixed pigment colours created for micropigmentation are less resistant to UV light and this can contribute to the scalp colouration changing or fading over time. “Inorganic” refers to products made of metallic compounds and salts such as chromates, sulphates, and metallic oxides including iron oxides.

In practice, both organic and inorganic mediums can be used in tattoo machines and SMP machines. Matters are further confused with the practice of mixing organic and inorganic mediums. There are also differences between the needles used for SMP and tattoos and cartridges should be used that prevent the potential backflow of blood.

TRAINING

The next issue for the BAHRS to define was the training required for a BAHRS SMPP affiliate member. Since SMP requires knowledge about the scalp and diseases, it was agreed that training in micropigmentation to other body areas would not be adequate and an awarding organisation (AO) accredited Level 4 qualification² specifically in SMP would be required. Since SMP in the UK is most often done by people with no medical training, applicants are required to have completed a Blood Borne Pathogen Course, or the equivalent, to have a certificate in First Aid, to have a certificate in Basic Life Support, and to keep themselves up to date with developments in the field by reading relevant publications and discussions with colleagues, as well as to participate in, and be aware of, audits in the practice where they work. Another reason why a specific SMP Level 4 course is required is because the BAHRS did not want traditional artistic tattooists to be eligible for membership, even if they were extremely experienced, without additional training.

In the UK, there are overlaps and differences in the statutory regulations to do with tattooing and micropigmentation. The relevant work-based regulations that must be followed and the professional and practice standards that must be complied with are listed in the BAHRS Professional Standards for Scalp Micropigmentation Practitioners.³ BAHRS SMPP affiliate members sign a Code of Conduct⁴ agreeing to abide by these professional standards.

If male and female pattern hair loss, as well as other non-scarring and scarring alopecias, are considered medical conditions, then it follows that SMP should be considered a

“medical” procedure. Furthermore, there is a real chance of blood borne disease transmission if incorrect needles and machines are used; in addition, there are other health risks when hazardous inks and dyes are used.

In the UK, therefore, we are encouraging a “Safety in Micropigmentation” campaign to highlight for both professionals and patients what is required for safe practice. Holding a medical or nursing degree does not obviate the need for specific training in SMP, and doctors and nurses who perform SMP should comply with the same standards as non-medical SMPPs. A different clinic license may also be required to perform SMP from that required to perform hair transplant surgery.

The opinions offered in this article relate to the English language and SMP provision in the UK but are intended to stimulate debate; we look forward to collegiate discussions at the workshop in Bangkok and elsewhere. We also encourage ISHRS Global Council regional societies to clarify SMP terminology in their own languages and to create standards according to the regulations that exist in their countries.

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4. https://www.bahrs.co.uk/content/large/documents/code_of_conduct/amsmpcoccv15march19.pdf ■



How I Do It

Timothy Carman, MD, FISHRS | La Jolla, California, USA | tcarmanmd@mac.com

In a twist on “How I Do It,” I would like to take this opportunity to alert readers to the upcoming ISHRS WLSW “Triple Crown” of FUT, FUE, and SMP (specifically the SMP portion), and “How the ISHRS will do it”!

Sharing our ideas with one another makes us clinically stronger as a collective group in the ISHRS. Please feel free to email me your ideas at tcarmanmd@mac.com for consideration for publication in our journal.

Scalp Micropigmentation (SMP) to Be Part of 2019 WLSW “Triple Crown”

As chair of the SMP portion of the ISHRS’s “Triple Crown” World Live Surgery Workshop, scheduled to take place in Bangkok this year, I would like to alert readers to a sample of the type of thoughtful material that will be presented during the SMP portion. In this issue’s lead article, Dr. Greg Williams and Dawn Forshaw outlined the efforts being made to standardize the nomenclature and technical procedures involving SMP in order to clearly define the principles and practices in this adjunctive therapy. I am happy to say both of them will be on our faculty and staff for the WLSW in Bangkok.

The ethical philosophy behind their collective effort mirrors that of the ISHRS in general, namely, that patient safety and education should be an absolute priority above all other considerations. This has become ever so important in recent years, as, unfortunately, the number of irresponsible practitioners in the primary and surrounding fields of Hair Transplant Surgery has increased dramatically.

The ISHRS’s continued efforts to provide physicians with a resource for high-quality, ethical, and accurate practice standards will continue at this year’s WLSW Triple Crown.

I am especially excited about the SMP portion as we are blessed to have the collective participation of a stellar faculty whose insight into the current and emerging field of SMP is second to none. This talented group will bring its collective expertise into play over a two-day period that will include pre-workshop informational resources, faculty and staff presentations, and, of course, a live demonstration in addition to the all-important hands-on workshop where participants will be able to receive basic instruction on the nuances of technique and artistic material management across a wide variety of SMP platforms.

Following this broad-based SMP introductory presentation, participants will gain a solid foundation in the ethical practice of state-of-the-art SMP in terms of its indications, limitations, and techniques. They will be educated on maintaining patient safety and obtaining high-quality results—benefits they will pass on to their patients during their ensuing journey into formal training in SMP.

As an artist, I am aware of the subtle touch required in SMP, which, when successfully applied, decreases the contrast between hair and scalp colour, leading to increased patient satisfaction related to the decreased perception of

thinning. It can also be a game changer when addressing scarring, which cannot be addressed by excision or FUE correction/improvement.

SMP is a portion of the workshop not to be missed. I look forward to seeing everyone in Bangkok! ■


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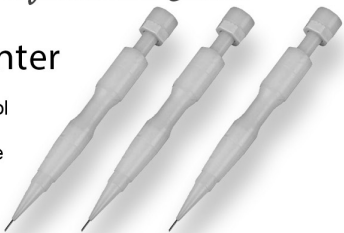


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Graft Shower



FUE Clinical Practice Guidelines

Developed by the International Society of Hair Restoration Surgery Follicular Unit Excision Advancement Committee (FUEAC)

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Disclaimer: These guidelines are provided for educational and informational purposes only. They should not be interpreted as setting a standard of care, or be deemed inclusive of all proper methods of care, nor exclusive of other methods of care. Following these guidelines will not ensure successful treatment in every situation. Each individual physician should make an independent judgment regarding the proper treatment of each patient based on the particular facts and circumstances. These guidelines are provided “as is.” The International Society of Hair Restoration Surgery (ISHRS) makes no representation or warranty as to their accuracy or completeness. The guidelines reflect the best available data at the time they were prepared. Future studies may yield results that require revisions to the recommendations in this guideline to reflect new data.

The Follicular Unit Excision Advancement Committee (FUEAC) of the International Society of Hair Restoration Surgery has written this treatise on Follicular Unit Excision (FUE) in which suggestions for the safe practice of this harvest method are provided. It was authored and reviewed by the committee and the suggestions were based on any available studies as well as the combined experience and expertise of the committee members. It is intended to provide basic information on the harvest technique for any physician performing FUE.

One of the most controversial aspects of FUE is the improper delegation of the excision aspect of this procedure to non-physicians and non-licensed medical providers. It is the position of the ISHRS that “such procedures [FUE] 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.”

It is the recommendation of the FUEAC that FUE must be performed by properly trained and licensed physicians and appropriately licensed and trained Nurse Practitioners and Physician Assistants working under the laws of that state and/or country. Acknowledging the position of the ISHRS, and at the same time recognizing that in some locales unlicensed health care staff may perform FUE, this document will refer to properly trained, licensed or non-licensed individuals legally performing FUE as a “non-physician clinician,” or NPC. In the opinion of the FUEAC, it goes against the patients’ interests and is medically unsound when individuals without a health care license perform FUE surgery, even if it might be legal in certain countries or states.

CHAPTER I: PATIENT EVALUATION FOR FUE CANDIDACY

Aditya K. Gupta, MD, PhD, FISHRS

1. SELECTION OF CANDIDATES

A. Medical History

i. Age of patient

1. Avoid performing FUE on young patients (< 25 years old) as the extent of future hair loss is difficult to predict. This significantly impacts the assessment of the safe donor area (SDA).¹⁻³

ii. Gender of patient

1. If patient meets all required candidacy criteria, FUE can be considered in both males and females.⁴

iii. Type and degree of hair loss

1. If a patient meets all required candidacy criteria, FUE can be considered in male patients with Norwood scores of II to VII. The use of body hair can be considered in advanced patterns.^{4,6}
2. FUE can be considered in female patients with diffuse thinning as long as they have an acceptable miniaturization rate.^{4,6}
- iv. Current treatments to prevent hair loss
 1. It should be noted that the continued use of medical treatments does not mean an aggressive harvesting of the donor zone should be conducted.^{8,13}
- v. Previous hair transplant procedures
 1. If a limited number of grafts have been previously harvested with strip or FUE and the patient meets all other candidacy requirements, then sequential sessions/procedures are possible.
 2. If FUE will cause overharvesting, that is, visible thinning in the scalp donor zone, then additional FUE sessions using scalp donor hair is not recommended.¹⁴

B. Evaluate Hair and Desired Transplant Location

- i. Assess density of donor and recipient areas.
 1. Use a handheld densitometer in multiple locations in the donor zone to obtain density.¹⁷
 2. Examine the donor and recipient areas for factors that could influence donor density such as the presence of scars and dermatologic conditions (e.g., alopecia areata, psoriasis, scarring alopecia).
 3. The presence of diffuse un-patterned alopecia (DUPA) may be a relative contraindication as it may result in a severely depleted appearance of the donor area.
 4. Assess hair direction, color, angle, caliber, and curl of hair in both the recipient and donor areas as these factors can impact the appearance of hair density.^{13,18,19}
- ii. Evaluate if non-scalp regions are suitable donor and/or recipient areas
 1. Examine the beard and moustache areas first as they typically have higher amounts of hair in the anagen phase, which are more likely to survive the transplant than telogen hair.^{24,25}
 2. Focus your assessment on patches of body hair that are noticeable and can be seen from a distance as they are likely to make a cosmetically significant difference once transplanted.²⁵
 3. Use the torso donor index to determine if chest hairs are suitable; if a patient scores below a 4, chest hair should not be used.²⁶

2. PATIENT EXPECTATIONS

A. Patient's Hair Length Expectations

- i. Inform the patient of the shaving options associated with each FUE technique, indicating that their hair would need to be trimmed to approximately 1mm in length.
- ii. If the patient wants to keep their hair length, discuss the use of non-shaven or preview long hair FUE techniques with them.^{32,33}

B. Scarring Possibilities

- i. Inform the patient that FUE is not a scarless surgery; pinpoint scarring (hypopigmentation) is likely to occur and will be more prominent in patients with Fitzpatrick IV-VI skin types as compared to patients with Fitzpatrick I-III skin types.³⁴
- ii. Inform the patient that FUE scarring will reflect light differently than surrounding skin, making hypopigmentation much more noticeable when hair is cut short.³⁴
- iii. As punch size and overharvesting may influence scar appearance, discuss the possibility of splitting the procedure into multiple FUE sessions instead of one large session.³⁴⁻³⁶

3. FUE VS. FUT

A. Relative Contraindications for FUE

- i. Patients with a narrow safe zone
 1. FUE should be considered carefully in patients with a narrow safe zone as there is a limited region of hairs presumed to be permanent.

2. Donor area depletion could be a possibility in patients with narrow safe zones and requiring a high number of grafts.
- ii. Patients with advanced baldness
 1. If transplanting body hair is not possible, patients requiring a large number of grafts should be counseled as to the limits of grafts available and scalp coverage.³⁹
 2. Strip harvesting, a combination of strip (FUT) and FUE, body hair donor, and/or non-surgical methods may be a better alternative for these patients.

B. Presentations Where FUE May Be Preferred Over FUT

- i. FUE can be used as a corrective procedure when repairing plugs or inappropriately placed grafts.²⁰
- ii. FUE can be used in patients with scars that cannot be excised such as patients with noticeable linear scarring or burns.⁴⁶
- iii. FUE is the preferred option for patients with limited or no scalp laxity.
- iv. FUE is the preferred method for body hair graft harvest.

CHAPTER II

DONOR AREA EVALUATION AND MANAGEMENT

Márcio Crisóstomo, MD, FISHRS

The donor area evaluation is a fundamental part of the FUE procedure, since it defines the limitations, cosmetic results, possible contraindication to the procedure, expected number of grafts, and the coverage possible.

A correct evaluation of donor area characteristics will help define the surgical plan.

1. DONOR AREA EVALUATIONS

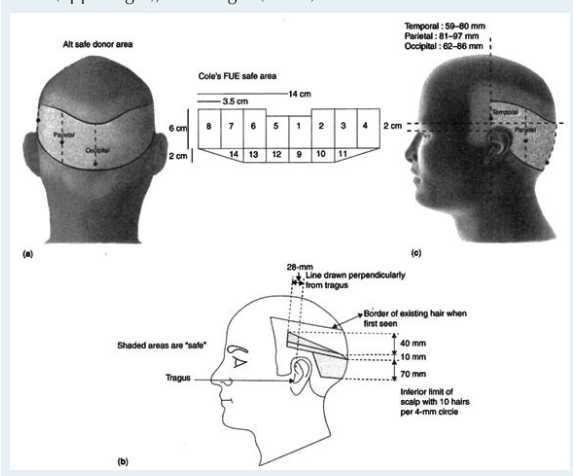
A. Determination of the Safe Donor Area (SDA)

- i. Ideally, all grafts should be removed from the SDA to decrease the risk of obtaining impermanent hairs.
- ii. It is hard to determine the real safe zone, especially in younger patients.
- iii. Careful family history and physical examination of the scalp can help determine the SDA.
- iv. Assess the patient for the possibility of retrograde alopecia and avoid harvesting from the area at risk.
- v. A relatively safe assumption is that every young patient could turn into a Norwood Class VI in the future. Figure 1 depicts a father and son as an example of the extent of future hair loss.
- vi. Some authors have proposed safe zones as exemplified in Figure 2 (Source: Devroye, J. An Overview of the Donor Area: Basic Principles. In: Unger, et al., eds. *Hair Transplantation*, 5th Ed., p. 258).
- vii. In larger sessions of FUE, it's believed that surgeons may cross the limits of the safe zone, harvesting grafts

FIGURE 1. Possible extent of future hair loss that needs to be considered.

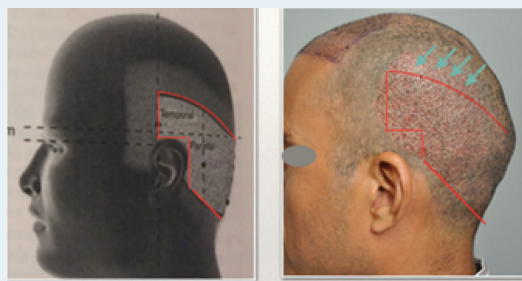


FIGURE 2. The “safe” donor zone as proposed by Alt (upper left), Cole (upper right), and Unger (lower).



from the edge or even outside the real safe zone (blue arrows in Figure 3). If the surgeon knows that this will happen in a given surgery, the patient should be informed of the benefits of this (to have more hair for a period of time) and the possible consequences for the long term (to lose some hairs harvested from an unsafe zone and possible visible punctiform white scars).

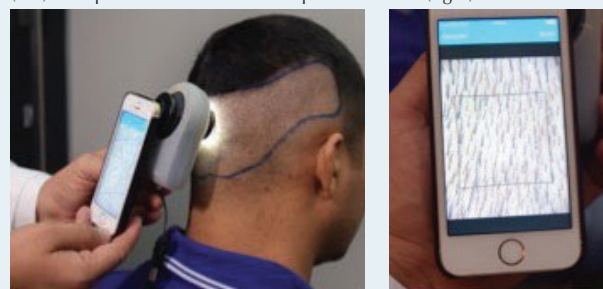
FIGURE 3. Grafts extracted outside the “safe” zone (blue arrows).



B. Determination of Hair Density

- The knowledge of hair density is to aid the surgeon in anticipating how many grafts can be safely excised.
- The use of a densitometry to evaluate the patient's scalp average hair and follicular unit density should be performed when planning the surgery.
- Measurements can be taken from the temporal, mastoid, and occipital areas as it varies according to the area.
- A photo of 1cm² is taken from the above mentioned areas and the number of follicular units/hairs is counted. Usually the density varies from 60 to 100 FU/cm². (See Figure 4.)

FIGURE 4. Densitometer is used to determine hair and follicular unit density (left). The photos can be seen on a phone camera (right).



C. Measurement of the Caliber of Hair and Hair Quality

- Hair caliber is another important variable when planning a hair transplant procedure and can be measured by a precision digital micrometer or thickness gauge (Figure 5).

FIGURE 5. Digital micrometer for measuring hair shaft diameter (left); thickness gauge for measuring hair shaft diameter (right).



- Terminal hairs are divided into the following:

FIGURE 6. Hair shaft thickness categories.

	Diameter (micrometers)
Fine hair	60 to 65
Medium hair	65 to 80
Coarse hair	80 and above

- Thicker hair usually produces a denser appearance after transplantation, but it can also impact the coverage of the donor area as the hair is removed.
- Other characteristics of hair that should be assessed that can impact transplant results include color, straight/curly, Afro-textured (tight curl), Asian (straight, wide caliber), and hair/scalp color contrast.

D. Calculations

- With the defined limits of safe donor area identified and hair density and hair caliber measured, some calculations can be made.
- The hair diameter index (HDI) or hair coverage value (HCV) can be used as a guide. These values are obtained from the product of the average hair shaft diameter and the number of hairs/cm². The HDI is calculated as hairs/cm² caliber (μm)/100 and the HCV as hairs/cm² × caliber (mm). The calculated values differ by a factor of 10.¹⁻⁴
 - It is suggested that adequate scalp coverage is maintained by only removing the number of follicular units that will leave a residual HDI of 60 or greater or an HCV greater than 6.
- Graft excision limit in a non-harvested scalp without

visual depletion: as an approximation, removal of 40% to 50% of the follicles in a given area should not produce a visible depletion of the area. Caution must be exercised as this value will depend on factors such as hairs/follicular unit, hair shaft diameter, hair length, hair curl, hair color, and angle of hair emergence.

- iv. The surgeon should compare the information of how many grafts are needed for the transplant (recipient area size $\times$ density proposed) with the total number of grafts that can be safely removed (donor area measurements $\times$ hair density $\times$ 40%) for surgical planning.

E. Secondary Cases

- i. With one or multiple strip scars, there may be a reduction in donor capacity and this should be evaluated before surgery.

FIGURE 7. Scalp micropigmentation to diminish the visibility of a linear scar (blue arrows).



ii. Repair options for strip donor scars include scar revision with primary excision, implantation of grafts into the scar, or scalp micropigmentation (SMP) (Figure 7). The combination of these methods is possible and should be discussed with the patient.

- iii. Previous FUE surgeries:

Densitometry is fundamental in these cases along with an overall aesthetic evaluation of the donor area. It is important to avoid overharvesting and to identify areas with preexisting low density. It is also important to avoid harvesting follicular units next to FUE scars to prevent voids and the creation of areas of low-density.

injection will not be as effective. Concentrations of 1:150,000 to 1:300,000 are most commonly employed.

- ii. Through use of skin traction and pressure
 1. Stretching the skin taut or applying hand pressure can control localized bleeding.

C. Hair Shaving

- i. Correct length
 1. Most FUE procedures are performed with the hair shaved to between 0.5 and 1.5mm long.
- ii. Full shave
 1. The entire donor zone can be shaved as this will facilitate excision site dispersion and enhance efficiency.
- iii. Micro strip or zone shave
 1. If a series of small scalp FUE procedures are planned, micro strips or zones may be shaved in the donor area, which will then be covered during healing by adjacent hair.
 - a. Low-density harvest advised with this approach to avoid creating thin appearing patches in the donor region.
 - b. The location of these strips or zones must be changed with each subsequent procedure.
 - c. Patients must be advised these “zones” may be visible if the hair is cut too short.
 2. This method of donor preparation should not be performed on any patient that might wear their hair short (less than 10 to 12mm) at some point. Limit this preparation to women, men who have had previous strip surgery, or older males who have no intention of wearing their hair short.

D. No Shave Techniques

- i. General
 1. When performing FUE without shaving:
 - a. Direct punch or low speed oscillation is helpful as punch rotation tends to tangle adjacent hair, particularly with motorized rotation.
 - b. When using rotation, the punch may be stopped when moving hairs out of the way of target units.
 - c. Adjacent hair should be held flat to avoid hair tangling and avulsion.
 - d. Harvesting from inferior to superior aids visualization and systematic excision.
 - e. These are highly advanced procedures and not advised for beginners.
- ii. Pre-trimming
 1. If performing FUE without shaving, the donor area is marked and prepared by selecting and trimming the targeted follicles with scissors. It is recommended to do this the day before the procedure as it is very time consuming.
- iii. No trimming
 1. Grafts can be excised without pre-trimming.
 - a. The hairs in the targeted FU are usually cut by the punch during excision but may remain

CHAPTER III GRAFT HARVEST

Robert H. True, MD, MPH, FISHRS

1. PREPARATION FOR HARVEST

A. Achieve Anesthesia

- i. The targeted harvest area must be anesthetized prior to beginning the graft harvest using local anesthetic (LA). A combination of short-acting and long-acting LA agents is recommended for harvests that will take over one hour.
- ii. Because the harvest area is usually larger than strip surgery, great care must be taken to calculate safe doses and avoid exceeding the limits of any anesthetic agent.

B. Ensure Hemostasis

- i. Through use of safe concentrations and amounts of epinephrine solutions
 1. Injecting dilute epinephrine and saline solution into the superficial dermis, throughout the harvest field, is advised to control bleeding during harvest. Deep

- intact. This is generally performed with sharp punches.
- b. Going slowly is a necessity.
- iv. Preview long hair¹
 1. Window or slot punches allow the long hairs to be held in the punch during excision, which keeps them intact for performing preview long hair transplantation.

E. Map Grid in Donor Region and Set Limit of Excisions per Grid Area

- i. Mapping a grid in the donor region is recommended as it facilitates an even distribution of excisions and limits the risk of overharvesting. Determine the target number of grafts and the number of grids (4 to 8cm²), then the number of targeted excisions per square centimeter. Not all grids will have the same density of excisions due to variations in follicular density.

F. Proper Positioning

- i. Critical to a successful and efficient harvest
- ii. With the patient recumbent:
 1. The surgeon is best seated or standing at the top or to the side of the top of the patient's head.
 2. The assistant is positioned to the side of the patient's head opposite the surgeon's dominant hand.
 3. The patient lies:
 - a. Prone for harvesting the occiput
 - b. Prone with head rotated to the side for harvesting the parietal areas
 - c. Lateral decubitus for harvesting the temporal zones
 - d. Supine with neck extended or lateral decubitus for beard harvesting
 - e. Supine, lateral decubitus, or prone for body harvest
 4. The patient is elevated to a level that the surgeon's vision with loupes is comfortable without neck strain and eyes are aligned to see the hair emergence angle.
- iii. Patient sitting
 1. The surgeon is best seated behind or to the side of the patient so that the eyes are level with or slightly below the harvest zone.
 2. One assistant will sit or stand beside the surgeon.
 3. One or two assistants may stand toward the front of the patient and place grafts as they are being harvested.
 4. The patient will be sitting with his/her back to the surgeon. An assistant may hold the head stable.

2. GRAFT EXCISION EQUIPMENT

A. General Principles

- i. All equipment and punches must be fully cleaned and sterilized.
- ii. Punches with an intact edge can be reused if cleaned and re-sterilized.
- iii. In some locations, single-use equipment is required by regulation.

- iv. Equipment designed for single use, such as tubing collection canisters and some punches, should not be reused.
- v. Knowing more than one FUE technique or device increases ability to deal with the widest variety of situations.
- vi. Having backup equipment protects against having to abort a procedure.

B. Manual Technique

- i. Employs a handle and sharp punch.
- ii. Direct method is pushing the punch into the skin without rotation.
- iii. Oscillation method is performed by rotating the punch back and forth between the thumb and index fingers as it enters the skin.
- iv. Precise depth control is required and customized.
 1. Typical initial dissection depth is 2.0 to 3.0mm.
- v. The UPunch Curl™ for Afro textured hair does not require rotation but a curved insertion and dissection motion to follow the curl of the follicles.

C. Motorized Sharp

- i. Settings must be customized.
- ii. Perform test grafts at beginning and throughout procedure.
- iii. Use lowest RPM (revolutions per minute) that cuts without skin distortion.
- iv. Typical initial settings
 1. Insertion depth 2.0 to 3.0mm
 2. 1,000 to 2,000 RPM
- v. One-stage punch insertion

D. Motorized Hybrid

- i. Settings must be customized.
- ii. Perform test grafts at beginning and throughout procedure.
- iii. Typical initial settings:
 1. 50- to 60-degree arc of oscillation
 2. 70 to 80 oscillations per minute
- iv. Two stages of punch insertion
 1. Hold punch firmly and stationary until epidermis incised.
 2. Let punch work itself deeper—do not push.
 3. Slow punch oscillation to a stop upon reaching desired depth.
- v. Insertion depth commonly 3.5 to 4.0mm, sometimes more

E. Motorized Blunt

- i. Settings must be customized.
- ii. Perform test grafts at beginning and throughout procedure.
- iii. Typical initial settings
 1. 4.0 to 5.0mm insertion depth (ethnicity dependent)
 2. 1,000 to 1,500 RPM
- iv. Two stages of punch insertion
 1. Hold punch stationary but firmly at angle until epidermis incised (engagement).
 2. Advance the punch to desired depth.

F. Robotic Assisted

- i. Settings must be customized.
- ii. Tensioner must be positioned and adjusted correctly.
- iii. Punch insertions must be monitored by surgeon.
- iv. Settings of the sharp punch depth, dull punch depth, punch size, and targeting pattern are determined by surgeon or by assistant with direct orders from surgeon.

3. GRAFT EXCISION TECHNIQUE

A. Use Skin Tension

- i. By the surgeon
 1. The hand not holding the punch is used to pull the skin taut, which helps reduce skin distortion, reduce transections, and facilitate excision.
 2. The direction of traction is typically opposite the direction of hair growth.
- ii. By the assistant
 1. The assistant can use both hands pulling in opposite directions to create counter-traction, which is even more effective.
- iii. By the surgeon and assistant
 1. The surgeon's hand pulls superiorly and the assistant's inferiorly to create counter-traction.
- iv. By tension devices
 1. The ARTAS Robot employs a tensioning ring.
 2. Attaching stretched tubing or a surgical glove to the scalp with staples provides another way to create traction.

B. Administer Superficial Tumescence

- i. Deep tumescence in large fields is not as effective as tumescence given into the superficial dermis locally just before an area is harvested.
- ii. The degree, amount, and location of tumescence ultimately will depend on the FUE device being utilized and the physician's experience to obtain the best quality grafts with the type of punch being utilized.
- iii. Combining this with traction/counter-traction greatly aids excision.

C. Determine Correct Punch Insertion Depth (*depth with minimal transections and removal without force*). *This differs according to punch type and patient skin type.*

- i. Sharp
 1. Initial setting 2.0 to 3.0mm
 2. Adjust according to test grafts.
 3. Monitor and adjust throughout different donor regions based on continuous observation of graft quality and extraction forces.
- ii. Blunt
 1. Typically dissect to the full punch depth of 4.0 to 5.0mm.
 2. Adjust according to test grafts.

3. Monitor and adjust throughout different donor regions based on continuous observation of graft quality and extraction forces.

iii. Hybrid

1. Initial setting 3.0 to 3.5mm
2. May go as deep as 4.0 to 5.0mm.
3. Adjust according to test grafts.
4. Monitor and adjust throughout different donor regions based on continuous observation of graft quality and extraction forces.

D. Determine Correct Punch Centering and Insertion Angle

- i. Place the point where the target hairs emerge from the skin in the center of the punch.
- ii. Observe hair exit angle with high power loupes.
- iii. Initial punch insertion angle should be 10 to 20 degrees greater than observed exit angle.
- iv. Observe grafts for transections and adjust.

E. Determine Correct Punch Diameter

- i. Use smallest diameter punch that produces grafts with minimal transection, splay, denuding of follicles, and follicle paring.
- ii. Most common diameters between 0.8mm and 1.0mm

F. Adjust Technique by Recognition of Follicle Variables

- i. Curve
 1. With sharp punch, adjust for curve with shallower insertion, larger punch, and/or arcing movement.
 2. With blunt or hybrid punch, adjust for curve with slight arc or punch size.
- ii. Extreme curl
 1. With sharp punch, use larger diameter, careful depth limit, and arcing insertion or convert to blunt or hybrid.
 2. With blunt or hybrid punch, use larger punch or arcing movement.
 3. With all punch types, center target follicle toward front (hair emergence is the obtuse angle) edge of punch.
- iii. Splay
 1. Use a loupe magnifier for inspection of test grafts and measurement of location and degree of splay.
 2. Set sharp punch insertion just above point of splay or use larger diameter punch.
 3. With blunt or hybrid punches, this is usually not a challenge, but if it is, use a larger diameter punch.
- iv. Recognize and adjust for donor architecture
 1. For patients with complex donor area, perform partial harvest from sections of follicular groups that least disrupt the donor hair architecture.

4. GRAFT REMOVAL EQUIPMENT

A. Forceps Types

- i. Serrated
 1. Grips the tissue, but may cut into it with too much pressure.
- ii. Smooth

1. May slip from the tissue and then crush if squeezed too firmly.
- iii. Diamond crusted
 1. Grips the tissue without cutting or slipping.
- iv. ATOE (Aide to Extraction)
 1. Specialized forceps for pulling grafts that allows several grafts to be gathered at a time
- v. Straight vs curved forceps
 1. Both may be used for initial grasp of graft just below epidermis.
 2. Curved is preferred for grasping graft below bulge.

B. Removal Technique

- i. Single forceps
 1. Should be applied just below the epidermis and above the bulge.
 2. Is only possible if graft is deeply incised.
 3. Can produce high rate of capping.
- ii. Double forceps
 1. First forceps placed just below epidermis and graft slightly elevated.
 2. Second forceps applied below bulge.
 3. Graft removed by pulling with both forceps simultaneously.
 4. Extraction possible at shallower incision depth.
 5. Reduces capping.
- iii. Triple forceps
 1. Same as the double-forceps method but second person pushes the skin downward with the forceps as the two forceps pull upward.
 2. Overcomes tethering even better than the two-forceps method.
- iv. ATOE plus forceps
 1. Grafts lifted with forceps applied just below epidermis and gathered into ATOE applied below the bulge. Extraction is accomplished by pulling with both forceps and ATOE.
- v. Traction and counter-traction
 1. When grafts are difficult to pull, having an assistant stretch the skin in opposite directions with two hands makes the extraction easier.

C. Correct Use of Suction

- i. Suction substitutes for forceps in the extraction phase of follicular unit excision.
- ii. Suction can be used to elevate the graft during excision allowing a shallower punch insertion depth.
- iii. Suction can be used to remove the graft once it has been excised
 1. To accomplish this, punch must be inserted deeply.
 2. Since sharp punches are used, deep penetration risks higher transection rates. Extreme care must be taken to ensure grafts are not dried and desiccated because of the suction.

5. ANCILLARY EQUIPMENT

A. Proper Magnification and Illumination

- i. Surgical loupes in the range of 4.5 to 8.0 are recommended.

- ii. Loupe working distance of 200 to 400mm is most ergonomic.
- iii. Addition of an LED light to the loupes improves visualization.

B. Use of Sterile Punches Only

- i. If punch sterility is broken during the case, it should be replaced with a new sterile punch.

6. ROLES OF THE SURGICAL TEAM

A. Surgeon

- i. Performs all incisions (unless delegated to a non-physician clinician).
- ii. May delegate graft removal (extraction) from the skin.
- iii. Routinely monitors assistants extracting and processing grafts.

B. Assistants

- i. Are fully trained in safe graft handling.
- ii. Remove grafts incised by the surgeon.
- iii. Maintain graft hydration during all phases of handling.
- iv. Perform microscopic inspection and sorting of grafts.

CHAPTER IV GRAFT EVALUATION AND MANAGEMENT

Ken L. Williams, Jr. DO, FISHRS

1. GENERAL

A. Graft Evaluation

- i. Comparing grafts: fatty (strip harvest) versus skeletonized (FUE)
 1. Grafts created using stereomicroscopic dissection after strip excision possess a greater amount of enveloping fat that surrounds the vital structures of the follicle such as the connective tissue sheath, external and internal roots, bulge, and dermal papilla (DP).
 2. FUE grafts typically possess less enveloping fat and are commonly referred to as "skeletonized grafts," which are sensitive to desiccation and repetitive placement injuries.
 3. Smaller punch diameters typically produce grafts that have less investing fat and tissue, which may impact graft quality and survival if the grafts are handled without careful attention.
- ii. Defining transection
 1. Follicle transection is defined by any microscopic or visible fracture of the follicle.
 2. Transected follicles are more susceptible to graft growth failure or poor growth.
 3. Transected grafts can be recorded and categorized as partial or complete transection.
- iii. Intraoperative use of microscope
 1. The stereomicroscope remains the best graft evaluation device.

2. Stereomicroscopic evaluation of the grafts can be used to assess the Graft Quality Index (GQI) as described by True.
- iv. Monitoring graft quality
 1. The monitoring and recording of graft quality are typically done by a technician.
 2. The graft quality assessment and transections recording can be performed on every excised graft or on samples.
 3. Operative factors impacting follicle growth and survival
 - a. Physical damage to the grafts caused by dehydration, transection, or blunt trauma during the extraction and implantation of grafts
 - b. Ischemia-reperfusion injury (IRI), storage medium, and out of body time of the grafts
 4. Follicle damage should be analyzed and reported to the physician so that any necessary changes in the dissection equipment, instrumentation, or technique may be instituted as soon as possible.
 5. Graft transection recording can be performed on every excised graft or on samples.

B. Graft Handling

- i. Stresses encountered by follicles
 1. Minimize graft "out-of-body" time to decrease IRI to the grafts.
 2. Bio-enhanced holding solutions and culture media may decrease IRI.
- ii. Graft placement-technician training and experience
 1. Properly trained technicians or medical assistants must gently and efficiently place the grafts in the recipient sites.
 2. Repetitive Placement Trauma (RPT) negatively impacts graft survival and cosmesis. RPT occurs after numerous unsuccessful attempts to place the grafts, and the goal is to place grafts in a single insertion attempt.
 3. The epidermis of the harvested graft can be removed by the properly trained technician. If the graft epidermis is not removed by the technician after harvesting, the graft should be placed such that the epidermis is about 0.5 to 1.0mm above the scalp surface.
- iii. Effect of drying or desiccation
 1. FUE harvested grafts can be at greater risk for desiccation because of the decreased volume of perifollicular fat.

2. SPECIFIC TOPICS

A. Graft Preservation (enhanced storage solutions with buffering, osmotic balance, nutrients, and liposomal ATP may enhance graft survival)

B. FUE Graft Dissection (Trimming, removing hair fragments, fat, epidermal cap)

- i. Trimming of FUE grafts to remove surrounding fat should be avoided.
- ii. Hair fragments from harvested grafts represent frac-

tured follicles and should be removed under the microscope prior to implantation.

- iii. The epidermal cap (EC) can be removed under the microscope. If the EC is not removed, the grafts must occupy a position 0.5mm above the dermal surface to reduce scalp defects such as cobble stoning, pitting, and scar tissue reaction.

C. Graft Splitting (*ex vivo* and *in vivo*)

- i. *Ex vivo* splitting of complex grafts under a stereomicroscope is standard of care if and when additional single follicles are needed for the hair restoration procedure.
- ii. Complex family groupings may be isolated, incised, and extracted *in vivo* in a pattern that removes only a portion of the follicular groupings. This manner of harvesting leaves behind melanin-containing follicles in the scalp to reduce hypopigmentation.

D. Ergonomics in Evaluation and Management

- i. Serious complications from poor ergonomic application in a hair transplant procedure occur. They apply to both the patient and physician during FUE donor harvesting. The ergonomics of FUE can increase the risk for musculoskeletal injury especially to the physician operator.
- ii. The physician and patient are exposed to prolonged periods of time during donor harvesting that can impact underlying or preexisting musculoskeletal diseases.
- iii. FUE requires substantial musculoskeletal energy, prolonged static and stationary positions. Harvesting can last up to 6 to 8 hours for the novice surgeon attempting large FUE cases (>2,000 grafts).
- iv. FUE donor harvesting requires physical exertion, so intermittent rest periods during FUE donor harvesting are recommended.
- v. The use of robotic FUE naturally reduces ergonomic injuries to physicians.

3. QUALITY CONTROL MEASURES

A. Transection Rates (TR)

- i. Vary from one physician to another. Constant monitoring of the TR during FUE donor harvesting is critical for successful graft growth. The final growth yield from transected grafts is lower than grafts without fractures or damage within the follicular unit. It is important to minimize follicle transection rates; striving for a rate less than 10% would be prudent.

B. Average Hairs per Graft

- i. an important concept in determining the possible cosmetic outcome to the hair transplant procedure as more hair shafts equate to greater visual hair density.

C. Missing Grafts

- i. A concept that is defined by the inability of the operator to identify a graft, follicles, or a skin cap after a scoring attempt has been made. The rate of "missing grafts" should be as low as possible as an increased rate results in excessive and unnecessary donor scarring.

CHAPTER V

FUE GRAFT IMPLANTATION

Parsa Mohebi, MD, FISHRS

1. PLACING TECHNIQUES

A. Forceps

- i. Forceps placement requires excellent manual dexterity to attain good transplant outcomes. Poor forceps placement technique can result in poor outcomes as the FUE grafts are susceptible to repetitive placement trauma (RPT) and desiccation.
- ii. Considerations
 1. Grasping the graft at the bulb may cause damage and affect survival (Figure 8).
 2. Grasping above the bulbs may cause bending of the follicles during insertion and result in a "J" hook deformity that may impact graft survival (Figure 9).

FIGURE 8. Grasping the follicles above the bulb results in a bent distal hair shaft.

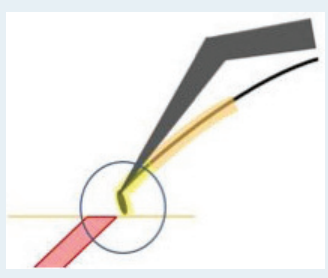


FIGURE 9. "J" hook deformity of retained hairs with a bent distal shaft.



3. Since the hair on FUE grafts is usually trimmed short, determining the curvature of hair growth can be a challenge. The first attempt can be to identify direction of the hair shaft curl. The second is that the sebaceous glands tend to be on the acute side of hair emergence.
4. To minimize trauma to the FUE grafts, consider the "no-touch" technique where the recipient site is dilated or enlarged with a needle, probe, or a small hook. The graft is then grasped from the epidermis only and inserted without the forceps touching the follicles at any location.

B. Implanter

- i. Implanters have a plunger, and when depressed, a stylus will push the graft out of the device into the recipient site. These devices allow grafts to be placed easily and with high efficiency without the risk of RPT. The technique of using implanters is easily learned and can minimize the over-manipulation of the grafts, prevent hook formation, and prevent dehydration if performed properly.
- ii. Which implanter to choose: the type of implanter chosen for the procedure depends on several factors such as the physical space, the number of technicians, and the feasibility of having multiple operators working on a patient's scalp at the same time.

1. Sharp Implanter

- a. The implanter tip is sharp and enables the surgeon to create the recipient site and implant the grafts in sequence. The grafts are typically loaded into the implanters by the technicians. The typical implanter needle has a thin wall and slot that allows the grafts to be pulled into the lumen of the implanting needle.
- b. The surgeon should not delegate the use of sharp implanters to unlicensed medical providers.

2. Blunt Implanter

- a. The blunt or dull needle implanter can either be created by blunting or dulling the sharp leading edge of the needle or can be purchased blunt. It is specifically intended to place grafts into pre-made recipient sites, and this task can be delegated by the surgeon to any qualified staff member.

C. Placer

- i. Grafts are loaded into a blunt needle-like device with a channel either by use of forceps to drag the graft into the lumen or by rolling the channel over the graft to insert it onto the lumen. This is followed by inserting the non-sharp tip into a pre-made recipient site and then forceps are used to slide the graft into the recipient site.

D. Inserter

- i. A combination type of implanter/placer¹ that allows loading grafts like a placer and a mechanism for placing the graft into the pre-made recipient site similar to an implanter.

2. CONCLUSIONS

- i. Safe handling of the grafts is crucial to the outcome of a hair transplant procedure. The use of implanters or placers is encouraged to minimize graft trauma.
- ii. When choosing the method of implantation, the surgeon should consider the arrangement of the procedure in terms of the number of technicians available and whether the grafts will be implanted while extraction is in progress. Simultaneous extraction and placement of the grafts allows for a reduction in the time that the grafts stay out of the body.

CHAPTER VI

POSSIBLE FUE SEQUELAE

Kapil Dua, MBBS, MS, FISHRS

1. HYPOPIGMENTED SCARS IN THE DONOR AREA

A. Cause

- i. They occur because of the removal of the melanin-bearing hair follicle and skin and the subsequent secondary intention healing.
- ii. They can appear as atrophic white scars at the donor site, often as large as 1.5mm in diameter.

- iii. They are more prominent in patients with darker skin than in patients with fair skin.
- iv. They become more visible in patients with shorter hair, especially if the donor area has been overharvested.

B. How to Minimise the Appearance of These Scars

- i. Use smaller sized punches (0.8 to 0.9mm).
- ii. Avoid excising adjacent grafts.
- iii. In high density excisions, excise alternate grafts in zig-zag fashion to prevent coalescence of white dots and avoid the appearance of donor area thinning.
- iv. Consider the use of ACell in the donor sites (although this is not proven to prevent this).
- v. Use sub-follicular unit harvesting to leave hair behind immediately adjacent to the excision site

C. Management

- i. Scalp micropigmentation (SMP)
- ii. Keep the hair longer to cover the hypopigmented excision sites.

2. MOTH-EATEN/PSEUDOSYPHILITIC APPEARANCE

A. Cause

- i. It occurs due to excessive graft removal in non-adjacent areas.
- ii. This condition may become visible and more prominent in short hair style or when the head is shaved.

B. Avoidance

- i. How to minimise the moth-eaten appearance:
 1. Properly space excisions to ensure that there is hair emerging superior to the excision site to “cover” the extraction site.
 2. Excise in a zigzag manner to provide uniformity and to avoid linear gaps.
 3. Diffuse excision sites in a uniform distribution.

C. Management

- i. Scalp micropigmentation
- ii. Keep the hair longer hair to cover the moth-eaten appearance.

3. DONOR AREA EFFLUVIUM

A. Cause

- i. Iatrogenic, unknown etiology
- ii. Possible interruption of the blood supply from overharvesting or excisional trauma due to large punch size
- iii. Excessive use of epinephrine

B. How to Minimize the Chances of Donor Area Effluvium

- i. Avoid the removal of consecutive grafts (high density excision).
- ii. Keep excision densities less than 30 grafts/cm².
- iii. Use the smallest punch size possible.

C. Management

- i. Will usually resolves in 3 to 4 months without intervention.

- ii. Consider topical steroids or 5% minoxidil.

4. BURIED GRAFTS

A. Cause

- i. Occurs when the punch is inserted into the dermis without proper engagement (incision of the skin by the punch) and the follicle is pushed inside the dermis and embedded.
- ii. Most commonly seen when using blunt punches.

B. How to Avoid Buried Grafts

- i. Allow adequate time for the punch to engage (incise) the skin.
- ii. Use any markings on the punch to provide a visual clue of engagement.

C. Management

- i. Attempt removal of the buried grafts by putting pressure on the surrounding skin or exploring the wound.

5. FOLLICULITIS OF THE DONOR AREA

A. Cause

- i. High percentage of transected follicles remain buried in the dermis
- ii. Buried grafts as described above

B. How to Avoid Folliculitis

- i. Minimize transections.
- ii. Remove buried grafts.

C. Management

- i. Use topical and systemic antibiotics for few days.
- ii. Incision and drainage or removal of the retained follicles, if required.

6. NECROSIS OF THE DONOR AREA

A. Causes

- i. Microvascular trauma
- ii. Interruption of the blood supply by high density extractions or the insertion of punches too deeply
- iii. Excessive use of high concentration epinephrine

B. How to Minimize the Chances of Necrosis of Donor Area

- i. Avoid overharvesting.
- ii. Use the smallest punch size possible.
- iii. Insert the punch to the minimal depth required to remove the graft.

C. Management

- i. Use proper antibiotics after culture sensitivity.
- ii. Consider the use of nitroglycerin paste.

7. OVERHARVESTING/THINNING OF THE DONOR SCALP

- i. Appears as visible thinning with patches of hair loss

A. Cause

- i. When large numbers of follicular units are removed

and often associated with high follicle transection rates

1. High probability that the transected hairs do not regenerate, and if they do, their caliber is less than compared to the original hair.
2. Increased microvascular trauma to the donor area
3. A lower percentage of anagen hairs as they have been selectively removed
4. Reduced caliber of the hair shaft

B. How to Avoid Overharvesting

- i. Avoid high-density excisions (greater than 10 to 15 grafts/cm²) in a single session.
- ii. Assess the donor area follicular unit density and hair quality and adjust the excision density.

C. Management

- i. Scalp micropigmentation (SMP)
- ii. Keep longer hair to cover the thinned donor area.
- iii. Implant follicular units into the donor area (which can be harvested from body or scalp, if possible).

8. HARVESTING OF GRAFTS THAT ARE AT AN INCREASED RISK OF FUTURE LOSS

A. Cause

- i. When grafts are harvested from outside the safe zones, especially in younger patients with ongoing process of hair loss, these grafts may be lost over time.
- ii. This usually occurs when grafts are taken from the upper and lower margins of the donor region.
- iii. In the donor area, it can lead to white dots in the crown area, which will become visible as the balding area advances.

B. How to Avoid It

- i. Confine the excisions to the best estimate of the safe donor zone.

C. Management

- i. Scalp micropigmentation in the area where white dots are present
- ii. Implant more grafts if available from the body.

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Clarification

The FUE Terminology Subcommittee of the Follicular Unit Excision Advancement Committee would like to issue the following definition clarification for the term *Sequential Method*, which can be found in the “Revised Standardization of the Terminology Used in FUE: Part II” section of the article, “A 2019 Guide to Currently Accepted FUE and Implanter Terminology” (*Hair Transplant Forum Int'l*. 2019; 29(3):98-106):

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. This technique was first described by Dr. Bertram Ng as the “Double-Guns” technique (2008) and further popularized by Dr. Koray Erdogan (2012).



Controversies

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What is your surgical planning timeline?

As I have mentioned in the past, surgical planning is best conducted as a possible “worst-case scenario” regarding the potential for significant further balding. My reasons include the following:

1. We surgeons, along with our patients, tend to underestimate future hair loss.
2. Patient reliability as to taking long-term preventive medication (compliance) is, at best, variable.
3. Balding will often progress, though perhaps at a slower rate, even in patients taking medication.

With regard to estimating future hair loss, I recently heard a respected, highly experienced surgeon state that in his 19-year career he had never seen a Norwood II (2) patient progress to a Norwood VII (7). While this observation may be true for his experience, it doesn't preclude it from happening to other surgeons over a similar 19-year period, and it certainly doesn't predict what might happen over a longer time frame, say 25 to 30 years.

I recently reviewed my patient records in 820 patients for progression of balding over time frames ranging from 18-31 years follow-up. While no patient who presented with Norwood II balding became a Norwood VII, 1% of Norwood II patients progressed to a Norwood VI. The observed progression is shown below:

Norwood II	Norwood III
II-IV 29.3%	III-IV 31.7%
II-V 9.2%	III-V 26.9%
II-VI 1%	III-VI 5.5%

Norwood IIIv	Norwood IV
IIIv-IV 57.7%	IV-V 56.9%
IIIv-V 29.2%	IV-VI 26.5%
IIIv-VI 7.3%	IV-VII 16.6%
IIIv-VII 0.7%	

I have highlighted the progression to Norwood VI and VII to show that any form of crown thinning/balding shows considerable risk of significant balding later in life (43% if you present as a Norwood IV). Please note that 1 in 6 patients (16.6%) presenting as Norwood IV eventually progressed to Norwood VII over this time frame.

We should not only reflect on these figures, but also upon the age of our patients at presentation. I have previously mentioned the concept of “balding aggressiveness,” which relates to the age of the patient and the degree of balding at that time. Our younger, more balding patients are highly likely to progress to severe balding in later life.

Consideration of these factors is important when determining a surgical management plan. It is important to

carefully manage the donor area, which will decline over time, of our younger, more aggressively balding patients, as our surgical planning timeline is longest in these patients. This requires us to take a more conservative approach in our use of the donor area so that donor is preserved for future needs. In addition, it should also influence our willingness to expend considerable donor reserves in the crown area because this area is highly likely to expand significantly over time as shown by the above results.

Without buying into any argument about the relative worth of FUE harvesting vs strip harvesting, it might also suggest that conservative donor management might well be best served by initial use of strip harvesting, followed later in life by judicious FUE harvesting when future balding outcomes are more readily observed.

Thank you to Dr. Vikram Jayaprakash for assistance with the statistics. ■

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Medical and Professional Ethics

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Spotlight on Treating LGBTQ+ Patients

LGBTQ+ stands for Lesbian, Gay, Bisexual, Trans, Queer (or Questioning) plus others. Sometimes an

"A" is added to recognise Allies (supporters) or the group of individuals who consider themselves Asexual. The ISHRS is a worldwide organisation and so its members come from a wide range of races, cultures, and religions. How a doctor views LGBTQ+ patients and therefore treats them socially and professionally may be influenced by where the doctor grew up, did his or her medical training, or currently lives. There are countries where homosexuality remains illegal and can be punished by the death penalty and others where same-sex marriage has been legalised. In between, globally, there is a wide range of regulations that affect LGBTQ+ patients from anti-discrimination laws to those concerning domestic partnerships and parenting.

For most patients requesting hair transplant surgery, their sexual orientation should not present any issues that would affect their treatment, however, in many countries, rates of HIV infection are highest in gay men. Universal precautions for surgical procedures should mean that safety measures are taken for all patients regardless of what their blood borne disease status is. For patients who declare that they are HIV positive, it is prudent to know what their viral load is, their CD4/CD8 ratio, and their CD4 count. Some doctors require HIV testing as part of pre-surgery screening. If a doctor's policy is to not do surgery on patients who are HIV positive, then the doctor should refer the patient to another hair transplant surgeon who is willing to do so.

However, a patient's gender orientation is important to hair transplant surgeons particularly for those patients with gender dysphoria. Male-to-female transgender patients (trans women) commonly present to hair transplant surgeons requesting the creation of a female hairline. These patients may have temporal recessions as part of a normal masculine hairline but no evidence of androgenetic alopecia, deeper temporal recessions due to male pattern hair loss, or more advanced degrees of frontal and crown thinning.

The next ISHRS World Congress and Triple Crown Workshop will be held in November 2019 in Bangkok, which is a mecca for trans women seeking gender confirmation surgery and also attracts trans women seeking hair transplant surgery. In this column, I am going to address the management of trans women. Although you can find the more technical aspects on this subject reported on in many hair transplant surgery book chapters, here I am going to focus on the ethical dilemmas that we physicians are sometimes presented with.

Homosexuality was removed from the International Classification of Diseases (ICD) by the World Health Organisation (WHO) in the early 1990s but Gender Dysphoria currently



Reflective Questions

Do I have a clear understanding of the rights of trans women and men in my country?

Would I perform a hair transplant on a trans woman who is not taking hormone therapy?

Do I require a letter of support from a psychiatrist before performing hair transplant surgery on a trans woman?

Do I have a specific policy for treating trans women?

remains listed as a Mental Disorder in ICD-10. However, ICD-11, which is due to come into effect in 2022, has removed it as a mental disorder although it remains a diagnostic code under sexual health conditions¹ because there are medical and surgical interventions that require coding, unlike homosexuality.

There is much debate about at what age gender dysphoria can be diagnosed and what the criteria are to do so. Many teenagers are confused about their sexual preference, but gender dysphoria is often something patients have felt strongly about their whole life. Nonetheless, there are patients who are confused or feel they belong in a "non-binary" gender category reflected by the use in today's society of terminology such as bigender, pangender, gender fluid, third gender, other gender, non-gender, agender, and gender neutral, amongst others. Most hair transplant surgeons are not trained to understand the variations of gender dysphoria and should seek advice from the specialist psychiatrist or psychologist looking after the patient. But what if the patient is not under the care of a specialist? I once had a male patient who asked that I give him an "androgynous" hairline. He came with his female partner who was supportive, and he denied wanting to be a woman. He agreed to see a psychologist and subsequently altered his request to a masculine hairline design with small bitemporal recessions rather than a completely rounded female hairline. Post-operatively, he reported a high degree of satisfaction and was relieved he had not pursued his original request.

Many trans women will be under the care of a multi-disciplinary team by the time they present seeking hair transplant surgery, and they will often come for the consultation dressed as a woman, but many will be seeking preliminary information or still be presenting themselves as a man. If suitable, the decision on when hair transplant surgery would be scheduled should be made between the surgeon and the patient taking into account whether or not they have started hormone therapy and what other surgeries are planned. For instance, if facial feminising surgery (FFS) is planned via a bi-coronal incision, it might be sensible to wait until after-

wards to do hair transplant surgery although often scalp is excised during the FFS and the follicles are implanted rather than being thrown away. If gender confirmation surgery is planned, this major surgery could result in telogen effluvium and perhaps should either be done before the hair transplant or after the transplant result has been established. Sometimes, a patient will request hair transplantation before starting hormone therapy. But should this be done? The World Professional Association of Transgender Health (WPATH) offers guidance on the criteria that patients should satisfy prior to hair transplantation and does not cite this as a prerequisite.²

Typically, a trans woman who is seeking hair transplant surgery and is already dressing as a woman will be wearing a wig. Explicit instructions should be given regarding how long the patient will need to wait postoperatively before being able to wear it again. Importantly, patients should be given very clear expectations regarding the density and extent of coverage that they can expect to achieve, whether repeated surgery will be required to achieve their expectations, and the costs involved. If the patient has advanced male pattern hair loss, should they be counseled against having hair transplant surgery and instead into wearing a wig that will give the appearance of a full head of female hair?

If requested, patients should be given the opportunity to meet trans women who have had surgery in your clinic, but many will be a part of a social network that includes other trans women who have had hair transplant surgery and will already be well aware about what is involved.

In some countries, patients are legally allowed to change their names. Should their medical records be kept in their legal name or in their preferred name? What if a patient asks to be addressed using a name that is different from their legal name? What name should be used on any medications dispensed by the clinic? Should you or your clinic have written policies regarding these issues so that all staff members, including those in the frontline admin team, are aware of what to do and say?

Some physicians might not feel comfortable operating on trans women because of personal beliefs. If this is the case, the patient should still be treated with kindness and empathy and referred to a colleague who has experience in this aspect of hair transplant surgery.

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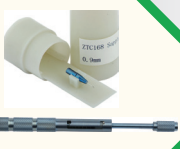


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Literature Review

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The Role of PRP and Growth Factors for Androgenetic Alopecia

Rodrigues, B.L., et al.

Treatment of male pattern

alopecia with platelet-rich plasma: a double-blind controlled study with analysis of platelet number and growth factor levels. *J Amer Acad Dermatol.* 2019; 80:694-699.

Amable, P.R., et al. Platelet-rich plasma preparation for regenerative medicine: optimization and quantification of cytokines and growth factors. *Stem Cell Res Ther.* 2013; 4:67.

The use of platelet-rich plasma (PRP) for the treatment of male and female pattern hair loss has received a significant amount of attention and debate.

Recently, a double-blind placebo-controlled study was performed in Brazil examining the efficacy of PRP for pattern hair loss. Twenty-six patients were randomized to receive four subcutaneous injections of PRP or saline. Peripheral blood was collected with six 8.5mL acid citrate dextrose tubes, one 4-mL EDTA acid tube, and one tube

without anticoagulant, and prepared according to methodology by Amable et al. Each session comprised 20 injections of 100µL totaling 2mL. The trichoscan method was used to assess hair growth, hair density, and percentage of anagen hairs at baseline 15 days after the last injection and at 3 months after the last injection. This involved shaving a 1.52cm² area and using 40× magnification to photograph the area and analyze it with TrichoScanHD Software. In addition, growth factors (platelet-derived growth factor, epidermal growth factor, and vascular endothelial growth factor) were measured by the Luminex method before and after treatments (Millipore, Bedford, MA). This involved the use of magnetic beads coated with monoclonal antibodies specific to the human protein to be determined.

The studies demonstrated a statistically significant increase in hair count ($P=.0016$), hair density ($P=.012$), and percentage of anagen hairs ($P=0.07$) in the PRP group versus the control group. However, there was no correlation quantification of the growth factors in PPR.

Comment: This study favors the use of PRP as a therapeutic treatment option for hair loss. The lack of correlation with growth factor levels suggests that there may be other mechanisms involved in its efficacy or suggests involvement of other growth factors not yet identified or tested in this study. ■

Techniques to Differentiate Recipient Site Sizes

Ginzburg, A., and S. Agrawal. Alternate coronal and sagittal slits in recipient area of hair transplantation to ensure the correct graft implantation by assisting surgeon. *J Amer Acad Dermatol.* 2019(May 28); epub ahead of print.

Many hair surgeons use pre-made sites during hair transplantation. Our colleagues Drs. Ginzburg and Agrawal recently had a paper accepted by the Journal of the Ameri-

can Academy of Dermatology demonstrating their technique to differentiate graft site size for the placers. They describe using coronal sites for 1-hair follicular units along the frontal hairline, sagittal sites for 2-hair follicular units in 3-5 rows behind this, and then using coronal sites for the 3-4 hair groupings behind this.

Comment: There are many ways to create graft recipient sites and allocate graft sizes. This technique can be quite helpful to the surgeons or technicians who are placing the grafts into such pre-made sites. ■



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.

We all know that ANY scalp surgery causes scarring in the donor area (and if you are currently advertising otherwise, you might want to edit your site!). Certainly, some patients will end up having visible scarring no matter what a surgeon's technical skill or how vigilant a patient's post-operative care. Tips and tricks for helping scars to heal abound, but what do we really know? Whether you perform Follicular Unit Excision or linear excision surgery (or both!), you need to know what optimizes the scarring outcome for your patients. Put a few of these into practice at your clinic and tell me next year how much better your scars look!

Optimizing the Appearance of Scars in Hair Surgery

1. If a surgeon chooses to perform a trichophytic closure scar in a linear excision (FUT) surgery, which of the following will optimize the appearance?
 - A. Top edge trichophytic closure
 - B. Lower edge trichophytic closure
 - C. Both upper and lower edge trichophytic closure
 - D. Neither upper nor lower edge trichophytic closure
2. Which method of selecting FUs for FUE harvest will result in the least disruption to the architecture of the donor area and thus the best overall appearance (i.e., LEAST patchy once healed)
 - A. Harvesting FUs adjacent to additional FUs rather than in the center of a field of scalp
 - B. Harvesting only single-haired FUs
 - C. Harvesting isolated follicular groupings
 - D. Harvesting less than or equal to 10% of the available donor density per square centimeter
3. Which of the following is one potential method of increasing strip size (and thus graft yield) in linear donor harvesting without risk of wider donor scars?
 - A. Inject Human Recombinant Hyaluronidase (HRH) above and below the intended harvest area about 10 minutes before incision.
 - B. Measure donor elasticity using either the Laxometer (Mohebi) or the Elasticity Scale (Mayer-Pauls).
 - C. Start daily scalp stretching exercises 1 week pre-operatively.
 - D. Use a tissue spreader (e.g., Haber) or tensioner (ARTAS-like) during the excision process.
4. Assuming donor graft harvest is within reasonable density limits, any "patchy" scarring appearance of the donor area after FUE harvest is mostly related to:
 - A. Punch size only
 - B. Size of the area devoid of hair after extraction
 - C. Punch size and size of the area devoid of hair after extraction
 - D. Undiagnosed Diffuse UnPatterned Alopecia (DUPA)
5. Which of the following would result in the least amount of scar?
 - A. Cutting needle with interrupted 2-0 nylon for a linear excision
 - B. Occlusive dressing to the wound area for either linear or FUE surgery
 - C. Running stitch placed with tapered needle and 4-0 non-dissolving suture for a linear excision
 - D. Minimal stretch or tension on any scalp surgery the first 21-25 days post-operatively
6. Assuming your patient prefers to wear their hair at a short (0.5cm) but not shaved length, which of the following is(are) optimal method(s) for revising a previously stretched 1cm linear donor scar?
 - A. Scar excision with trichophytic (upper AND lower edge) closure
 - B. FUE grafts into the scar
 - C. Scalp Micropigmentation (SMP)
 - D. FUE grafts into the scar with subsequent SMP
7. If your patient develops raised "Braille-like" scars after body hair surgery (FUE/BHT), which of the following will help improve cosmesis?
 - A. Cautery
 - B. Time
 - C. Inject each individual FUE extraction scar with steroids
 - D. Ablative laser therapy every 4-6 weeks until resolved



8. If your patient has a patchy appearance from an FUE surgery at another clinic, which of the following would be the most effective treatment for improving the appearance with the least risk?
- A. Scalp Micropigmentation at a full year
 - B. Scalp Micropigmentation as early as possible
 - C. Transplant hair from the surrounding areas into the FUE scars
 - D. Platelet-Rich Plasma (PRP) injections one month apart for about 6 to 12 months
9. In a 2,000 graft FUE case, how much of a difference can the punch size make? For instance, if you reduce the punch size by 0.1mm (i.e., go from a 1.0mm punch size to a 0.9mm punch), about how much *less scar* do you create?
- A. 5%
 - B. 10%
 - C. 20%
 - D. 30%

➤ ANSWERS ON PAGE 158

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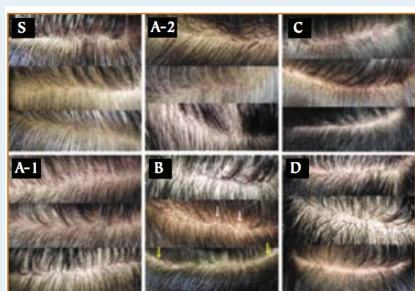


Figure 1. Donor Scar Classification: Six types were classified based on the donor wound healing: Type S; Type A-1; Type A-2; Type B (the white arrows show spot-like scars and the yellow arrows show short linear scars); Type C; and Type D.

help a mediocre one become good, and a good one move to great, in my opinion. Of course, some physicians get remarkable results without trichophytic closure at all, and some patients scar no matter what we do. This question is about optimizing the situation for every patient and, at least for this article, both upper and lower edge trichophytic closure seems to work the best. (See figure.¹)



Figure 5. Donor macro after full FG harvest showing significant disruption of architecture.



Figure 6. Donor area macro after partial FG harvest showing preservation of architecture.

process. Less visible scarring is one of the promises of FUE! Harvesting only single-haired FUEs will result in a poor recipient area result, and harvesting isolated follicular groupings is the problem. Harvesting <10% of the available donor area will help reduce the overall appearance, but this will still disrupt the architecture of the donor area if isolated follicular groupings are selected.

3. **A!** Another Dr. Bob “True-ism.” (Get it?) When I started using HRH with my strip cases, scars improved significantly. Simply measuring donor elasticity will not increase strip size although it may help you better predict potential complications and plan surgeries better. Daily scalp stretching exercises DO work, but need to be started earlier than one week in advance to have the effect. The tissue spreader will help reduce transections, and a tensioner holds the skin taut, but neither increases the potential size of a donor strip.³
4. **B.** Keeping punch sizes as small as possible will help with the overall appearance of scarring in the donor area after FUE excision, but it is the size of the area LEFT BEHIND that gives it the patchy look, and even a small punch will leave a patchy appearance if the FU selection is not a careful one. Similarly, a larger (1.0mm) punch can leave a beautifully diffuse hidden pattern of scar in the donor area (without patchiness) IF the selec-

1. **C.** This study provides evidence that the improvement when working with both wound edges is better than either edge alone, which is also better than no trichophytic closure at all. Trichophytic closure will not save a bad scar, but it can

2. **A.** This is otherwise known as “fractional harvesting of follicular groups.” The effect is subtle, yet profound. The first mention I found published was Dr. Bob True’s co-editor’s message (see figure).² If you are a newer FUE-only practitioner, it is worthwhile to look at the photo in the figure and try to develop your pattern recognition to emulate this selection

tion of FUs is done properly.⁴ In case you don’t know what answer D, “DUPA,” is—look it up and avoid it—at least on the ABHRS Oral Board Exam!

5. **D.** Less tension = less scar. B (Occlusive dressing) helps wounds to heal for certain, but tension + occlusive dressing will still result in more scar than occlusive dressing alone. Answer A will cause more scar than answer C, so if you are doing a linear excision, answer C would be better. But no matter how excellent your closure technique, less tension = less scar.⁵
6. **D.** 1cm scars will not be hidden by SMP alone if the hair is shorter than the scar, and are not likely to be optimized by either FUE hair into the scar alone or plain scar removal. This question can be argued differently in different situations, and if the patient wears their hair long, it might even be a non-issue, but in the case as described, the answer will most often be D.
7. **C** was the answer... until Dr. Ron Shapiro emailed me while I was writing my column!⁶ The case was originally presented by him and involved body hair transplant from the chest. Injections with steroids had helped



resolve the scarring. The updated history is that now the patient has developed large keloids at these areas that have coalesced (see figure). They do resolve with injections, they just come back larger, like the mythical Hydra. The current treatment plan is being debated, but may include either more steroid injections with subsequent pressure dressings OR excision with the same. I will have to do a later question update (or perhaps Dr. Shapiro will consider presenting this case at the ABHRS/ISHRS Morbidity and Mortality dinner in Bangkok). Meanwhile, for those who keep score for their Hair Quiz, consider this a free bonus question.

8. **A.** This is correct assuming the scarring is not so bad as to have no hair left in the area at all. Transplanting hair from “other” areas begs the question of where the donor hair would be coming from. This is not a trivial problem since body hair and hair outside the safe zone is not as reliable or aesthetically matched as scalp hair. Platelet-rich plasma injections will not restore visual density to a scarred area, and stem cell hair treatments are unproven and will not work either (that we yet know of). The reason to wait a year is to 1) see how much hair regrows so that you can add density in an even manner, and 2) avoid pigment fading from the healing process.
9. **C.** I love these little math teasers! Here’s what you need:

Formula for the area of a circle: $A = \pi r^2$

- Radius of each little circle with a 1mm diameter punch: 0.5mm = 0.05cm (Let’s not quibble sharp/blunt/trumpet, shall we?)
- Radius of each little circle with a 0.9mm diameter punch: 0.45mm = 0.045cm

Letter to the Editors

Mir Malkani, MBBS | London, England |
Info@malkanihairinstitute.com

Re: Follicular Unit Excision (FUE): How to get more multi-FUs (MFU) than single FUs and minimise transection rate.

In my 11 years of experience as an FUE hair transplant surgeon, I have been visited by several colleagues and I have visited others. One of the questions that is often asked is: how do we reduce transection and capping and increase multiple grafts harvesting. Here, I address this question and share my tips.

In FUE hair transplant surgery, the key is the donor area and not just the type of hair (e.g., fine, coarse, grey, white, blond, ginger). It also depends on scalp skin (e.g., tough or thick skin, normal laxity or hyper mobile skin, length of grafts, subcutaneous tissue, etc.). You determine most of this only after you have started punching and extraction.

In addition, the age and lifestyle of the patient determines, to an extent, how much bleeding and oozing you are likely to encounter, and this may influence the speed of excision. Therefore, how easy or difficult a case is going to be is impossible to say with certainty until you have actually started the procedure.

It is my practice that after injecting LA, I excise 10-20 grafts as "test" grafts from the mid occipital scalp and the same number from the sides (mastoid areas). This gives me an idea as to how the rest of the procedure is going to go. Every patient--their scalp and grafts--is unique, and yet there are similarities. For example, for an occipital scalp that is hyper lax or mobile, the surgeon needs to stretch and stabilise it with the non-punching hand in order for the punch to penetrate without skewing and transecting grafts. This is one way to reduce transection rate.

The other way is to adjust the length of your punch to the length of the test grafts so that the punch stops just short of the hair bulb but to not include the bulb otherwise grafts will get sucked into the punch and block it like a drain. You will know this if subsequent punching will make grafts stay below the surface of the scalp and look like buried grafts. At that point, you will need to stop, clear the punch of grafts or change it, adjust the length of punch, and restart. It is worth noting that grafts vary in lengths in different areas of the scalp and you need periodic adjustment. It is also my experience that 9 out of 10 men with male pattern hair loss and receding hairlines tend to have more hair loss on the right than left, and grafts tend to be of better quality and more multiples and longer on the more hair loss side in the donor area.

After punching, another important way to minimise transection and maximise multiple graft harvesting is to extract using forceps. In general, I use angled/curved forceps in my dominant hand and straight in my non-dominant. I pull the graft 0.1-0.2mm with angled forceps, which gives a clear idea of graft direction, and I then apply straight forceps under the angled and apply traction and complete traction. For grafts that are capped or offer resistance, I wiggle and leave them for few minutes and then come back to them and they extract easily.

This way, my speed, depending on type of hair and scalp, ranges from 400 to 650 per hour. I do not do purely Afro curly hair and use serrated Cole punch size 0.9mm. My assistants never dissect/split the grafts, however, they do trim thick grafts with excessive fatty tissue. ■

So for a perfect 2,000 graft FUE harvest, the calculation for a 1.0mm punch would be:

$$2000 \times 3.14 \times 0.05\text{cm} \times 0.05\text{cm} = 15.7\text{cm}^2$$

And for a perfect 2,000 graft FUE harvest for a 0.9 mm punch would be:

$$2000 \times 3.14 \times 0.045\text{cm} \times 0.045\text{cm} = 12.7\text{cm}^2$$

Which is a difference of ~20%! Don't always go for the smallest punch in every case, though. Consider your punch size selection wisely since graft quality will always be the most important selection criteria of all.

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6. Personal communication with Ron Shapiro, MD. June 17, 2019. ■



Message from the ISHRS 2019 World Congress Program Chair

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

Registration is now open for the ISHRS Meeting in Bangkok. Go to 27thannual.org to register online. Don't delay. Make your plans, if you haven't already. We have an

amazing lineup of speakers, topics, and sessions.

Our Featured Guest Speakers this year include **Ohsang Kwon** from South Korea speaking on "Allogeneic Hair Transplantation." **Tom Dawson**, a renowned hair scientist from Singapore, who previously was a hair scientist at P&G in their consumer health care products focused on hair, will be speaking to us on "Optimizing Hair Health." **Ramon Grimalt** from Barcelona will speak with us about "Managing Androgenetic Alopecia with Medical Therapy" and "Platelet-Rich Plasma for the Treatment of Androgenetic Alopecia." **Gillian Westgate**, a hair biologist from the U.K., will educate us on "Adipose Derived Stem Cells: Where Are They From and What Are They Doing for the Hair Follicle?" And **Janet Nelson**, a certified office ergonomist from New York City who practices applied and clinical physiology, will teach us about "Ergonomics and Prevention of Injuries when Performing Hair Restoration Surgery."

We have two banks of Workshops on Friday. As part of your Congress registration fee, you may choose one workshop in each bank. Several featured speakers will be teaching in the Workshops as well. Brad Wolf, Workshops Chair, put together an excellent selection. Most workshops

have limited seating, so reserve your tickets early...register now!

Bank 1

Workshop 101: [Hair Care Products](#)
Workshop 102: [FUE Tools & Techniques](#)
Workshop 103: [Cicatricial Alopecias](#)
Workshop 104: [Non-Surgical Medications](#)
Workshop 105: [SMP](#)

Bank 2

Workshop 111: [Recipient Area](#)
Workshop 112: [FUT: Techniques to Create a Narrow Scar](#)
Workshop 113: [Implanters](#)
Workshop 114: [FUE Beard and Body](#)
Workshop 115: [Stem Cells](#)

We again will be hosting our popular Newcomers Program. If you haven't been to an ISHRS meeting yet, I encourage you to attend this year. Our Newcomers Program helps orient those who are new to the field or new to the ISHRS Meeting. You'll meet many colleagues and feel welcomed. If you are a longtime ISHRS member who attends many ISHRS meetings, then please consider signing up as a host.

For the most up-to-date program and information, please visit the ISHRS Bangkok Congress website at 27thannual.org. I look forward to seeing you in Bangkok! ■



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2019 WORLD CONGRESS FEATURED GUEST SPEAKERS



Ohsang Kwon, MD
Department of Dermatology,
Seoul National University College of Medicine,
Seoul, Korea

“ALLOGENEIC HAIR TRANSPLANTATION: CURRENT STATUS”

You likely get the following question asked by your patients: “My friend/brother/cousin has so much hair! Can’t you take some of his and transplant it to me?”

Is it possible to transplant hair from one person to another? It has been tried in the past, but success would require harsh immunosuppressive drugs and, for this reason, was not a logical treatment. Dr. Kwon has been conducting research on mice and will share with us new, exciting developments. Could this be the future of the field of hair restoration surgery?



Thomas L. Dawson, Jr., PhD
Agency for Science, Technology, and Research
(A*STAR), Institute for Medical Biology,
Singapore

“OPTIMIZING HAIR HEALTH”

What we apply to our hair and scalps matters. The value of the global hair care market amounted to nearly 100 billion U.S. dollars in 2017. You can imagine that there are hundreds of thousands of invalidated marketing claims. What is the truth about certain products? Which ones really work? What should we recommend to our patients—or for that matter, to use on ourselves and to recommend for our family and friends—to optimize our hair health? Learn from an accomplished hair research scientist and have the opportunity to ask your questions.



Gillian Westgate, PhD
Centre for Skin Sciences, University of Bradford,
United Kingdom

“ADIPOSE DERIVED STEM CELLS: WHERE ARE THEY FROM AND WHAT ARE THEY DOING FOR THE HAIR FOLLICLE?”

We have been hearing a lot about injecting fat as an adjunctive therapy for hair loss and to improve HRS outcomes. What is the rationale? What are the different types of adipose tissue and what is the clinician aiming to do? What does the research say?



Ramon Grimalt, MD
Department of Dermatology, Universitat Internacional
de Catalunya,
Barcelona, Spain

“MANAGING ANDROGENETIC ALOPECIA WITH MEDICAL THERAPY”

We are all familiar with the tried and true topical minoxidil and oral finasteride. But what about oral minoxidil? Is it an effective medication for AGA? Based on the research trials thus far, what is the appropriate dosing, what are the side effects?

“PLATELET-RICH PLASMA FOR THE TREATMENT OF ANDROGENETIC ALOPECIA”

The popularity of injecting PRP to treat hair loss has been growing exponentially. There are many protocols and no set treatment standard. Many doctors report positive results. What do we know about PRP for AGA? What is the theory about why it should work? DOES it work? What are the concentrations, intervals, and protocols that doctors are using?



Janet L. Nelson, MS, ACSM
Manhattan Applied Physiology,
New York, USA

“ERGONOMICS AND PREVENTION OF INJURIES WHEN PERFORMING HAIR RESTORATION SURGERY”

The delicate microsurgery and repetitive nature of techniques performed during hair restoration surgery has always lent to concerns of neck and back strains, and thus, proper ergonomics during surgery, for both the surgeon and the technicians. With the popularity of FUE, there are additional concerns as so many hours per day are involved with focus on a small surgical field. Learn and practice from an Applied & Clinical Physiologist about proper posture during surgery and possible ergonomic aids to minimize strain, as well as what exercises and stretching should be incorporated to maintain musculoskeletal balance and health.

NOV 13-16 | 27TH WORLD CONGRESS



WORLD LIVE SURGERY WORKSHOP | NOV 16-17



Message from the ISHRS 2019 World Live Surgery Workshop Chair

Kapil Dua, MBBS, MS, FISHRS | New Delhi, India | drkapildua@akclinics.com

Dear All,
We are now only a couple of months away from the Workshop. The plan is already in place and the

faculty has been finalized.

We are fortunate that the best surgeons in the fields of Strip, FUE, and SMP form all parts of the globe. They will be demonstrating and sharing their expertise in the six operating rooms.

We are trying to prepare some material for the workshop that can be sent to you before coming to Thailand. We are also trying to work out a computer station so that you can go through the main material anytime during the Congress.

Mid November is a time of Lantern festival in Thailand and our hotel will be specially decorated for it. It will be an experience to remember.

Looking forward to catching up with all of you in Bangkok! ■



Shangri-La Hotel, Bangkok, is nestled on the banks of the Chao Phraya River and offers a strategic, luxury haven to call home in the city.



Colourful hanging lantern and flags on locals' homes during the lantern festival. <https://asiagofun.com/loy-krathong-yi-peng-thailand-lantern-festival-2019/>

HAIR LOSS DIAGNOSIS COURSE FOR THE NON-DERMATOLOGIST

What You MUST Know If You Are Performing Hair Transplantation Surgery

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LEARNING OBJECTIVES

Upon completion of this course you will be able to:

- ▶ Describe many hair loss disorders as well as common scalp dermatologic conditions that the hair transplant surgeon may encounter.
- ▶ Discuss the diagnosis and treatment of many non-androgenetic alopecias.
- ▶ 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 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.

2014 – post 2 HT (2000 grafts)

2017 – still pulling

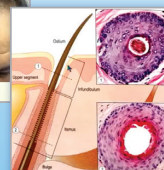
Lichen Planopilaris

- Band-like "lichenoid" inflammation at infundibulum of hair follicle and the attached sebaceous gland

How Does PRP Treat Hair Loss?

Growth factors → (Wnt)/β-catenin → ERK/AKT pathway activation:

- Promotion of vasculogenesis
- Promotion of angiogenesis
- Triggers anagen entry
- Extends anagen duration
- Information/oxidative stress reduction
- Triggers hair stem cell regeneration



COURSE OUTLINE	running time
Welcome & Opening Remarks Ricardo Mejia, MD	06:01
Hair Loss Diagnosis, Anatomy and Classification René Rodriguez, MD	20:01
Alopecia Areata, Diagnosis and Management Ivan S. Cohen, MD, FISHRS	22:29
Cicatricial Alopecias Nicole E. Rogers, MD, FISHRS	29:08
Inflammatory Scalp Disorders/Lumps and Bumps Jennifer Krejci, MD	24:08
Q&A All Panelists	13:25
Dermoscopy/Trichoscopy Lessons Learned Aron Nusbaum, MD	20:12
Diagnosing Hair Loss in Women Neil S. Sadick, MD	36:01
Scalp Cancers Ricardo Mejia, MD	13:55
PRP Basics Neil S. Sadick, MD	24:10
Q&A All Panelists	11:04

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Meeting Reviews

Review of the 5th Latin-American FUE Workshop March 18-20, 2019 • Buenos Aires, Argentina

Sara Salas, MD | *Tijuana, Mexico*; Steven P. Gabel, MD, FISHRS | *Tigard, Oregon, USA*;
Parsa Mohebi, MD, FISHRS | *Encino, California, USA*; Bessam K. Farjo, MBChB, FISHRS | *Manchester, UK*

The 5th Latin American FUE Workshop, attended by more than 200 physicians, was held in the beautiful city of Buenos Aires. The Latin American workshop has been pivotal in advancing the field of FUE in the past few years, with many novel techniques and devices originating from some of the greatest minds from the area. There were two days of lectures and a hands-on workshop in addition to great evening entertainment, which included a tango night. Dr. Sebastian Yriart, workshop president, along with the program chair and co-chair, Drs. Roberto Trivellini and Parsa Mohebi, organized a workshop that provided good coverage of most of the trending topics in the field of hair restoration, including Follicular Unit Excision (FUE).

MONDAY/MARCH 18

Following the welcome session, Dr. Nilofer Farjo led a panel with a series of useful lectures on the general concepts of hair restoration, the preliminary approach to hair loss, diagnostics, and the less common types of hair losses.

Dr. Francisco Jimenez shed some light on the functioning anatomy of hair follicles with a novel approach. It was also mentioned that in reality we have 7% single-hair, 53% two-hair, and 40% three-hair follicular units naturally, and that we only shed 50 hairs per day and not 100.

Dr. Sharon Keene led the next panel that covered existing and emerging medical treatments for hair loss. Clascoterone, a topical androgen receptor antagonist, and setipiprant, an oral PGD2 antagonist, were mentioned, along with the concepts of hair follicle regeneration and rejuvenation.

Dr. Alejandro Chueco's panel focused on specific planning treatments for less common hair loss scenarios. Dr. Bob True reviewed the principles involved in consistently excising excellent-quality grafts. He noted that even minor adjustments can make a significant difference in the outcome of FUE procedures. His advice was to ideally centre the follicle within the punch lumen, however, if hairs are acutely angled, the follicle should be placed near the rear of the punch. If the hairs are curled, they should be placed near the front of the punch.

Dr. Pitalla suggested there was clear benefit from activating PRP with calcium gluconate when treating androgenetic alopecia.

Multiphasic extraction devices, such as the Trivellini device, provide the physician maximum flexibility in obtaining the best quality grafts by utilizing the various modes and settings. Dr. Franzini reminded us that hyperprolactinemia may contribute to graft failure and poor growth and reduced density. Prolactin can be elevated by antidepressants and thyroid issues, and it was suggested that it might even contribute to wider scars.

Graft harvesting principles were reviewed by Dr. Mauro Speranzini and his panel, bearing in mind the new punches available. Dr. Koray Erdogan presented his "KE-bot," which measures both density and hair and coverage value. He concluded that a higher coverage value increases the percentage of the donor hair available for extraction. Dr. Sharon Keene used a densitometer on different areas of the scalp to measure the total donor hair available. She advised harvesting an average of 15 hairs per square centimeter. Dr. James Harris followed with a method that could be used as a middle ground for measuring the donor size and he discussed the Hair Diameter Index (HDI). Dr. Harris estimated 6,000-7,000 grafts are available in a patient's lifetime. It was also noted that 15-20% of patients will progress to Norwood VI-VII, and it was advised not to operate on the crown on a patient under the age of 40. Dr. William Rassman discussed the limits of how many FUE grafts are available, and advised to avoid harvesting below the occipital protuberance.

Dr. Akaki Tsilosani led an interesting panel on the diverse range of new devices available.

A Black Market Roundtable was moderated by Dr. Craig Ziering about the black market/unlicensed practice of hair restoration. Drs. Farjo, Keene, Jimenez, True, and Arthur Tykocinski were panelists while others from the floor joined in a very lively conversation. While some old ideas were reviewed, some novel notions were presented, such as taking practical steps to get the governments involved to attempt to help put a stop to this practice.

Different personal techniques were presented by Drs. Chueco and Ruston, both detailed and educational. Dr. Conradin von Albertini compared his experience with different extraction devices including the Powered Cole Isolation Device (PCID), S.A.F.E.™ System and Trivellini System. Dr. Nicolas Lusicic then reviewed the new ARTAS® technology. The following panel, led by Dr. Tykocinski, reviewed recipient area, site making, and artistic considerations for a perfect hairline.

New implantation and inserting devices were compared during the subsequent panel. Dr. Rassman led the Scalp Micropigmentation (SMP) session, which included a review of the practical aspects of SMP and its clinical indications. The first day then ended with a video session covering a variety of topics such as dull implanters, long hair FUE, and cannula use for beard and eyebrow hair restoration.

TUESDAY/MARCH 19

To open day two, combination surgeries utilizing both FUT and FUE were discussed, along with extraction and implantation techniques, aiming to improve graft survival. This was followed by a review of circumstances where a high

number of grafts were transplanted in a single session for more severe cases of hair loss. These included FUE “mega sessions” using both long and short hair, along with combined FUT + FUE surgeries.

Applying these techniques in the African-American patient was covered in detail. We learned the most important aspects involved when performing hair transplantation in women using the FUE technique.

More complex cases, along with beard and eyebrow transplantation, were covered in the session that followed, encompassing detailed advice for pre- and post-op care and supported by videos.

The importance of eyebrow anatomy in relation to transplantation was covered, and in particular how to create a design in accordance with individual facial anatomy. The session reminded us that grafts from either FUT or FUE can be used as long as they are of an appropriate length to allow the curl to be visualized upon placing, ensuring the hair is placed in the correct direction.

Starting with mention of its creator, Dr. Marcelo Pitchon, long hair transplantation was the subject of the next session. There is an incredible amount of patient satisfaction with long hair surgery, since the results are visible immediately following surgery. We were reminded to pay attention to our ergonomics and position during surgery.

Communicating the examination findings and surgical plan to the patient was emphasized, including an estimation of the total number of grafts that can be transplanted in the patient’s lifetime.

Tranexamic acid was mentioned as a potential treatment to reduce bleeding. The calculation of hair per graft was discussed in full by making a comparison between what can be obtained with the FUE technique versus the FUT technique. This led to a discussion on FUT surgery and its value as a treatment option. Most panelists agreed that there is still value in doing strip surgery for many patients, reiterating patient selection and knowledge of the technique are important, along with checking scalp elasticity and history of keloid scarring.

The day concluded with the topic of pre-surgical and post-surgical medical treatments as well as indications for considering a biopsy of potential cicatricial alopecias. The complications of the FUE technique were reviewed in another panel.

WEDNESDAY/MARCH 20

Live Surgery Workshop

Hosted by Drs. Lusicic and Alejandra Susacasa, there were almost a dozen live cases performed. Attendees were exposed to a wide variety of techniques for both FUE and implantation. These could be viewed either in the surgical suites or in the lobby on monitors set up to show all of the cases at once.

OR 1: Drs. Mohebi and True demonstrated the multiphasic Trivellini device to extract scalp hairs. Dr. Trivellini then inserted the grafts to develop a beard using a 90-degree bent needle and dilator while his assistant grasped the follicles only by the epithelium to slide them in.

OR 2: Dr. Rodriguez performed an eyebrow transplant extracting the grafts using the long hair FUE technique and placing about 300 grafts per side with sharp implanters.

OR 3: Drs. Susascasa and Lusicic used the ARTAS robot to harvest over 2,000 grafts in the morning while their assistants placed the grafts using forceps in the afternoon.

OR 4: Dr. Chueco manually extracted grafts while Dr. Erdogan and his staff demonstrated how to implant grafts using the KEEP implanters. They emphasized correct insertion and rotation of the implanter for proper hair direction. Dr. Erdogan also noted that the use of polarization and magnification improves visualization of the scalp.

OR 5: Dr. Sanusi Umar extracted chest hair with the Dr.UGraft™ device and punches. He emphasized that patients undergoing body hair transplants need to be properly prepared by having them shave the donor area about one week prior to the operation and also apply minoxidil 1 month in advance. This helps to select hairs in the anagen phase of the hair cycle, which are much better for body hair extraction.

OR 6: Drs. Marie Schambach and Otavio Boaventura performed a 1,000-graft long hair FUE on a female patient. Grafts were inserted into the frontal zone with implanters. They emphasized that traction on the existing hair with Velcro is helpful for visualizing the excision area, and to only use oscillation when extracting long hair. In addition, it is important to not push the punch into the scalp but instead to allow it to do the work and only guide the device as the punch is penetrating the skin.

For the afternoon cases, Dr. Harris demonstrated harvesting grafts with the SAFE system using a blunt punch and Dr. Speranzini made the recipient sites and placed the grafts using dull implanters. Dr. Speranzini stressed the need to rotate the implanter for correct graft exit direction and to precisely leave the graft at the correct depth in the skin. Drs. Alex Ginzburg and von Albertini showed manual and motorized FUE techniques and Drs. Muricy and Oscar Marinacci demonstrated implantation techniques on a patient with a large scar in the frontal zone. Lastly, Drs. Salas and Sara Wasserbauer performed SMP on a patient with a prior strip harvest scar.

In total, the live surgery portion of the workshop was well organized and offered a tremendous opportunity to view a variety of cases throughout the day. Best of all, the sharing of ideas and techniques with all the physicians in attendance was outstanding. The evening ended with an amazing professional tango performance and dinner.

Summary

With a healthy number of esteemed faculty as lecturers and operating surgeons from different countries, this workshop offered opportunity for participants to keep up-to-date on the latest methods in the field of FUE. The next Latin American workshop is expected to be held in the beautiful city of Cancun, and considering the rapidly increasing number of attendees to this annual workshop, we expect a high turnout. ■

Review of the ISHRS FUE Hands-on Cadaver and Live Surgery Workshop

Istanbul • April 19-21, 2019

This unique course was organized by Drs. Kayihan Şahinoğlu and Tayfun Oğuzoğlu. It was designed to give participants general information about hair restoration surgery and FUE as well as to provide basic hands-on FUE experience with cadaver scalps and exposure to live surgery demonstrations.

FRIDAY/APRIL 19

James A. Harris, MD, FISHRS | *Greenwood Village, Colorado, USA*

Cadaver Lab

This portion of the course was conducted the second half of the first day, but I will begin with this review first. The faculty had a chance to test specially prepared cadaver heads for teaching FUE. I have been personally involved in a 15-year search for an adequate model for teaching FUE, including different animal skins, synthetic skins, cadaver scalp, silicone models, and foam models of various types without ever finding the ideal model. Dr. Şahinoğlu, a former professor of anatomy, had an idea about how to process fresh cadaver heads in such a way as to preserve tissue integrity and he used this process for this workshop. The process takes 3 months and involves vascular washing and perfusion along with the preservation of the specimen in a tank with a special solution.

This process resulted in cadaver scalps that had slight rigidity—mimicking live tissue that had a small amount of tumescence—and there was excellent preservation of the follicular unit architecture at the surface. When attempting FUE with a sharp 1mm punch, the punch entered easily, and grafts were readily produced preserving the anatomy of the follicular unit. The follicle transections were easily analyzed as to the issue causing the transection including angle and direction errors. In typical cadaver tissue, there are issues of the boggy tissue clogging the punches and this problem was not encountered. The only tissue in the punches was the occasional intact graft that was usually easily removed.

Another typical problem with fresh or formalin preserved cadaver scalp is that when attempting to remove dissected grafts, the hair shaft often separates from the follicle making graft removal difficult; these specially treated scalps only had a rare separation of the hair shaft from the follicles.

In a matter of a few hours, the students had produced hundreds of FUE grafts with an experience that closely matches training on live patients. The grafts were easily analyzed for technique errors and were usable for graft implantation training.

I see this method of scalp preservation as becoming the standard for the model of FUE training since it can be used to bring doctors to a state of proficiency in the shortest amount of time. This preservation technique will also be invaluable for training physicians and technicians in graft insertion whether using forceps or implanters.

Lecture Program

The first day of lectures was held in the beautiful and modern Acibadem University Medical School. Dr. Şahinoğlu be-

gan the day by discussing the essential anatomy of the scalp, which is fundamental knowledge for any hair restoration surgeon and would also provide a foundation for the remainder of the lectures and the cadaver lab experience. Dr. A. Emre Kardeniz provided an overview of hair restoration to give the attendees a general impression of the scope of this specialty and to give the remainder of the lectures some context.

Dr. Konstantinos Anastassakis reviewed the essentials of hairline design along with a live demonstration using the scalp and hair of several attendees followed by a lecture on the principles of safety and long-term decision making in hair restoration paying special attention to those decisions that could lead to less-than-acceptable long-term consequences.

Dr. Yeimy Alvarez began the introduction to FUE. She presented the range of FUE instrumentation and implanters as well as some of the fundamental theories and rationale for their use.

I then presented FUE donor calculation principles based on the concepts of the safe donor area as well as the hair diameter index and how they are used to provide basic concepts in donor capacity calculations. This was followed by my presentation on FUE donor harvesting principles and techniques highlighting the basic devices of manual techniques as well as motorized devices including sharp, blunt, hybrid, and robotic devices.

Dr. Anastassakis next presented the basics of recipient site planning, instrumentation for recipient site creation, and methods for graft implantation. He discussed the rationale for the various methods and instruments.

Dr. Alvarez returned for a talk on her experience with the ARTAS® robot versus that with the motorized SAFE System, and her clear preference for non-robotic FUE based on a variety of reasons including speed, graft yield, patient experience, cost, and graft quality.

Finally, Dr. Karadeniz provided a presentation to balance the harvest methods of strip harvest versus FUE along with the considerations and thought process about under what circumstances when each method might be more appropriate.

The last half of the day was spent in the anatomy lab providing attendees the opportunity to use the specially processed cadaver heads to perform FUE using a motorized sharp punch system, graft removal, recipient site planning and creation, and graft placement. There were also foam models to use for hairline and temple point design. Each participant had at least one hour of hands-on experience with a student to teacher ratio of 4:1.

SATURDAY/APRIL 20

Steven Gabel, MD, FACS, FISHRS | *Tigard, Oregon, USA*

Lecture Program

The second day of the workshop was conducted at the Acibadem Altunizade Hospital. The first half of the day consisted of presentations in a large auditorium, which were followed by two live FUE surgical cases.

Dr. Ekrem Civas started the morning with an in-depth presentation on the most common treatment protocols for

male and female androgenetic alopecia. A nice chart was provided at the end of the talk scoring each of the treatment options based on their scientific merit in the literature.

Dr. Sanusi Umar provided a wonderful overview of the various types of FUE punches available. He discussed everything about FUE punches including shapes, sizes, metallurgic scoring, and configurations (theory on sharp, dull, and hybrid) presented in a world-class video animation, which made it easy to understand. Next, Dr. Umar presented theory and his techniques on body hair transplantation. He discussed how he prepares the body hair weeks ahead of surgery to specifically select the anagen hairs, and how punch size and shape influence the mechanics of the body hair extractions. Lastly, he presented his specific techniques for FUE in African patients with many tips and pearls for improved results.

I then presented an overview on post-operative care following FUE with emphasis on close patient follow-up, meticulous post-operative cleaning and wound care, and providing the patients with detailed information to minimize post-operative complications. I then followed with an overview lecture of medical therapies for androgenetic alopecia.

Dr. Civas returned and gave an excellent presentation on scarring and non-scarring alopecias. He emphasized the importance of obtaining a correct diagnosis, and he provided several important flow diagrams to aid in this process.

Dr. Tayfun Oğuzoğlu then presented an overview on regenerative medical options for hair loss including platelet-rich plasma (PRP), ACell, and stem cell therapies for hair loss, and how he has incorporated these into his practice.

I returned and discussed complications pertaining to FUE hair restoration surgery by dividing the topic into general surgical complications, donor site complications specifically for FUE harvesting, and recipient site complications. This was then followed by a presentation on setting up a hair restoration practice, how to hire and train staff, and the importance of excellent photography to document the results.

The final presentation was conducted by Drs. Anastassakis and Karadeniz on the black market in hair restoration surgery. This topic was especially relevant since the workshop took place in Turkey where there are now over 1,000 hair restoration clinics, most of which are unregulated causing significant, permanent complications to patients including poor hairline design and growth, donor site overharvesting leading to significant scar formation, and overall unsatisfactory results for these unfortunate patients. They discussed the ISHRS position statement and campaign to bring awareness to the general public about the black market in hair restoration surgery.

Live Surgery

Following lunch, live surgery was performed on two patients. Attendees were able to watch the procedures up close in the surgical suites or in the auditorium with Drs. Harris and Anastassakis moderating the session.

In Room 1, Dr. Şahinoğlu performed a 600-graft FUE procedure on a 35-year-old male patient who desired to



increase the density to his frontal hairline region. Dr. Şahinoğlu explained step by step his methods for anesthesia in the donor and recipient areas and his techniques for graft excision. He utilized an ERTIP sharp FUE punch (0.9-1.0mm) with a motor-

ized handpiece and showed the attendees the importance of always monitoring and adjusting direction and depth of the punch depending on the location in the donor area. Once the grafts were removed, his staff examined and appropriately trimmed the grafts of excess tissue, which were then counted and sorted according to graft size. After anesthetizing the frontal zone, the slits were made in a sagittal orientation with chisel blades of various sizes. The staff then placed the grafts with 45-degree forceps.

In Room 2, Drs. Oğuzoğlu and Umar performed a 1,415-graft FUE procedure on a 37-year-old male to increase density in the frontal and mid-scalp zones. They used a 19g Dr.UGraft™ punch to extract grafts from the side of the scalp and an 18g Dr.UGraft punch to extract grafts from the central donor area of the scalp. The grafts were examined and sorted by the staff. Dr. Oğuzoğlu demonstrated his method of anesthetizing the recipient area. He then created the recipient sites using a 1.3mm diamond blade knife. The implantation of the grafts was done by the staff using classic forceps. Attendees were able to observe two surgeons on the same patient in order to compare and contrast their particular styles and techniques for graft harvesting.

That evening, the gala was held at the Büyük Kulüp (Cercle D'orient) at Kadikoy. We all enjoyed a wonderful dinner, awards presentation, and dancing to traditional Turkish music with a private band.

SUNDAY/APRIL 21

Steven Gabel, MD, FACS, FISHRS | Tigard, Oregon, USA

The final session of the workshop was a relaxed, round-table discussion with faculty and attendees over Sunday breakfast. We had a two-hour lively discussion covering all sorts of topics in hair restoration surgery including safety, anesthesia, FUE techniques/punches, strip harvesting techniques and closure, complications, post-operative care, medical therapies, and best practices. Attendees were also very interested in preparing for the Board Examination and we presented a brief discussion on applying to the ABHRS and preparing for the written and oral examinations.

In Summary, the 2019 ISHRS FUE Hands-on Cadaver & Live Surgery Workshop in Istanbul was a great success incorporating relevant lectures, live surgery, and a hands-on cadaver laboratory session to give the beginner hair restoration surgeon a well-rounded educational experience. The participant to faculty ratio was advantageous to provide a significant amount of individualized teaching, especially in the cadaver laboratory where the students were able to practice and learn techniques for scalp and beard graft excision. Drs. Şahinoğlu and Oğuzoğlu did an excellent job of coordinating and developing the program designed to help participants expand their knowledge base for their future in hair restoration surgery. They plan to continue the hands-on workshop on a yearly basis. ■



“Find a Doctor” Online Search Notification of Change

The mission of the International Society of Hair Restoration Surgery (ISHRS) is to achieve excellence in medical and surgical outcomes by promoting member education, international collegiality, research, ethics, and public awareness. In an effort to adhere to these fundamental principles, we will be revising benefits for Associate Members of the ISHRS.

Notification of Change in the ISHRS “Find a Doctor” Online Search

As of January 1, 2020, only full “Member” and “Fellow Member” physicians will be included in the public “Find a Doctor” online search at www.ishrs.org. Associate Members will no longer be included.

The decision was made in an effort to recognize those who show a commitment to the specialty by receiving continuing medical education to keep abreast of the latest advancements in hair restoration surgery. While the Find a Doctor does not certify or guarantee a level of training or competency, by including those who attend meetings, the public can at least be assured that the member did not simply pay dues and use the ISHRS “badge” as a marketing tool.

**Associate Members are encouraged to elevate to full Member status.
Deadline: July 1, 2019, for 2020 calendar year**

To elevate from Associate Member to full Member, a physician must either:

1. Earn ABHRS certification and attend at least two ISHRS approved meetings, or
2. Attend at least 4 ISHRS approved meetings.

To maintain full Member status, a person must attend at least 1 ISHRS approved meeting every three years.

For a list of ISHRS approved meetings go to:

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

We are dedicated to our purpose to educate and share knowledge with our members and to promote excellence in patient outcomes. We look forward to providing you the opportunities for life-long learning.

If you have questions about your membership status, please contact the ISHRS headquarters at info@ishrs.org or by phone at +1-630-262-5399.

On behalf of the ISHRS Board of Governors,
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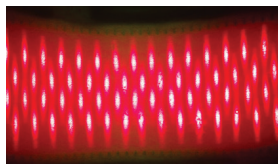
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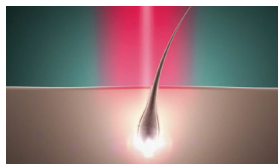
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2019 Meetings Calendar

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

November 13-17, 2019

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

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



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/>

11th Annual

August 2-4, 2019

St. Louis, Missouri, USA

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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.

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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 Restoration Surgery http://pa.slu.edu	pa@slu.edu
AUG 9-11, 2019	4th Annual Congress of the CAHRS <i>Guangzhou, China</i>	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 <i>Nile Ritz Carlton Hotel Cairo, Egypt</i>	Arab Association of Hair Transplantation (AAHT)	esprs@hotmail.com
* NOV 13-17, 2019 NOV 13-16, Congress NOV 16-17, WLSW	27th World Congress of the ISHRS & World Live Surgery Workshop: Triple Crown <i>Bangkok, Thailand</i>	International Society of Hair Restoration Surgery www.27thannual.org	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 | Thailand

28TH WORLD CONGRESS

October 21-25, 2020
Panama City | Panama

29TH WORLD CONGRESS

October 2021
Europe

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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 Swiss Society of Hair Restoration Surgery
 Thai Society of Hair Restoration Surgeons



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

- 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.
- Articles submitted with the sole purpose of promotion or marketing will not be accepted.
- Authors should acknowledge all funding sources that supported their work as well as any relevant corporate affiliation.
- Trademarked names should not be used to refer to devices or techniques, when possible.
- 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.
- Once the manuscript is accepted, it will be published as soon as possible, depending on space availability.
- 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.
- 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).
- 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).
- Please include a contact email address to be published with your article.

Submission deadlines:

August 5 for September/October 2019 pre-meeting issue
 October 5 for November/December 2019 issue
 December 5 for January/February 2020 issue
 February 5 for March/April 2020 issue

Please note submission address:
forumeditors@ishrs.org

Classified Advertising Guidelines for Submission

To place a Classified Ad in the *Forum*, email cduckler@ishrs.org. In your email, include the text of what you'd like your ad to read. You should include specifics in the ad, such as what you offer, the qualities you're looking for, and how to respond to you.

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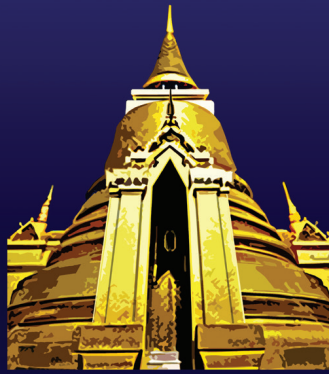
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Plan to Attend

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	General Session Live Patient Viewing Welcome Reception
FRIDAY November 15, 2019	Discussion Table Topics General Session Workshops M&M Conference
SATURDAY November 16, 2019	General Session <i>until noon</i> World Congress <i>ends at noon</i> WLSW: Triple Crown <i>begins (SMP) at the hotel when the World Congress ends</i> Gala! <i>in the evening</i>
SUNDAY November 17, 2019	WLSW: Triple Crown <i>hospital all day</i>



INTERNATIONAL SOCIETY OF HAIR RESTORATION SURGERY



World Congress Chair
WLSW Triple Crown Chair
WLSW FUE Co-Chair
WLSW FUT Co-Chair
WLSW SMP Co-Chair

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