Official Publication of the International Society of Hair Restoration Surgery

FORUM

HAIR TRANSPLANT FORUM INTERNATIONAL

VOLUME 28 | NUMBER 5
SEPTEMBER/OCTOBER
2018

IN THIS ISSUE

If hair is dead, when does it die? The Zombie Hypothesis

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INTRODUCTION

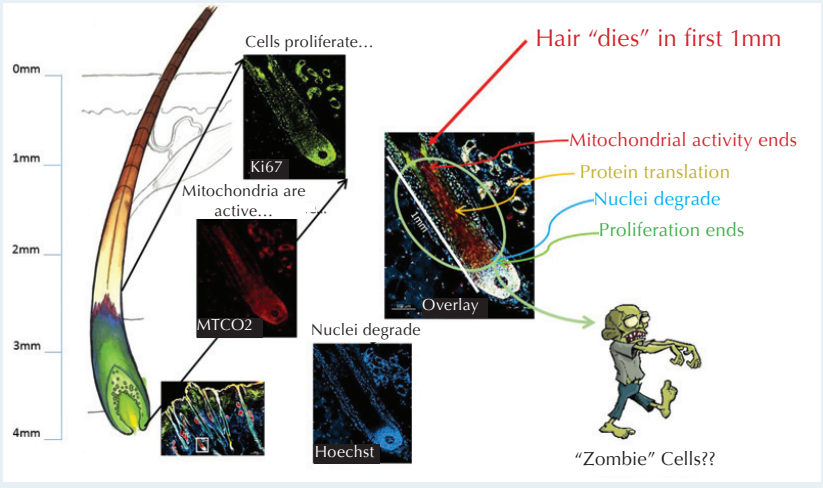
In a recent manuscript in the *British Journal of Dermatology,* Jones et al. show that the hair shaft dies within the first 1mm of the proximal aspect of the dermal papilla and undergoes a predetermined cell death program that involves destruction of the cell nucleus within the first 0.5mm of this region.[1] Following the nuclear degradation, there is continued mitochondrial respiration and new protein translation even in this anucleated state. These brainless "zombie" cells continue to make and crosslink the final proteins for the structure of the hair shaft using a preprogrammed set of instructions up to the 1mm mark where the mitochondria are destroyed and cell death is unequivocal. With the average scalp follicle being ~4mm long, this leaves the remaining ~3mm of newly formed hair susceptible to damage and without active cellular defenses against oxidative damage from intra-scalp and extra-follicular influences.

BACKGROUND AND OBJECTIVE

The production of the hair fiber has been studied for hundreds of years with research spanning everything from natural fibers used in textiles (wool) to the hair we as humans have on our heads. Most of the work, however, is at the extremes, either on the "live" follicle or on the "dead" hair shaft, with little attention paid to the transition between these two very different states. In this work, we focused on that transition to better understand hair growth and formation. This effort was undertaken to understand when the hair can be a "cosmetic" substrate—a potentially new space where hair biology becomes hair chemistry—in order to understand pre-emergent hair damage.

METHODS AND RESULTS

FIGURE 1.



In this paper, human scalp biopsy samples and human follicular units (FUs) were sectioned and triple stained with Hoechst dye for nuclear staining, an antibody against Ki67 to mark cell proliferation, and an antibody against MTCO2, a mitochondrial enzyme indicative of metabolic activity. As shown in Figure 1, cellular proliferation (Ki67, green) is high in the matrix region of the follicle. This activity is required to provide the biomass needed to make the hair shaft as it is constantly formed from the bottom up. This is quickly followed by a loss of the cell nucleus (Hoechst, blue) once the cells are finished providing the fodder for the hair shaft. It's at this point where the cells enter an anucleated state and maintain active processes of mitochondrial function (MTCO2, red), protein production,

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FORUM
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2018

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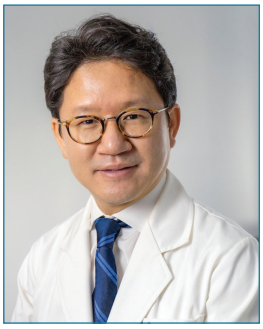
HAIR TRANSPLANT FORUM INTERNATIONAL
is published bi-monthly by the
International Society of Hair Restoration Surgery

First-class postage paid Milwaukee, WI and additional mailing offices.

POSTMASTER Send address changes to:

Hair Transplant Forum International
International Society of Hair Restoration Surgery
303 West State Street
Geneva, IL 60134 USA
Telephone 1-630-262-5399
U.S. Domestic Toll Free 1-800-444-2737
Fax 1-630-262-1520

Official Publication of the
International Society of Hair Restoration Surgery



President's Message

Sungjoo (Tommy) Hwang, MD, PhD, FISHRS | *Seoul, South Korea* | president@ishrs.org

Dear Colleagues,

I hope all of you are well!

This is my last message to you as president. It has been my honour to serve as president over the past year. As president, I have tried to be as democratic as possible and to be open minded to all perspectives when issues arise. Furthermore, I have also tried to respect the recommendations from the Board of Governors, the Executive Committee, past presidents, and the Global Council to make unbiased and fair decisions. Looking back over the past year, I don't think I would have been able to have a good year without the help of many of the members. I would like to express thanks to you all and especially to the entire administrative staff of the ISHRS for their support.

I remember back to 1999, when I participated in the ISHRS for the first time. Over the past 20 years, the ISHRS has changed significantly. During my time as president, my respect and passion for the ISHRS has grown. I learned that the ISHRS has flourished owing to the service of many members. Without their efforts, I don't think we would have been able to experience the immense growth of our society. We will be holding an event to honour some of these colleagues at the Hollywood World Congress. I hope you will join me in congratulating them and that we can all celebrate together.

This year, three members will retire and become Emeritus members. They are Bill Parsley, Richard Halford, and Walter Unger. On behalf of the society, I especially thank them for their dedication and service to our colleagues for the past several decades. Congratulations on becoming Emeritus members! I wish each of you good health and happiness. I am sure that our colleagues will not forget all your hard work.

In 2019, the World Congress will be held in Bangkok, Thailand, and in 2020 it will be held in Panama City, Panama. For the 2021 World Congress venue, we are considering Lisbon, Portugal, and Athens, Greece. If you would like to recommend a suitable city as a venue for the Congress, the Board of Governors will take all recommendations into consideration at the Hollywood meeting. Please express your interest and share your ideas for the most suitable place.

The 2019 World Congress in Bangkok, Thailand, was scheduled to host the Satellite Live Surgery Workshop one week prior to the General Session as we had done before. However, resulting from the positive feedback of our members, we adjusted the World Congress to November 13-16 and the Live Surgery Workshop to November 16-17 so that your leave period is not too long. I would like to ask for your active participation in this event.

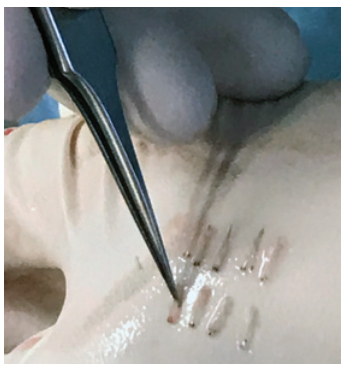
Some good news! I am very glad to let you know that the nominating committee has nominated Ali Abbasi as the new Board of Governor for the 3-year term, and Jean Devroye and Nilofer Farjo for the second 3-year term of the Board of Governors. In addition, Mel Mayer was nominated as the Secretary of the ISHRS after Francisco Jimenez, who was nominated as the Vice President of the ISHRS. In accordance with the ISHRS by-laws, alternate nomination petitions are available to voting members upon request. If the ISHRS does not receive a valid alternate nomination petition in accordance with the ISHRS by-laws before September 13, 2018, the above Slate will be elected by acclamation at the Hollywood World Congress of Voting Members on October 14, 2018, and the current Vice President, Arthur Tykocinski, will become the president of the ISHRS. They have been serving our society for a long time and have worked very hard over the past couple of years. I would like to congratulate all of them and express gratitude for their service. Also, I have no doubt that Arthur Tykocinski (the next president of the ISHRS) will do an excellent job as our new president, and will continue to develop our society over the next year.

Finally, there are many special events in Hollywood. I sincerely thank all those who have worked hard to prepare this Congress. I would like to invite all of you to participate actively and to enjoy your time in Hollywood.

Thank you again, and I look forward to seeing you all in Hollywood! ■

Pardon my error…

In Dr. Parsa Mohebi's, "A Novel Device to Insert FU Grafts into Premade Sites" (Vol. 28, No. 4; pp. 146-148), the photo in Figure 3 (p. 147) was inadvertently cropped. The photo on the right shows how grafts are arranged all in one direction.



My sincerest apologies for this oversight.

—Cheryl Duckler,
Managing Editor

Co-editors' Messages

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Everybody come to Hollywood!

Our upcoming World Congress in Hollywood will provide another great opportunity for us to learn and exchange ideas and concepts.

Hollywood is the magical dream factory, the center of the international movie and entertainment business. Many film and music stars live and work here. And their hairstyle is one important way for them to express themselves and play their roles. In fact, many celebrities have had hair transplants and some even admit it, being role models for our patients.

Could you imagine all actors having the same hair in all their movies? Or no hair at all?

This illustrates the importance of hair loss prevention and hair restoration and how it can change a person's appearance and life quality. And we all know how rewarding it can be: just think of that happy smile on the patient's face as Dow Stough described in his speech in Prague.

But how do we get to that point? Hair loss patients come with high expectations. The question is, how to meet them. Basically, we should listen and examine carefully, and establish a clear diagnosis and a systematic long-term plan.

Hair loss may be a symptom of internal disease and the treatment may require special drugs and/or skilled surgery. The management of alopecia is certainly not just an aesthetic job but a complex medical task, a physician responsibility.

We have to communicate this to the public through all available channels. My Hollywood movie idea: the ISHRS produces a YouTube video on hair transplantation that all members can share on their websites. It may become a blockbuster.

This issue again contains some interesting articles. I especially would like to thank the authors of the FUT vs. FUE survival study. The methodology is excellent. While a larger study would provide even more statistical evidence, it could be shown that FUT and FUE may produce a high yield in skilled hands. I think both harvesting methods have their own advantages and indications. While some patients may be more suitable for one method only, others may profit from a combination.

Some topics are controversial, so we expect to read your opinions in letters and articles. Send them to forumeditors@ishrs.org. ■

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Thanks to Mike Davis for presenting the synopsis of a study on the living-dead transition seen in hair follicles, which he performed with Dr. Jones et al. Mike presented this paper at Tri-Princeton's 8th International Conference on Applied Hair Science in Red Bank, New Jersey, where I gave a keynote presentation, "Modern Techniques in Hair Restoration Surgery." The main theme at this meeting of scientists and hair product manufacturers was the live vs. dead dichotomy of hair. The activity of the live follicle (first 1mm) is considered biology (treated medically) whereas the study of the dead hair shaft is considered chemistry (influenced by cosmetic hair care products). It also has implications for us as manipulation or injury in this crucial area during hair transplantation may cause pre-emergent damage.

The above study and the studies reviewed by Vlad Ratushny (Hair Sciences) on the WNT/ β-catenin pathway and Nicole Rogers (Literature Review) on PRP are well-constructed scientific studies that are lacking in our field.

Speaking of well-constructed studies, congratulations to David Josephitis and Ron Shapiro on their article comparing FUE and FUT results. It's not surprising to learn FUE and FUT grafts grow equally (when transplanted properly) but it's necessary to see evidence. We hear reports of 1,000 FUE grafts harvested per hour, transplanting 7,000 grafts in one day, and the advantages of implanters for placing grafts. But few are the studies that document results including yields/counts of grafts and follicles. I believe reports and claims made should not be published or reported at meetings until 6-12 months of growth and the type of survival analysis performed in this article. We are headed towards this standard for claims to be taken seriously.

Articles by Jeffrey Epstein and Gorana Kuka Epstein as well as Roberto Trivellini contain updates to similar published past *Forum* articles. While the ISHRS does not endorse either surgical technique or surgical device/instrument, their descriptions of the mechanics of their procedures/device are insightful and instructive as knowledge of the scalp and its follicles advances.

I was neither familiar with the work of nor ever met Felipe Coiffman, but I was stuck by David Perez-Meza's heartfelt eulogy. I was also struck by the quote concerning the harvesting of 4mm punches in the donor in the 1960s: "He [Dr. Coiffman] pointed out that donor strip removal and suturing leave a linear scar, which results in less scarring than the circular punch (4mm dia.) in the donor." Walter Unger stated: "I guess we had all forgotten Dr. Coiffman's ingenuity and its intrinsic long-term advantages over punch harvesting for decades." Now, the size of the punch and the scar are much smaller with FUE, strip scars have gotten thinner, the calculations have been made, and it appears history does repeat itself.

Finally, all roads lead to Hollywood—hair pilgrims unite. If you have any ideas, articles, or comments for the *Forum*, don't hesitate to talk with Andreas or me during the conference. I look forward to seeing all in LA. Safe travels! ■

CONTINUED FROM FRONT PAGE

and protein crosslinking; activities normally only seen in complete nucleated cells. This suggests that a preordained program was established prior to enucleation and the cells act like "zombies," carrying out activity without an active internal nucleus as the command and control center.

To further investigate the process of hair cell death, we characterized the way in which the organelles are prescriptively destroyed and have shown that the nucleus is degraded via canonical apoptotic and non-apoptotic processes and within the first 0.5mm of the proximal dermal papillae. Terminal deoxynucleotidyl transferase dUTP nick end labeling (TUNEL) is a nonspecific measure of nuclear destruction. Caspase-dependent and -independent processes were mapped using antibodies against caspase-activated deoxyribonuclease/DNA fragmentation factor subunit B (DFFB), a marker for apoptosis, and cell-autonomous nuclear degradation (DNAse1L2), a marker for cell-autonomous nuclear degradation.

After destruction of the nucleus, the cells in the follicle maintain mitochondrial activity to the 1mm mark where staining with ubiquitin-like protein LC3B and Bnip3L showed that the mitochondria then undergo a specialized form of autophagy specific to mitochondria called mitophagy. It is at this point when the cells that make up the hair shaft are considered dead as they continue their one-way journey upward and continue the cornification process that forms the hair shaft. This autophagic process has been recently shown to be critical to hair follicle function in a cultured hair follicle model.[2]

DISCUSSION

Proper hair architecture at the molecular level is an important characteristic of hair that has a healthy look, shine, and feel. Ironically, this lively, healthy hair is actually dead and is not regenerative after it exits the scalp. However, the origin of hair begins as a very active follicle that is full of specialized cells that ultimately make up the cosmetic hair fiber. The questions raised in the manuscript by Jones et al. include: Where does the transition of living-to-dead happen? and What are the molecular processes that happen during this transition?

The article states: "Transition of keratinocytes from actively respiring nucleated cells to anucleated structural cells within the hair follicle is key to the creation of a strong, healthy hair fiber. This specialized form of cell death, or cornification, requires cellular organelle removal to allow the cytoplasm to become packed with keratin bundles that are further strengthened by a carefully orchestrated, reactive oxygen species dependent cross-linking." This research demonstrates a programmed stepwise progression from the live to the dead state within the first 1mm of hair formation seemingly to make space for keratin proteins that make up the hair shaft and provide a healthy hair deep within the scalp.

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2. Parodi, C., et al. Autophagy is essential for maintaining the growth of a human (mini-)organ: Evidence from scalp hair follicle organ culture. *PLoS Biol.* 2018(Mar 28); 16(3):e2002864. doi: 10.1371/journal.pbio.2002864. eCollection 2018 Mar. ■

Notes from the Editor Emeritus, 1999–2001

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The Boys and Girls from Brazil

I have just had the privilege of attending the 7th Congress of the Brazilian Association of Hair Restoration Surgery. This was an excellent program consisting of high-quality presentations by speakers who were predominantly Brazilian but who were supplemented by speakers from many other countries.

Brazil occupies a special place in the field of cosmetic surgery in general, and hair restoration surgery in particular. Historically, we know of the special contributions of plastic surgeons such as Carlos Uebel, who published on micrografts in 1986 and won the Platinum Follicle in 2000. Other prominent contributors have been Fernando Basto (published on irregular hairline design in 1993), Marcelo Gandelman (Manfred Lucas award and Platinum Follicle winner), and Marcelo Pitchon, who described "preview long hair" FUT transplants in 2006.

In recent years, the field has also expanded to dermatologists, enlarging the talent pool. I can say with complete confidence that Brazil is currently enjoying a "golden age" with a whole generation of innovative, world-class surgeons becoming prominent in our field. The incoming president of the ISHRS, Arthur Tykocinski, is one. The current president of the Brazilian Association of Hair Restoration Surgery, Mauro Speranzini, is another. Then also consider Tony Ruston, Márcio Crisóstomo, Henrique Radwanski, and Maria Angelica Muricy.

Many Brazilian surgeons embrace the concept of "preview long hair" FUT transplantation pioneered by Marcelo Pitchon. I have always wondered about the wisdom of giving instant temporary gratification to patients with long hair grafting as I felt the resulting disappointment 2 weeks later, as the grafted hair shed, negated the early euphoria of the patient. However, every Brazilian surgeon who performs this told me that there was 100% patient satisfaction with this technique. Interestingly, it may be that the "preview long hair" technique "saves" grafts by allowing the surgeon and patient to decide when sufficient density has been obtained intra-operatively. It will not surprise you to know that "preview long hair" FUE is being trialed in Brazil and that modern punch technology has allowed impressive results to be demonstrated by this example from Dr. Muricy, who harvested 200 long-hair FUE grafts in 15 minutes! (Figure 1.)

Other surgeons to whom I spoke insisted that they could harvest more FUE grafts in a session if the donor area was shaved. As we have come to expect, there was much discussion about donor area harvesting with FUE and the definition of the "safe" donor area. I am inclined to think that we should talk about the "safer" donor area and the "less safe" donor areas. It is clear from the presentations there is wide variation in what different surgeons declare as safe…

Another big topic at the meeting was the "homogenous" depletion of density in the donor area using FUE. The reality of this philosophy is that the "less safe" donor areas will be depleted at the same rate as the "safer" areas. I fear history will not be kind to us in this regard as the progression of balding exposes some donor areas. With this in mind, there was further discussion of the selective use of "less safe" donor hairs strategically placed in the recipient area to allow a future natural balding pattern to develop if the grafts were lost. I remain skeptical of the wisdom of this approach but time will tell.

FIGURE 1. Long hair FUE grafts harvested by Dr. Muricy.

I was very pleased that the theme of the conference was "FUT and FUE: Staying Together," and that equal time was given to both techniques with high-quality presentations discussing the strengths of both approaches. This does not surprise me given the predominance of plastic surgeons practicing hair restoration in Brazil.

After the conference, Bob Haber and I had the privilege of visiting the offices of Tony Ruston, Mauro Speranzini, and Arthur Tykocinski. It was clear to us that cutting-edge work was being performed in these clinics. They all exclusively place grafts with various implanters (dull for Ruston and Speranzini, sharp for Tykocinski), and the skill sets of their staffs was something to behold.

As well respected as the Brazilian surgeons are in our field, I can't help but think that their innovations would be more widely known if their published contributions had been in English rather than Portuguese.

Muito obrigado to our learned Brazilian colleagues! ■

FUT vs. FUE Graft Survival: A Side-by-Side Study of 3 Patients Undergoing a Routine 2,000+ Graft Hair Transplantation*

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Ron Shapiro, MD, FISHRS | *Minneapolis, Minnesota, USA*

*2015 ISHRS Research Grant Recipient Study

INTRODUCTION

While every patient is unique, the goal of hair transplantation is the same: to provide natural and dense coverage in the recipient area, while taking good care of the donor region. Graft yield (survival) is one of the main determinants of density and coverage. Since the mid-1990s, follicular unit transplantation (FUT) has been the "gold standard" for obtaining grafts. With the use of microscopic follicular unit dissection of the excised strip, viable grafts with low transection rates and high yield are consistently obtained.

An alternative to the FUT method, follicular unit excision (FUE), which uses micro-punches rather than a linear strip, has been developing since the early 2000s. Patient concerns about the linear strip scars and societal trends toward shorter-cropped hairstyles led to the advancement of this method of donor harvesting.

Unfortunately in the early years, FUE results were not as good as FUT results, especially with respect to density and coverage. This was probably due to multiple factors. First, the new technical skill needed to perform the "blind" punch of FUE was difficult to learn and took a long time to master. For many years, there simply was a lack of experienced and skilled physicians practicing the technique. In addition, the grafts produced with FUE tended to have higher transection rates, were skinny and denuded of protective tissue, and were subject to increased forceps trauma during extraction of tethered grafts. Many felt FUE grafts were more "fragile" than FUT grafts due to these various traumas and, therefore, possessed a greater risk of poor survival.[1]

However, over the years, the FUE technique has been modified and improved. Transection rates have decreased, grafts have more tissue, and forceps extraction is gentler. The survival rate of FUE grafts has improved and many feel the rate is now similar to that of FUT grafts.[2,3] However, controversy still exists. Is it known for a fact that FUE and FUT graft survival (and the results produced therefrom) are actually identical? This is an important question because many physicians have stopped offering the FUT method altogether, and most new physicians entering the field are learning and providing FUE only.

Only a few studies exist that compare the overall survival of FUE vs FUT grafts. Most of the studies have been small, box studies, working in an isolated area with only a few hundred grafts.[4] Grafts in small studies like these are usually placed and handled very careful and don't accurately reflect the environment of a real case. This could minimize the difference found between the two techniques that may occur during a larger, full surgery. The use of a full-size case under normal circumstances may better elucidate any shortcomings in one technique over the other. The number of grafts done, and time out of the body, handling, and placing grafts, might be more reflective of the conditions that exist during a true full surgery.

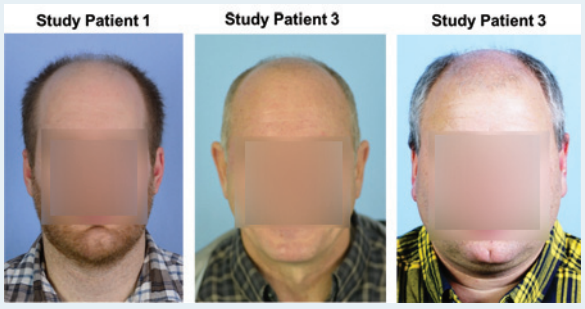
This study was designed to compare the overall hair yield and subsequent cosmetic result of the two techniques side-by-side, in the same patient, during a larger-scale, full-size case.

STUDY DESIGN

Patient selection

Three male patients between the ages of 35 and 60 years were enrolled in the study. All of the patients were Norwood Class V or greater and none had prior hair transplantation. The front half of their scalps were completely devoid of hair to allow a clean "canvas" for the study (Figure 1). No patients were on hair loss preventative medications.

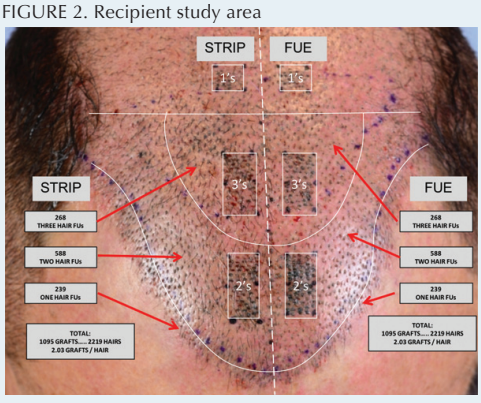
FIGURE 1. All patients were Norwood Class V or greater.



Recipient site design

A recipient study area was chosen that included the hairline and front third of the balding area (Figure 2). This area was divided in half at the midline sagitally and an equal amount of incisions were made on both sides. The number of incisions made in each half was approximately 1,000 for a total of about 2,000 in the total study area. The right half was delegated for FUT grafts and the left half for FUE grafts. All study incisions were made prior to donor harvesting with precut blades at a density of 30 per cm^2. For consistency, the incisions were initially

FIGURE 2. Recipient study area



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made with the assistance of a premade ink pattern using a template stamp created by Paco Jimenez. A 0.7mm blade was used for 1-hair grafts and a 0.9mm blade was used for both the 2- and 3-hair grafts. The zone just behind the study area was reserved for the extra grafts obtained over the 2,000 needed for the study.

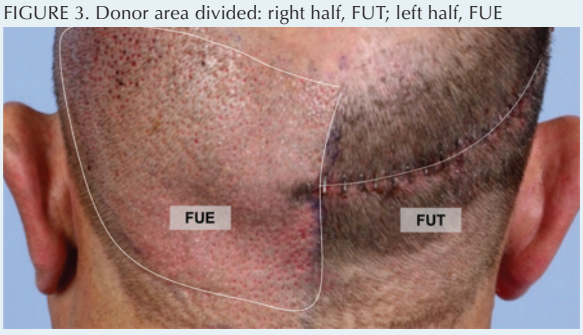
Three pairs of tattooed study boxes, one on either side of the midline, were created within the study area. These boxes were surrounded by recipient incisions, rather than an isolated location. The idea was to place the boxes in an environment more typical of a full surgery. The boxes created included the following:

1. A pair of 1 × 2cm ($2cm^2$) boxes placed on both sides of the midline slightly behind the hairline for the placement of 2-hair grafts. These boxes would contain 60 grafts each.
2. A second pair of 1 × 2cm ($2cm^2$) boxes on both sides of the midline, slightly posterior to the first pair, for the placement of 3-hair grafts. These boxes would also contain 60 grafts each.
3. A final pair of 1 × 1 ($1cm^2$) boxes slightly posterior to the second pair for the placement of 1-hair grafts. These boxes would contain only 30 grafts each.

Donor harvesting design

The donor area was divided in half at the posterior midline (Figure 3). The right half of the donor area was harvested with the FUT (strip) technique in the center of the safe area (level of occipital notch). The same physician with 20+ years of FUT experience removed the strip in all 3 cases. The same technicians with 15+ years of FUT experience microscopically dissected the strip into 1-, 2-, and 3-hair grafts.

FIGURE 3. Donor area divided: right half, FUT; left half, FUE



Immediately after the strip incision was closed, the patient's left half of the donor area was harvested with the FUE technique. The extended safe area described by Cole was used. The WAW Hybrid Punch system was used. The same physician with 8+ years of FUE experience harvested and extracted the grafts in all 3 patients. The grafts were sorted under a microscope into 1-, 2-, and 3-hair grafts.

An important component of this study was ensuring that the exact same number of 1-, 2-, and 3-hair grafts were used on both halves of the study area. There were enough grafts produced on both sides of the donor from each technique to make this fairly easy to do. However, some *ex vivo* splitting of extra 3-hair FUE grafts was needed in order to make the requisite number and assortment of grafts. The extra grafts harvested above the 2,000 needed for the study were placed posterior to the study area in a natural distribution.

All grafts were stored in cooled Lactated Ringer's solution. No HypoThermosol®, PRP, or liposomal ATP was used during the procedure. The reasoning for this was to put maximum equal stress on all grafts to better identify subtle differences in yield that may not be as apparent without stressors.

An attempt was made to ensure time out of the body for both sets of grafts was similar in the following way. FUT strip removal was done first followed immediately by FUE harvesting. This ensured FUE and FUT grafts were being created at approximately the same time. Grafts were also organized by the time they were created. Placing for both sets of graft started simultaneously and the "first graft out, first graft in" approach was used. The total time out of the body was less than 5 hours for all grafts.

Placing design

All grafts were placed with forceps by the same two technicians, each with 15+ years of experience. One technician placed the FUE side of the recipient, while the other technician placed the FUT side of the recipient. No implanters were used for placing. The reason for this was once again to put maximum equal stress on all grafts to better identify subtle differences in yield that may not be as apparent without stressors.

For simplicity, FUE and FUE grafts were placed on the ipsilateral (same) side from which they were extracted. The sites were stained with Gentian Violet for ease of placement. There was no special treatment given to the placement of grafts in the tattooed boxes.

RESULTS

Follow-up parameters

The patients followed up at 4, 8, and 12 months. Measurements taken at these visits included:

- Digital photographs of graft counts and hair yields in study boxes
- Hair Mass Index (HMI) using HairCheck® to measure hair volume. Two locations were used within the study area on each side.
- Gross photography of the patient
- Subjective evaluation from patient

Graft and hair yield

Table 1 compares FUE vs FUT graft yield per patient within the study boxes on both sides. The total number of grafts placed in the study boxes on each side was 150. Looking at the first table, there was very little difference noted between the two groups. Grafts on both sides grew consistently well. FUT was slightly better than FUE in 1 patient while FUE was slightly better than FUT in the other 2 patients. However, the difference was very low and never more than 2.7% in favor of FUE.

Table 1. Graft Yields per Patient

Patient	FUT	FUE	Difference
Patient #1	148/150 (98.7%)	146/150 (97.3%)	1.4% FUT (over FUE)
Patient #2	140/150 (93.3%)	143/150 (95.3%)	2.0% FUE
Patient #3	137/150 (91.3%)	141/150 (94.0%)	2.7% FUE

Hair yield is a more informative parameter than graft yield. Grafts can contain any number of hairs (1, 2, or 3) and the yield data can be misleading if not carefully examined. This data does not consider the yield of hair within those grafts. Table 2 compares the hair yield per patient within the study boxes on both sides. The total number of hairs from the single, double, and triple graft study boxes were counted showing a total of 330 total hairs placed in the study boxes on each side. The findings were similar to those of graft yield with FUT being slightly better in 1 patient and FUE being slightly better in the other 2 patients. The difference was still low, but a little more obvious with hair yield than with graft yield, reaching 9.4% in 1 of the 3 patients.

Table 2. Hair Yield per Patient

Patient	FUT	FUE	Difference
Patient #1	242/330 (73.3%)	240/330 (72.7%)	0.6% FUT (over FUE)
Patient #2	244/330 (73.9%)	272/330 (82.4%)	8.5% FUE
Patient #3	244/330 (73.9%)	275/330 (83.3%)	9.4% FUE

Table 3 shows the difference in graft and hair yield when the data from all three patients is combined. This is probably the best parameter to look at. Again, there was very little difference in the survival of grafts in both groups. For graft yield, the difference between the two groups was about 1% in favor of FUE. For hair yield, the difference was just slightly higher at about 6% in favor of FUE.

Table 3. Total Graft and Hair Yields

Combined Results	FUT	FUE	Difference
Combined Graft Yield	425/450 (94.4%)	430/450 (95.6%)	1.2% FUE (over FUT)
Combined Hair Yield	730/990 (73.7%)	787/990 (79.5%)	5.8% FUE

From a practical standpoint, due to the small size of this study, no hard conclusion can be drawn that one technique has a better survival rate than the other on a consistent basis. However, since the question that we were most concerned about was whether FUE graft survival was less than FUT grafts, the results are interesting since in this case FUE graft survival seemed to be slightly better.

Hair Mass Index

Table 4 compares the HMI on each side of the study area. Unfortunately, only 2 patients were available for this measurement. The measurements were made at two locations on both sides of the study area (the anterior and posterior parts of the frontal zone (Figure 4). The HMI was almost identical in the FUT side compared to the FUE side of the study.

FIGURE 4. HMI measurement locations

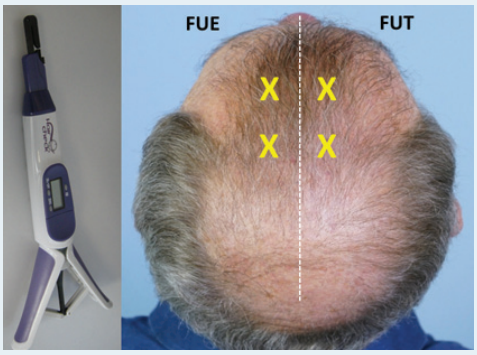


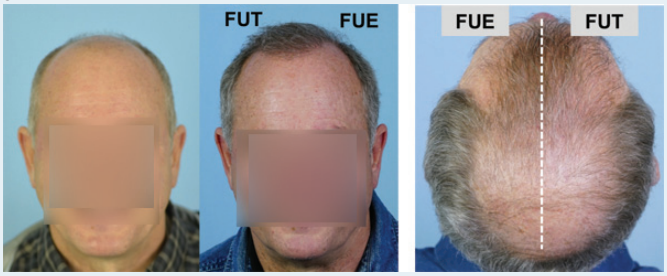
Table 4. Hair Mass Index with HairCheck

Patient	FUT Side	FUE Side
Patient #2	Frontal (21) / Midscalp (22)	Frontal (21) / Midscalp (23)
Patient #3	Frontal (27) / Midscalp (27)	Frontal (27) / Midscalp (26)
Average for Both Patients	Frontal (24) / Midscalp (25)	Frontal (24) / Midscalp (25)

Gross photography

Gross photography was done on patients at various intervals throughout the study (Figures 5). There was no difference in the speed of growth of one group versus the other. Also, the final 12-month follow-up photos show no large difference between the groups.

FIGURE 5. One-year post-op, gross photography shows no difference in speed of growth between the techniques.



Subjective evaluation from patients

All patients felt that the results with respect to rate of growth, feel, and appearance of fullness were the same on both sides.

DISCUSSION & CONCLUSION

The ability to meet patient expectations of density and coverage is one of the most important goals in hair transplantation. The ability to produce density and coverage is primarily determined by two things:

1. The amount of donor that can be safely harvested from a patient per session and over the life of the patient.
2. The survival of those grafts that are harvested and transplanted.

For many years, there has been controversy over the survival of FUE vs FUT grafts. Many have felt that FUE grafts are “more fragile” than FUT grafts and have a higher risk of poor survival. This was true early in the development of FUE for reasons stated earlier in this paper. But with the improvements that have occurred in the FUE technique over the past 5 years, this question has become more controversial. Studies to address this question have been small and primarily of the isolated box study method. This type of study does not mimic the true environment and stressors grafts are subjected to during the course a full transplant.

The purpose of our study was to see if FUE graft survival, with modern techniques, is indeed less than the survival of FUT grafts. We wanted to do this in the environment of a true full surgery in order to better imitate the actual environment and stressors to which grafts are exposed during a full surgery. We felt this would better identify subtle differences in survival between the two techniques than the less realistic, gentle environment of an isolated box study. We did the hair counts in study boxes that were placed in the center of a full hair transplant, surrounded by other grafts. The same routine placing and care was done in the study boxes as would be done in the rest of case. The tattooed boxes were only created as a way to standardize and adequately compare both sides.

We also decided not to use bio-enhancers (e.g., ACell,

liposomal ATP, HypoThermosol, PRP) or implanters for a similar reason. We felt that by not using these adjuncts, a greater stress would be equally placed on both types of grafts, and we'd be better able to identify subtle differences in yield that may not be as apparent without stressors.

Four variables were looked at in this study to compare the yield of FUT vs FUE grafts: graft and hair yield, HMI, gross photography, and patient subjective comments. For all practical purposes, FUE and FUT were equal with all parameters. Although FUE seemed to have a very small edge with respect to graft and hair yield counts, the study was too small to draw any conclusions. However, the fact that FUE grafts performed as well as or a little better in all parameters seems to provide good evidence that, at a minimum, FUE graft survival is not worse than FUT graft survival. In addition, with the addition of implanters and bio-enhancers, the survival of FUE grafts could quite possibly be even better than in this study

It should be mentioned that some of the same factors that plagued early FUE results can still cause issues today. With inexperienced technicians and improper graft handling, the results of this study could have been vastly different. Physicians need more than a modicum of experience in both techniques to deliver results like these.

I would like to mention one final point. Graft survival is only one of two important variables that ultimately determine the ability to produce density and coverage in a patient. The "number of grafts" that can be obtained over the life of the patient is a second, very important factor. We still do not know the difference in the number of grafts we can obtain on the same patient if they were approached with FUE only, FUT only, or FUE + FUT combination. I believe understanding this better is the final cog in the controversy over the ability of different approaches to produce the best results. This is an extremely important question to answer, especially with the increasing trend toward FUE-only practices and new physicians coming into the field learning only FUE.

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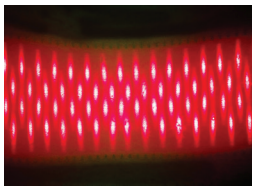

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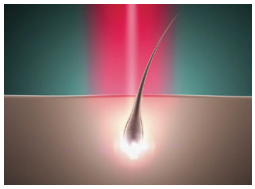

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Surgical Hairline Advancement: Patient Candidacy and Best Techniques

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The growing interest of both patients and surgeons in hairline lowering/forehead reduction surgery (also called surgical hairline advancement, or SHA) is due to the availability of information online, its presentation by different surgeons at ISHRS meetings (e.g., in Prague and the Orlando Live Surgery Workshop), and a Cyberspace Chat discussion in a recent issue of the *Forum* (2017; 27(5):188-190) concerning a complication due to SHA. Most importantly, patient demand is driven by the recognized advantages of the surgery over hair transplants alone in the appropriate candidate. Just in the past six weeks, the senior author received referrals of three female patients from leading ISHRS surgeons who felt hairline lowering surgery was a better option for these patients. One referral had insufficient graft density and a poor outcome due to a history of frontal fibrosing alopecia.

SHA is unsurpassed in its ability to lower high hairlines by an average of 2.1cm, however, as much as 5.5cm of lowering is possible in exceptional candidates (Figures 1 and 2). This represents the equivalent of transplanting 8,000-10,000 grafts, takes less than two hours to perform, and offers results that are immediately visible. In as little as three months following SHA, the majority of patients undergo hair grafting to further round out the hairline and/or conceal the fine-line hairline scar. The transplants are typically performed by the referring physician.

FIGURE 1. 19-year-old before (A, B), 1 week after (C), and 6 months after (D, E) hairline lowering surgery, where 26mm of advancement was achieved.

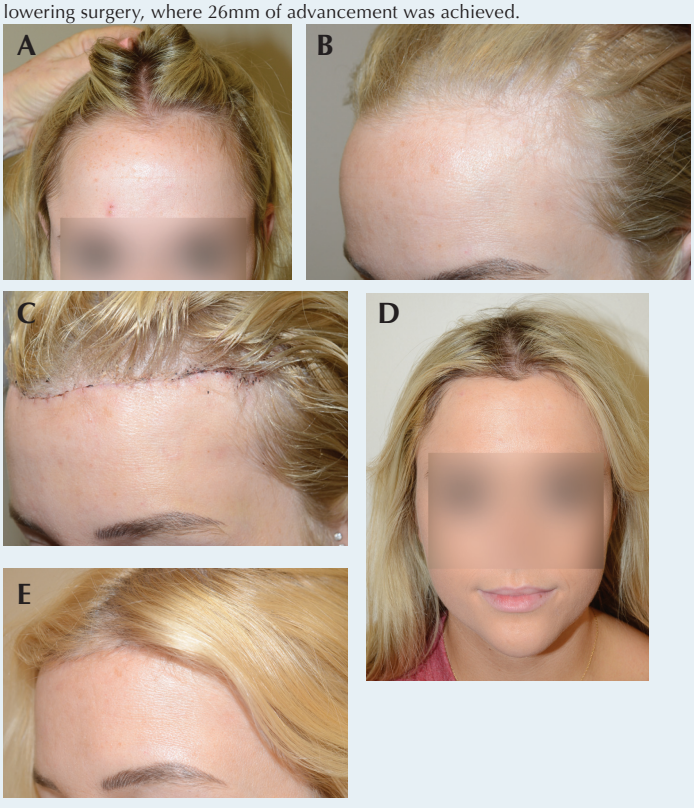
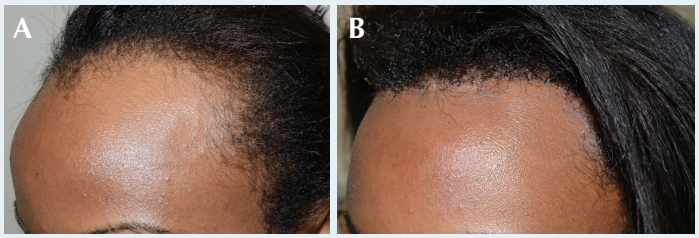


FIGURE 2. African-American patient before (A) and 1 year after (B) hairline lowering surgery.



Like any surgical procedure, SHA requires proper execution and determination of candidacy, and when performed properly, SHA has a very low incidence of complications. This surgery was first described in the literature in 1999 by Timothy Marten, a plastic surgeon, as hairline lowering in conjunction with brow lifting.[1] It has subsequently been written about in conjunction with frontal bone reshaping[2] and as a stand-alone procedure.[3-5] It also has appeared in articles in past issues of this journal.[6,7] Following is a review of the latest modifications in techniques and strategies for achieving the most consistent results, based on performing 89 procedures over the past 9 years, with 37 of them over the past 18 months as patient interest has grown and outcomes have improved due to improvement of techniques.

OVERVIEW

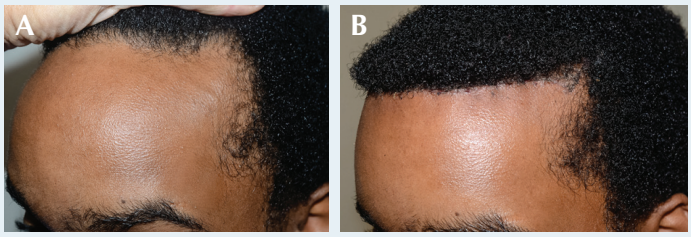
SHA is a 90-minute procedure typically performed under twilight and ring block anesthesia, but oral sedation is also suitable. Through a trichophytic frontal hairline incision, first described by Mayer and Fleming, the scalp is undermined in the subgaleal plane past the vertex, then galeotomies are performed to further maximize mobility.[8] The frontal hairline is then secured in its more anterior position, and excess forehead skin excised. With the Kabaker modification to the technique (I was able to observe Dr. Sheldon Kabaker, largely credited as the developer of the procedure, perform several of these surgeries just prior to his retirement last year), it is possible to provide some rounding of the lateral hairline. While possible to combine with a browlift or the taking down of frontal bone prominence in the transitioning male to female patient, SHA is primarily indicated to shorten the high forehead in women. The occasional male patient can be a candidate (Figure 3), however, he must display no frontal hair thinning, and if he is under the age of 40, he must not have a family history of male pattern hair loss (MPHL).

Patient selection

When selecting patients for SHA, the following characteristics are essential:

- Good to very good scalp mobility so that the hairline can be manually pushed forward 1.3cm or more

FIGURE 3. Male African-American patient before (A) and 4 months after (B) hairline lowering surgery; performed due to no risk factors for future male pattern hair loss.



(Figure 4). This forward displacement estimates how far forward the scalp can be advanced, with typically 5-10mm of additional advancement achieved from coronal galeotomies. The patient with less mobility can, if highly motivated, undergo balloon tissue expansion over four to six weeks that will allow virtually unlimited advancement (Figure 5).

- A strong frontal hairline without foreseeable risk of thinning.
- Preference for SHA over hair transplantation. SHA is more likely to create a dense, dramatic, virtually instantaneous lowering of the hairline with a fine-line scar in the hairline that may require transplants to help conceal it, whereas hair transplantation alone entails the time for regrowth and may possibly require a second procedure to achieve the desired density.
- No history of prior coronal or temporal browlift, temporal or vertebral artery ligation, or any other condition that compromises blood supply to the frontal scalp. A prior hair transplant is not a contraindication and in fact some patients undergo SHA after being disappointed with the density from a prior transplant.

FIGURE 4. Scalp laxity test determines how far the hairline can be advanced. Before (A), displacement of hairline as far forward as it can be advanced (B), and the marking of the planned location of the lowered hairline (C).

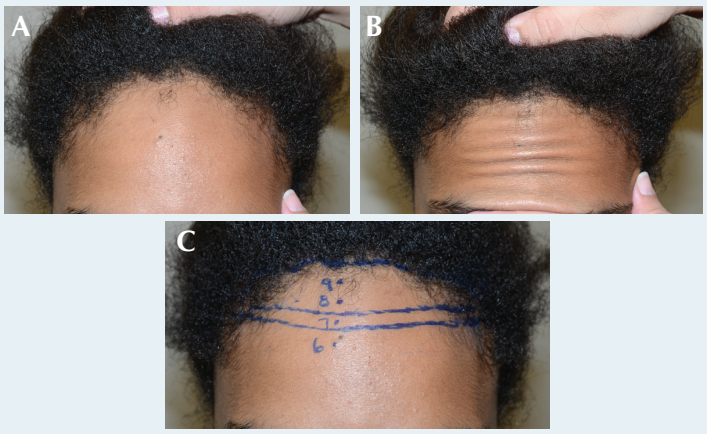
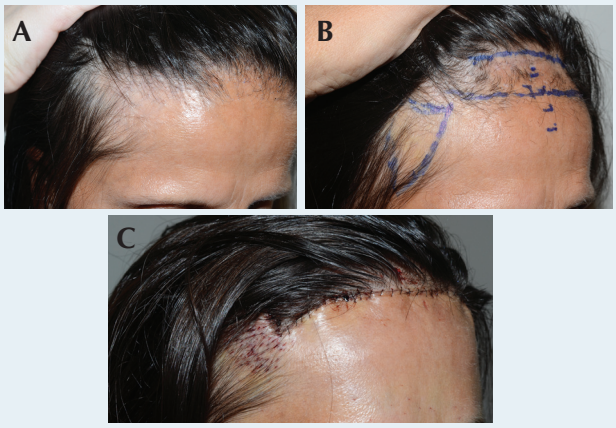


FIGURE 5. Female patient with end-stage frontal fibrosing alopecia who underwent unsuccessful hair grafting 2 years earlier, before (A), after 5 weeks of balloon tissue expansion because of a very immobile scalp (B), and 1 day after hairline lowering surgery (C) where the unaffected frontal hairline was advanced 23mm to permit the excision of the prior hair grafts returning her to a more feminine-positioned hairline.



In addition, the following secondary characteristics are preferred, but not required:

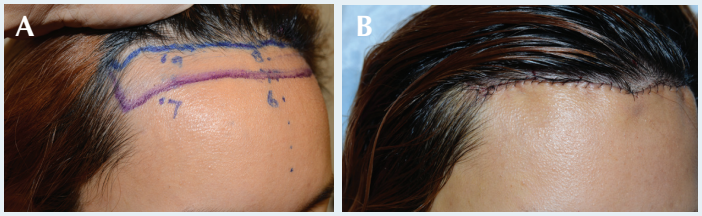
- Hairline hair growth in an anterior direction to allow for hairs to grow through the trichophytic incision.
- The patient desiring primarily vertical shortening rather than horizontal narrowing or rounding of the forehead.

SURGICAL STEPS

Design and anesthesia

The existing hairline is marked out as a somewhat irregular line, just behind any vellus hairs that are too fine to effectively grow through the trichophytic incision. Starting at the midline and proceeding laterally 6-7cm from the midline on each side, this line curves gently downwards for 1cm to capture the frontal-most finer hairs of the upper temporal/frontotemporal junction, then takes a right-angle turn and proceeds posteriorly in a horizontal direction for 15-20mm. A second line is then drawn where the hairline can realistically be advanced, paralleling the shape and irregularity of the initial line (Figure 6).

FIGURE 6. Kabaker modification of incision design, allowing for optimal rounding out of the hairline, before (A) and immediately after (B).



The procedure is usually performed under twilight sedation, or occasionally only oral sedation. Lidocaine anesthesia (2% with epi 1:100,000) of the scalp is achieved with supraorbital and supratrochlear nerve blocks in addition to a ring block around the rest of the scalp. Tumescence with saline significantly reduces bleeding and avoids the need for injecting epinephrine, which can be associated with shock loss.

The hairline incision is made at an acute angle to transect hair follicles, then directly perpendicular through the deeper aspect of the tissue to the periosteum. Dissection is performed with scissors and undermining is done manually in the avascular subgaleal plane to the vertex. This subgaleal dissection is then extended posterior to the vertex another 2-3cm with a Deaver retractor optimizing exposure of the typically fibrous tissue that runs between the galea and periosteum in this area. This dissection is similarly extended laterally to the upper parietal and temporal regions to contribute to scalp mobility.

With the scalp optimally undermined, traction is applied to the frontal scalp using three towel clips pulling the scalp

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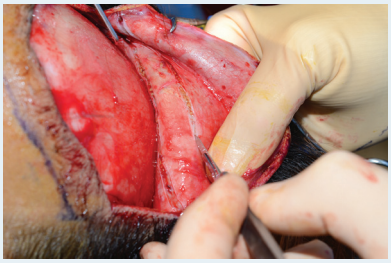
FIGURE 7. Second of two coronal galeotomies are made with careful incising of the galea. Each galeotomy can provide 3-7mm of additional advancement, but must be made carefully to avoid any damage to more superficial vessels.



as far anterior as possible, generating as much mechanical creep as possible for 60 seconds. One coronal galeotomy approximately 25mm posterior to the leading edge of the frontal scalp and usually a second galeotomy 10-15mm behind the first are made with the tip of a #15 scalpel blade that cuts just through the galea and avoids the vessels that are just superficial to it (Figure 7). After each galeotomy, 60 seconds of traction is applied in the same fashion with on average 2-3mm, but as much as 7-10mm of additional mechanical creep is generated from each galeotomy.

The scalp must be secured in its most anterior position. There are several methods to do this; our preference is using two Endotine® clips because of ease and reliability. The anchor of each Endotine clip is placed into holes drilled into the cranium that are each located approximately 2cm lateral to the midline. The small hooks of the clips engage the galea with the scalp pulled as far anterior as possible, securing the hairline at its maximally-advanced position. Over the next six months, although these clips will dissolve, the hairline will not migrate posteriorly.

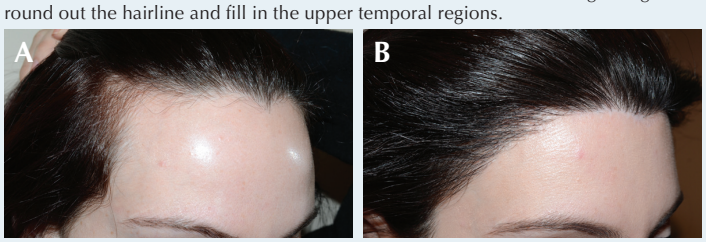
The forehead skin now overlapped by the advanced frontal scalp is excised. If a browlift is desired, dissection just deep to the frontalis muscle of the forehead is performed to the supraorbital rims to optimize mobility, then the additional skin excised to achieve the desired brow position. The hairline incision is closed with interrupted 3-0 PDS sutures from the scalp galea to the forehead frontalis muscle, then a running 5-0 nylon suture to reapproximate the skin edges in a trichophytic fashion, the forehead skin overlapping the leading edge of the de-epithelialized frontal scalp. The temporal portions of the closure are performed to eliminate a dog-ear deformity.

Antibiotic ointment is applied and a pressure dressing is left in place until the next day, at which time patients are presentable with the hair brushed forward or wearing a cap. Normal hair washing is permitted on the third day, and sutures are removed at one week. By six weeks, hairs grow through the trichophytic incision. Loss of sensation at the frontal scalp, due to cutting the supraorbital and supratrochlear nerve branches at the hairline, resolves typically by 80% within one year.

HAIR TRANSPLANTS WITH SHA

Many SHA patients can benefit from transplants, which can be done as soon as three to four months post-surgery. Four hundred to 1,600 grafts can be transplanted to round out the hairline and, if desired and indicated, into and in front of the hairline scar to further reduce its visibility and possibly to lower the hairline a bit more (Figure 8). These grafts can be obtained by FUE or strip technique with no special considerations.

FIGURE 8. Before (A) and 18 months after SHA/14 months after hair grafting (B) to round out the hairline and fill in the upper temporal regions.



In the occasional patient, grafting is done simultaneously with SHA, with 200-250 grafts placed into each upper temporal region to create a more rounded hairline. These grafts are harvested by the follicular unit excision (FUE) technique from the lower occiput region or are dissected from tissue obtained from the dog-ear repairs along the temples. Because of the lower percentage of regrowth with these simultaneously placed grafts and the difficulty in placing grafts close to the hairline incision, transplanting, if indicated, is best performed three to four months post-op.

RESULTS AND COMPLICATIONS

The technique described had several modifications made 18 months ago that improved outcomes. We summarize the results on the last 37 patients treated over this time, including 3 males, 2 transgender females, and 32 lifetime females. Four patients underwent balloon tissue expansion due to low scalp mobility. Of the 33 patients not undergoing tissue expansion, the range of hairline advancement was 12-54mm, with the median 21mm. Two patients experienced small (less than 1cm in diameter) areas of limited hair loss, one over an Endotine clip and the other in the mid-scalp region, both notably on patients with thinner and tighter scalps. Both cases had at least partial regrowth of hair in these small areas, one of whom had approximately 50 grafts placed into that area at the same time as hairline grafting.

Despite online and hearsay reports of significant shock hair loss, no patients experienced shock loss. Two patients had concerns about the hairline scar being visible with their hair pulled back and both were treated with transplants to address this concern. To date, grafting to round out the hairline and/or soften the hairline scar was performed by us on 9 patients, and to our knowledge 4 patients had grafting performed by a local surgeon, with all patients advised prior to having surgery that this may be desired. Because of the up to one year of decreased sensation of the scalp, patients are advised to use caution when blow-drying their hair to avoid thermal injury to the scalp.

THOUGHTS AND TAKE HOME POINTS

No procedure is without risks, advantages, and disadvantages. Hairline lowering with transplantation alone has its complications, including poor graft regrowth, shock loss to existing hairs, superficial cellulitis/folliculitis, prolonged erythema, and not uncommonly insufficient density that requires a second transplant procedure. SHA also has its risks (which can be significantly minimized) and disadvantages, however, because it has the main advantage of virtually instantaneous lowering of a dense hairline, it should be considered in the appropriate patients. Overall, this is a

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Literature Review

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New Data on Best Protocol for Platelet-rich Plasma (PRP)

Hausauer, A.K., and Jones, D.H. Evaluating the efficacy of different platelet-rich plasma regimens for management of androgenetic alopecia: a single-center, blinded, randomized clinical trial. *Dermatol Surg.* 2018; 44:1191-1200.

A recent publication in the *Journal of Dermatologic Surgery* (funded by Eclipse Aesthetics LLC) examined two treatment protocols for PRP. In a prospective, randomized, single-blinded trial, 40 patients total (30 men and 10 women) with androgenetic alopecia (AGA) were randomized to receive treatments monthly for the first 3 months, followed by a fourth treatment 3 months later (Group 1), or to receive two treatments 3 months apart (Group 2). Global photographs were taken with the Hair Metrix SM/Canon Rebel T6i; Canfield Scientific Inc. and dermatoscopic photos were taken with the Korean Folliscope 2.8 at baseline, 3 months, and 6 months. The authors demonstrated that there was a similar and statistically significant improvement in hair counts for each group at 6 months, but that only Group 1 had statistically significant increases at 3 months. There were no differences in the increases seen among men and women (p=.78). For hair shaft caliber, statistically significant increases were seen for each group at both 3 and 6 months (p<.001). The authors postulate that it may require a lower concentration PRP-contained growth factors to thicken miniaturized hairs than to transition into anagen phase and promote new growth.

Patients were asked to rate their level of satisfaction as 3 (highly satisfied), 2 (satisfied), 1 (unsatisfied), or 0 (highly unsatisfied). Mean satisfaction across the entire study period was 2.3. Patients in Group 1 were more likely to report the highest scores probably because they perceived earlier results. The authors also used Jeffrey Rapaport's method of fewer subdermal injections, allowing diffusion of the PRP.

Comment: There remains continued debate among hair transplant physicians about the best protocol for PRP to treat hair loss. Some argue that a single injection should be sufficient to augment hair growth. They may justify that the addition of platelet activators or ACell can boost the results with a single session and thus lessen the need for additional treatments. Eclipse PRP® does not contain any such activators. Rather, it has a proprietary gel plug that removes 99.9% of erythrocytes and 92% of leukocytes. The data presented here suggests that the benefits from PRP may be greater (and appreciated earlier) if it is first administered monthly. However, the results may be essentially the same at 6 months. ■

procedure offering a tremendously high level of satisfaction for the appropriate patient.

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The Trivellini System and Technique

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Disclosure: Dr. Trivellini is the owner of Mamba Instruments, which is the manufacturer of the device described in this article.

The excision of follicular units using conventional FUE techniques has challenges and requires certain skills on the part of the physician. The multiphasic suction-assisted FUE device, described below, allows us to remove grafts with more tissue around the bulbs, less transection, and greater speed.

BACKGROUND

In conventional FUE, the physician needs to calculate and adjust his or her moves from area to area. The forces used to excise the follicular units need to be repeated many times for each patient. The punch must be aligned in the correct direction and at the correct exit angle of the scalp hair. This also depends on which position the physician adopts with respect to the patient. Next, the punch is advanced through the layers of the scalp. This could be challenging depending on such variables as the type of edge and geometry of the punch as well as the characteristics of the patient's skin and hair. Once the punch is through the scalp layers, the operator must decide when to stop the punch motion and when to retract.

Advancing the punch more than needed increases the transection rate, while not advancing it enough makes it impossible to liberate and remove the graft. It is very difficult to have control over these variables during FUE surgery. The Trivellini method was developed as a solution for reducing these variables. The system allows for repetition of the same sequence of action for every graft, thousands of times a day, and can work on any type of skin and hair. In addition, trauma to the follicles is minimized by directing the graft towards the center of the punch. Suction and vibration are two essential components of this system that work well with the potential energy that is generated by the follicles. In fact, the suction and the availability of the vibration in the system allows the operator to have maximum flexibility to consistently harvest high-quality grafts.

CONSIDERATIONS

If a scalp is divided scalp into 3 layers of 1.5 mm each, within the first two superficial layers, the densest ectodermal tissue with greater cell cohesion exists and decreases as you descend. Elastic fibers constitute 1% of the volume of the dermis and can be lengthened up to 99% or more before returning to their original lengths.[1] The more superficial fibers are arranged perpendicular to the surface of the epithelium. In the deep layer, those elastic fibers become more disorganized. The bulb of follicle, in the third layer, is surrounded by adipose tissue. This layer is semi-liquid with a density of approximately 0.9g/ml.

In classic FUE, when the surgeon introduces the punch into the skin, the punch undergoes permanent alterations in its trajectory. Once it crosses the glandular level, it enters the loose connective and adipose tissue. If the operator does not stop its advancement, the punch speed increases as it faces less resistance. When this happens, the trajectory of the punch becomes erratic, which increases the possibility of injury to the follicles. The Trivellini system provides a multiphasic approach that adjusts the punch mode and speed of motion as it enters different layers of scalp.

METHOD

Suction

Suction is a crucial element in this method. A pump that generates 650mmHg of vacuum is used. There is a certain relationship between the suction pressure (in mm of mercury indicated on the suction pump) and the suction flow at the tip of the needle. The exact pressure at the tip of the punch depends on the diameter of the tube system, punch, and device configuration. In a straight handpiece, a simple change in the diameter of the punch can double the amount of fluid aspirated with the same vacuum level.

Device modes

The Trivellini device provides a wide variety of modes. This versatility makes the device very flexible in dealing with different skin consistencies and hair characteristics. The device offers several modes such as rotation, oscillation, vibration, and oscillating asynchronous variation modes. It is possible to sequentially combine two or three modes and adjust the force and timing of each phase. The sequence of actions can be activated either by a slight touch of the pedal or automatically through the device's SmartReact™ system.

SmartReact

SmartReact is an intelligent computerized system that activates the motor when the tip of the punch is positioned over the follicular unit. The operator only needs to focus on following the exit angle of the follicles and placing the tip on the skin. The device does the rest automatically. (See video at the following link: https://www.youtube.com/watch?v=Fl3R93XbrKY.)

Time adjustment

The duration of each mode can be adjusted much like the power. The operator can set up the system to function with several modes for a set power and duration. For example, the punch can start rotating with maximum power and after 200 milliseconds (ms) decrease the power by half for another 200ms. During this time, the punch will penetrate up to 2.5mm and finish the scoring with less force.

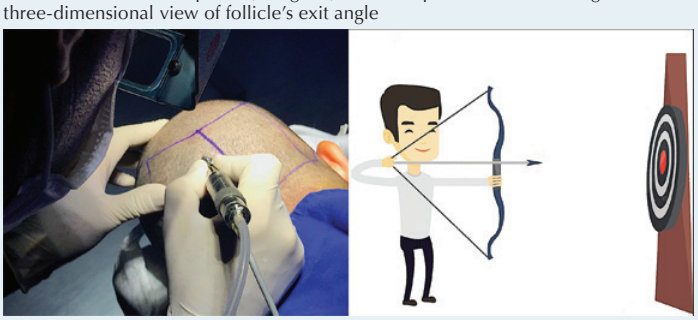
The surgeon must decide among many possibilities to determine which is the best configuration for the type of skin encountered. The Trivellini system has a variety of punches, such as edge out and flared, in different sizes. Combining the versatility of the modes with the appropriate punch makes it very easy in almost every scenario to get high-quality grafts consistently.[2]

RECOMMENDED PRACTICES

Surgeon position

Our handpiece is not a modified dental instrument and was developed exclusively for hair transplantation. It is the only straight handpiece with a hollow shaft on the market and was created to be able to locate the handpiece between the point of view and the objective. This provides the surgeon with a three-dimensional view of the hair's exit angle, reducing the possibility of follicle transection (Figure 1).

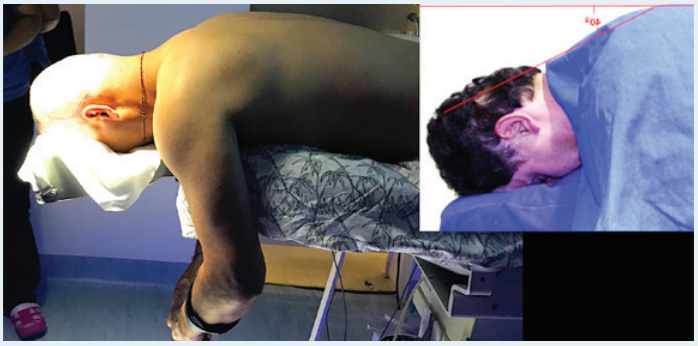
FIGURE 1. Position of patient, surgeon, and handpiece for correct alignment and three-dimensional view of follicle's exit angle



Patient position

The Trivellini system can be used with the patient in any position, however, to be able to place the surgeon behind the handpiece, we designed a bed the allows lateral and forward flexion of the head for better alignment of the handpiece with hair exit angle. The patient's arms hug the bed, so the operator can get close to the head (Figure 2). The operator is located to the side of the patient as shown in Figure 1.

FIGURE 2. Lateral and forward flexion of the head for better alignment of the handpiece with hair exit angle



INVOLVED DYNAMICS

Device configuration

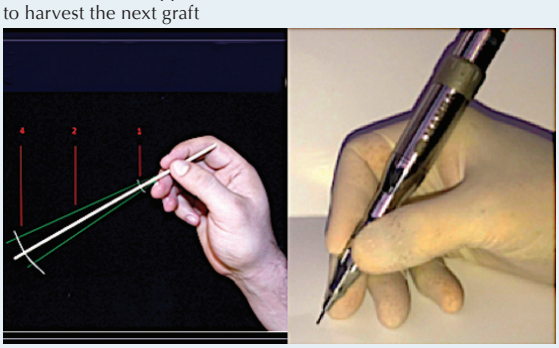
The device has many variables that need to be set by the surgeon for the optimum result. There are presets that work for most of the cases, but the surgeon may need to adjust the settings in more challenging cases. Following the skin consistency in different levels, one of the most common settings of the systems is rotation for 200ms on high power and then switching to oscillation for 300ms. This generates a lot of vibration in the handpiece. (See video at the following link: https://www.youtube.com/watch?v=0RabXFW0-r0.)

This configuration allows the punch to penetrate the epidermis and the superficial dermis. These are the layers with greater resistance and rotating for 200ms is the best movement to go through these tough layers. From this point, the oscillating movement is the most convenient to avoid twisting or damaging the graft.

Dissection

Once the punch has been centered over the follicular unit, the surgeon must hold the handpiece as close as possible to the tip, which provides for more control in positioning the punch. We recommend placing a finger at almost the same level as the punch as this allows a more precise targeting and positioning of the punch on the skin (Figure 3). The greater the distance between the grip of the handpiece and the scalp, the greater the distortion produced with the same movement.

FIGURE 3. The closer to the scalp the grasp on the handpiece, the more accurate the approach to the follicular unit and faster movement to harvest the next graft



When the punch is positioned over the follicular unit, it should be held still. The suction makes a suction-cup effect on the skin, which ascends inside the punch to form a dome to the point where the pressure has been balanced. This immobilizes the punch on the surface and prevents the skin from moving when the punch begins to rotate. This is one reason that the operator doesn't need to use traction with the Trivellini system: the suction acts as the best stabilizer of skin and keeps it from moving away. The main reason, however, that we do not recommend applying traction is to facilitate the transmission of the vibration waves from the punch to the tissue, which allows the grafts to enter the interior lumen of the punch with minimal trauma. (See video at the following link: https://www.youtube.com/watch?v=hIR1hFO2Cm0.)

Elasticity

Elasticity is the ability of material to deform when receiving a force and then return to its original shape when the force ends. That is how the follicular units react when receiving the external force. After engaging with the skin surface, enough pressure must be applied to the punch to depress the surface of the skin about 2-2.5mm. This increase in axial force (gravity + pressure exerted by the hand) causes a transverse deformity perpendicular to the axis of the force. Traversing the epidermis to the deep dermis are hair shafts that have a different structure than the surrounding tissue. The shafts are formed by keratin (a protein with helical fibrous structure) and an amorphous matrix that keeps the microfibrils packaged. This gives the hair shafts a remarkable hardness and flexibility.

When follicles receive the axial load, they exhibit a phenomenon of elastic instability called "buckling." This means the follicle is loaded with potential energy, which is stored due to the deformation, until the punch cuts the upper layers of the skin and releases the follicles, which return to their original shape. (See video at the following link: https://www.youtube.com/watch?v=ZVb4mZLcOgo.)

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Dynamics of punch movements

As the motor is activated by pressing the pedal or the SmartReact, a sequence of events begins:

1. When the punch rotates, it cuts the epidermis and part of the superficial dermis during the first 200ms. This rotation engages the tip of the punch into the skin and cuts through the toughest layer of skin.
2. Next, the oscillation starts and is maintained for 300ms. Oscillation decreases the friction between the inner wall of the punch and the hair follicles.
3. The graft is then pushed into the punch by the potential energy of the hair. If the unit has two or more hairs, or if it is thick, the accumulated energy will be greater. Harris uses a hexagonal punch with 6 flat faces on the outer wall parallel to its axial plane that, when rotating, creates alternative waves throughout the surrounding tissue. The vibration reduces friction by continuous expansion and compression of the tissue that can help dissect the tissue from the external wall of the punch. On the other hand, as the hexagonal faces have a larger diameter than the cutting edge, the contact surface is reduced, which is very beneficial for the dull punch.[3]
4. The suction applied to the epidermis of the graft inside the punch generates an additional force that results in the graft entering the punch.

   An important difference of this technique is that it does not require traction on the surface of the skin.[4] On the contrary, this suction-assisted system requires the follicular unit to move and vibrate so the natural forces can move the graft into the punch and dissect it from the surrounding tissue. When the surface of the scalp is tightened with traction to fix the follicles, the slightest contact of the sharp punch edge with a follicle will cut the follicle like a tense guitar string. We do not use deep tumescent infiltration since this decreases the density of the tissue, especially the adipose, and when using suction, the graft is aspirated. We do not want the graft to detach from the bed, therefore, we avoid deep tumescent infiltration, instead opting to infiltrate the superficial dermis, which tightens the surface and immobilizes the follicles inside the punch while leaving the deep part loose and avoiding the guitar string effect.
5. When 500 millisecond elapses, the movement of the punch stops. At this time, more than half of the graft is inside the handpiece, which has not moved, remaining in the same position. (See video at the following link: https://www.youtube.com/watch?v=297LKPis71w.)
6. Once the punch cuts the anchoring structures of the follicular unit, the graft is pulled upwards from the epidermis by the suction. As the lower part is fixed, the surrounding tissue is stretched so the punch can be advanced and cut through loose connective tissue and fat with the minimal force needed to cut the low-density hypodermis. With this dissection, more tissue around the stretched follicles is taken, creating chubbier grafts. With a punch of 0.90mm diameter, we can obtain grafts with a base of 1.2mm thickness (Figure 4). This also explains why splay is dealt with easily. When there is significant splay, the bulbs of the follicles of a unit are separated from each other in the deeper layers while the hair shafts are held together on the surface. It is not always necessary to advance the punch to this level, but when the anchor system is deeper, we have no choice. The operator can feel the resistance in this case. This feeling could be perceived through positioning the middle finger near the punch in contact with the skin and the fingers of the left hand on the scalp next to the extraction area. When the punch is advanced, a short advance movement is made while the fingers of the operator rest next to the punch as a pivot point. (See video at the following link: https://www.youtube.com/watch?v=3HCuwINvcjI.)

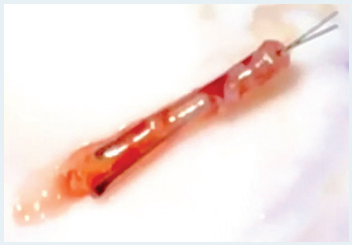

FIGURE 4. Extracted graft with diameter at the bulb greater than punch diameter, due to action of the system

7. When the punch is extracted from the scalp, the graft rises slightly, along with the punch, until the punch comes off when it loses its suction effect. The grafts stay loosely connected with a strand of loose connective tissue at their base and can easily and atraumatically be removed with forceps.

CONCLUSION

With my personal excision technique, I can obtain more tissue around and below the bulb, due to the traction exerted by the suction. The stretched follicular unit contracts at an angle perpendicular to the axial axis and allows the bulb to be extracted without depth control. The unit can easily be removed with just one forceps, and the total extraction time is greatly reduced due to the following:

- The punch has a thick wall and the geometry of its tip protects the follicles.
- The device executes programmable combined sequential movements that reduce the friction between the follicular unit and the inner wall of the punch.
- The suction increases the traction force in the epidermis of the follicular unit within the punch.
- The potential energy of the follicles is fully utilized.

For all this to work in an accurate and continuous way, it is necessary to keep the handpiece steady while the punch works, so that the follicular unit can go inside the punch. This is what ultimately prevents injuries to the follicles.

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Medical and Professional Ethics

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Spotlight on Surgery by Unlicensed Practitioners

The ISHRS posted a consumer alert on January 18, 2017, that stated the following:

Properly trained and licensed physicians (and where allowed by law in the United States, physician assistants and nurse practitioners who practice within the scope of their licenses), should be the only professionals performing certain aspects of hair restoration surgery. This includes:

- Preoperative diagnostic evaluation and consultation
- Surgery planning and surgery execution (including donor hair harvesting, hairline design, and recipient site creation)
- Management of medical issues and possible adverse reactions

There is much debate currently about the practice of unlicensed persons performing the surgical steps of a hair transplant procedure, but why has this issue come about?

Although today it is primarily a problem with Follicular Unit Excision (FUE) both in the donor area with incisions around follicular units and in the recipient area with sharp implanter incisions, it can be argued that the problem originated in handing responsibility to non-licensed persons to dissect Strip Follicular Unit Transplantation (Strip FUT) tissue. Had the original precedence been set to only delegate this duty to doctors, it is unlikely we would be facing this problem today. Even if this task had been delegated to nurses, or other regulated health care professionals, then there would be an avenue for appeal to their governing bodies to control unethical behaviour.

Still, we are where we are, and the challenge now is to curtail an ever-increasing number of non-licensed persons from doing surgery.

The first issue to be considered in the discussion is whether hair transplantation is actually "surgery." The existence of a specific legal definition of hair transplant surgery or in fact of "surgery" varies from country to country, and some countries, like the UK, have no formal medical definition of "surgery." With the strip FUT method, there is little doubt that making the incisions to remove the strip is a surgical procedure. But is the incision step of FUE actually "surgery"? A single dermatological diagnostic punch biopsy would not be considered surgery, but it is the cumulative size of the skin wound created by multiple FUE incisions that differentiates the two.

What then about recipient site incisions? After all, the skin puncture from a hypodermic needle used to take blood is hardly considered "surgery." Why then should multiple incisions with a hypodermic needle or similar sized blade be considered "surgery"? Perhaps because of the cumulative size of all the small incisions? Perhaps because of the risk of bleeding, skin necrosis, and scarring if not performed correctly?

There is little doubt that a higher level of decision making and understanding is necessary to determine where, how many, and how close incisions are made in the recipient area as well as which, and how many, follicular units are removed during FUE. As with many other aspects of medicine, it is the additional training that a doctor and other licensed individuals undertake that informs this higher level of decision making and understanding.

The second issue to consider is the legality, or illegality, of non-licensed persons doing surgery. Again, the explicitness of this varies around the world. In the United States, some states have laws making the matter clear and some do not. In Europe, different countries have varying and sometimes opposing laws, while some countries have no legal clarity. In countries where there is no specific law, some have established medical guidance based on ethics. The ISHRS has recently sent out a poll to all European members to collect data on this subject, which will be summarised in a meeting at the Hollywood World Congress to discuss whether "Hair Transplantation" should be included in a European surgical or non-surgical standard for cosmetic procedures.

There are many experienced and well-respected senior hair transplant surgeons around the world who feel it is perfectly acceptable to let their non-licensed assistants make FUE incisions. No doubt there are many non-licensed persons who are very good at FUE. However, the issue is not "Can it be done?" it is "Should it be done?". The ISHRS's position on this matter is a very clear "NO."

The point is then raised that if the ISHRS does not endorse non-licensed persons to make FUE incisions, under what conditions is it acceptable for a robotic device to be used in hair transplant surgery? The ISHRS's position is that a robotic device should always be under the direct control of a doctor (or other licensed individual practicing within the scope of their license) and this responsibility should also never be delegated to a non-licensed person.

Why do doctors allow their unlicensed assistants to do

Reflective Questions:

Would I let a non-licensed person make FUE incisions in my practice?

What would I do if I had first-hand knowledge of a colleague who allowed non-licensed individuals to make FUE incisions in their practice?

Case Study:

A member of the public raised a concern to the ISHRS regarding a hair transplant surgical assistant making FUE incisions with a suction-assisted device at the practice of an ISHRS member. Evidence was reviewed by the Ethics Committee confirming this and that another ISHRS member at that practice also allowed the assistant to make incisions. A recommendation was made to the Board of Governors and the ISHRS memberships of the doctors were terminated.

ISHRS POSITION STATEMENT ON QUALIFICATIONS FOR SCALP SURGERY

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

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

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

FUE incisions? It might be that they don't know how to do it themselves, aren't very good at it, or just don't want to do it—perhaps because they find it tedious.

Why do non-licensed persons do FUE incisions? For those who are employed, it might be because they can earn a better income than from doing other things; it may be because their employer endorses them doing it; it may be because they are unaware of the law in their jurisdiction or there is no law prohibiting them doing so; or it may be genuine professional satisfaction from providing a service to patients that they feel skilled to offer. For those who do it independently, or employ doctors to provide an illusion of legitimacy, it is likely because of the significant financial gain that can be achieved.

Certainly, it is deceitful to give the impression to a patient that the doctor will be making the incisions when it will be an unlicensed assistant, but what if the patient is fully aware and consents to a non-licensed person making FUE incisions because the doctor says it is OK and that the individual is very good at it?

It is sad that having moved out of the "doll's hair," "corn row," plug graft era and having made such strides in achieving natural results, the reputation of the hair transplant field should be now threatened by the rising tide of poor results delivered by unlicensed practitioners, especially from overharvesting donor zones and creating unnatural hairlines. It is up to all of us to do our part to educate the public on this bad practice and to encourage patients to ask questions before the surgery, such as "Who will be doing the FUE incisions?" and "Who will be making the recipient site incisions?" Also, during the surgery, patients should ensure the person they were told would do the FUE incisions actually does them. Patients should be encouraged to blow the whistle if this is not the case and, if the doctor involved is an ISHRS member, to report the matter to the ISHRS.

Editor's note: This is another important article that hopefully leads to an active debate. One debate would be about hair transplantation being listed in a European regulation as a cosmetic procedure (surgical or non-surgical). But most cases of hair transplantation are for the reconstruction of androgenetic and cicatricial alopecia. It should not be considered cosmetic or aesthetic because it is actually a therapeutic procedure to treat alopecia. The European colleagues will discuss this topic in Hollywood.

The other debate would be about the role of non-physician personnel in hair transplantation. Regarding the delegation of some parts of hair restoration, the international situation is very diverse. There are many differently trained categories of personnel. In general, there are at least 3 categories: physicians, licensed personnel, and non-licensed assistants who have been trained by the doctor only.

In the United States, there are so-called licensed physician assistants and licensed nurse practitioners, who in some jurisdictions have a license to work independently under a doctor's supervision. For some procedures, the doctor does not even need to be present in the practice.

In many European countries, such as Germany, some tasks may be delegated to licensed nurses and physician assistants as long as the responsible doctor regularly checks the procedure and is immediately available (next door).

For hair transplantation, it is medical consensus and part of the guidelines that microscopic graft dissection and blunt placing may be delegated while the planning, anesthesia, strip excision, and recipient site creation is reserved for the physician only.

The question is if creating recipient site incisions during follicular unit excisions (FUE) is a critical surgical task that should also be performed by the doctor personally, even though other licensed personnel would be allowed to do it, too. Many colleagues argue that this is the case. And they would like to keep full control of donor harvesting as well as recipient site incisions.

Other colleagues allow licensed personnel to do FUE. They warn that many patients would otherwise go to clinics with other standards or abroad that can offer the procedure for a lower price. They also say that for high graft numbers, fatigue of a single surgeon is a problem. Sharing this task with licensed personnel or delegating it completely would solve this problem. But new problems may arise from this approach and some conditions should apply.

While some licensed personnel may be allowed to do surgery and perform FUE in some countries, it would certainly be in the interest of the patient that a physician remain responsible for the surgery as a whole.

A physician should supervise the recipient site incisions and the FUE and be immediately available in case of any problems. This includes regular checks of the patient's well-being, anesthesia, bleeding and graft quality, and clear instructions regarding the donor zone and harvesting density. Preferably, the doctor should initially or repeatedly do FUE personally during each procedure to determine the instruments, technique, and feasibility of FUE in the individual patient. Depth-control instrumentation further reduces the medical risks. To improve the skills of licensed personnel, a curriculum and training program as well as standards for physician supervision could be established by the individual practice or in general guidelines.

The best interest of the patient should always be a priority. This involves quality, swiftness, and affordability of the procedure, but above all, patient safety.

We would be happy to publish your opinion or report of your regional situation in upcoming issues. —AF ■

Hair Sciences

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The Hypertrichosis Side Effect of Cyclosporine Is Mediated Through the Activation of the Anagen-Promoting Wnt/β-catenin Pathway

The study reviewed in this month's column is titled, "Identifying novel strategies for treating human hair loss disorders: cyclosporine A suppresses the Wnt inhibitor, SFRP1, in the dermal papilla of human scalp hair follicles." In their article, Hawkshaw and colleagues used the hypertrichosis promoting immunosuppressant cyclosporine as their lead target in the search for a novel hair growth promoting agent.[1]

BACKGROUND

Activation of the Wnt/β-catenin pathway has been shown to be anagen promoting and androgens may inhibit this pathway in androgenetic alopecia. Topical application of the Wnt/β-catenin activator methyl vanillate increased hair count and Hair Mass Index in women with androgenetic alopecia.[2] Topical application of another Wnt/β-catenin activator, valproic acid, was shown to increase hair count in male patients with androgenetic alopecia.[3]

There are a select few medications whose side effect profiles include hypertrichosis. The immunosuppressive calcineurin inhibitor cyclosporine is known to promote hair growth. In mice, cyclosporine has been shown to induce anagen phase in quiescent telogen phase hair follicles and also inhibit the catagen phase of hair follicle regression. Cyclosporine-induced hypertrichosis appears to be independent of its immunosuppressive effects since hair follicles grafted onto immunocompromised nude mice treated with cyclosporine also showed anagen prolongation *in vivo*.[4] It appears that the mechanism in which cyclosporine induces hair growth differs in mouse and human hair follicles. To investigate its effects on human hair follicles, investigators used organ-cultured human anagen hair follicles that they treated with a therapeutic dose of cyclosporine.

Study techniques and key findings included the following:

1. Microarray analysis was used to identify gene transcription changes of human hair follicles treated with cyclosporine.
2. The Wnt inhibitor SFRP1 (secreted frizzled related protein 1) demonstrated the largest downregulation upon exposure to cyclosporine. SFRP1 is produced by dermal papilla-associated fibroblasts and is secreted into the hair matrix and pre-cortex.
3. To prove that cyclosporine's hair growth effects occurred through SFRP1, the investigators treated human hair follicles grown *ex vivo* with vehicle, cyclosporine, recombinant human SFRP1 (rhSFRP1), or rhSFRP1 and cysloporine. Enhanced SFRP1 activity induced premature catagen. While cyclosporine increased the percentage of anagen hair follicles compared to vehicle, this effect was blocked by the addition of rhSFRP1 to cyclosporine, suggesting that this effect was mediated via SFRP1.
4. Using in situ hybridization and immunofluorescence microscopy, the authors showed that the Wnt/β-catenin signaling pathway, which is typically inhibited by SFRP1, is active in both the epithelial and the mesenchymal cells in the dermal papilla and hair matrix.
5. Next, the authors showed that SFRP1 functions as an inhibitor of canonical Wnt/β-catenin signaling in the human hair bulb.
6. Through incubation of human hair follicles with WAY-316606, a specific inhibitor of SFRP1, the authors showed that SFRP1 inhibition enhances β-catenin activity in human hair pre-cortex keratinocytes and dermal papilla fibroblasts.
7. Next, the authors investigated whether enhancing β-catenin signaling through SFRP1 inhibition leads to enhanced human hair growth. Hair shaft elongation was noted upon incubation of human hair follicles with WAY-316606 for 6 days *ex vivo*. In fact, this occurred even faster than cyclosporine-induced hair shaft elongation, which occurred several days later. WAY-316606 also induced human hair keratin expression.
8. Prolonging the duration of anagen is a key mechanism in hair loss mitigation. Cyclosporine achieves this by blocking catagen. The authors showed that 6 days of treatment with WAY-316606 promoted a greater percentage of organ cultured hair follicles to remain in the anagen phase.

This publication showed that cyclosporine may exert its hypertrichosis effects through downregulation of Wnt inhibitor SFRP1. However, the study didn't investigate whether cyclosporine also affects catagen entry through alternative immunomodulating effects. WAY-316606 was shown to be a promising pharmacological inhibitor of SFRP1. WAY-316606 has the potential to promote human hair growth without the toxicity profile of the broadly immunosuppressive cyclosporine.

Nonetheless, caution is warranted when attempting to bring a new pharmacologic target to market. Mouse data in *Sfrp1* knockout mice showed increased mammary ductal branching and dysregulated glucose metabolism.[5,6] These mice also had no hair abnormalities, further stressing the difficulty in extrapolating pharmacologic effects of SFRP1 inhibition in humans from mouse studies. Also, β-catenin is

a proto-oncogene, and its stabilization through the promotion of the Wnt/β-catenin pathway by WAY-316606 has potential oncogenic properties. The authors, however, claim that WAY-316606 promotes Wnt signaling through ligands that are already present in the human hair follicle, thus potentially minimizing the oncogenic risks of Wnt/β-catenin activation. Overall, this publication presents compelling preclinical data that can serve as a launching pad for clinical investigation into a new therapeutic target for hair loss.

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Hair's the Question

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

My husband recently mentioned he read an article on how bitter squash led two women to lose their hair. Since he is a chef, the topic was of interest to both of us. This spurred my search for other types of rare hair loss causes that you and I will probably never see in our practice lifetimes, but that are interesting trivia for a hair surgeon nonetheless.

Rare Causes of Hair Loss

1. Two middle-aged women present to your office with acute, significant scalp hair loss. The only thing they have in common is that they both recently visited the hospital after eating a bitter-tasting squash soup. Which of the following is the most likely cause of their hair loss?
   A. Amanita phalloides poisoning
   B. Cucubit poisoning
   C. Cucumber poisoning
   D. Oleander poisoning

2. You visit your grandmother to help her with a problem with ants infesting her house and notice that she is experiencing significant and diffuse hair loss. The ants are gone. Your grandmother says she used a very effective old remedy for getting rid of the ants. What is the most likely cause of her hair loss?
   A. Boron toxicity
   B. Selenium toxicity
   C. Zinc toxicity
   D. Coal Tar toxicity

3. A professional body builder comes to your office complaining of significant hair loss. He has been training for 3 years for his next bodybuilding competition with NO performance enhancing drugs. He says his bodybuilding secret is to eat 20 raw egg whites per day with lime juice sprinkled on top and a banana. There is no history of hair loss on either side of his family. Which of the following is the most likely cause of his hair loss?
   A. Vitamin C deficiency
   B. Potassium deficiency
   C. Protein deficiency
   D. Biotin deficiency

4. A nervous patient comes to your office to ask if she can have a hair transplant. She has hair loss on one side of her head and it includes half of the left eyebrow and the lateral section of her eyelashes. There is no history of hair loss in her family and all labs and the rest of her scalp exam is normal. Before doing a dermatoscopic exam, which of the following would you ask?
   A. Are you left-handed?
   B. Do you braid your hair?
   C. Do you sleep on your left side?
   D. Have you been exposed to radiation on your left side?

5. A new patient comes to your office complaining of a circular area of hair loss at his temple. He denies pulling at the hair and says the hair loss has been there since he was a child. What is your diagnosis?
   A. Circular alopecia
   B. Triangular alopecia
   C. Occult trichotillomania
   D. Malingering

6. A 37-year-old male comes to your office hoping to fill in a patch of scalp that seems to be losing hair. The patch is pink and expanding. The edges have small pustules and some of the remaining hair appears to be gathered into small tufts. Without seeing a photo, what is the most likely cause of this rare scarring alopecia?
   A. Pseudopelade of Brocq
   B. Tufted folliculitis
   C. Folliculitis decalvans
   D. It is not possible to give a diagnosis with this amount of information.

7. Concerned parents come to you with a young child who has lost all his hair. He had a normal head of hair, but slowly he has lost it all. All lab tests are normal and genetic testing is pending. They are hoping surgery can replace the hair. What do you tell these parents?
   A. Their child has hypotrichosis and you can take donor hair from a parent to replace it once the child is over 5 years old.
   B. Their child most likely has congenital atrichia and the hair will not regrow.
   C. Their child has alopecia areata and should be started on a high dose steroid taper immediately.
   D. Their child is in a normal shedding cycle and the hair will regrow within 3-6 months.

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8. A health conscious 35-year-old man comes to your office complaining of diffuse hair loss. His father had mild hair loss at the frontotemporal corners at age 40. He also is complaining of arthritis like aches and diarrhea. He takes "mega-doses" of the following vitamins: A, C, E, and B-12. What is the likely cause of his hair loss?
   A. Too much Vitamin A
   B. Too much Vitamin C
   C. Too much Vitamin E
   D. Too much B-12
9. You see an historical photo in a book that shows several persons with hair loss mainly at the vertex of their scalp. The patients are all different ages and the sides of the scalp are spared, giving the appearance of a monk's tonsure. There is hair on the rest of their bodies. What is the cause of the hair loss in the picture?
   A. Ritualistic group shaving for a Spring Festival
   B. Lice eradication efforts after breakout in a school
   C. Epilation after atomic bomb exposure
   D. Deliberate infection with leprosy (also known as Hansen's disease)

Answers

1. **B.** Cucubit poisoning is the culprit. Amanita phalloides is the Death Cap mushroom and the number one cause of mushroom poisonings worldwide—but it is not a cause of hair loss. To my knowledge, a cucumber never poisoned anyone, but an oleander flower apparently could, so I threw that in there as a distractor as well.
2. **A.** Boric acid is used as an insecticide. I used to use this powder ALL THE TIME in medical school, so if I start losing my hair, you can all nail this diagnosis. Interestingly, I found reports of this type of diffuse unexplained alopecia from boric acid in mouthwash. The other three answers are all ingredients in shampoos that actually HELP hair loss.
3. **D.** Biotin deficiency is rare in adults, but can be caused by ingestion of this amount of raw egg whites (which bind biotin) over a period of months to years. I guess that is why it is rare… biotin deficiency causing hair loss is much more common in the pediatric population, and even then it is rare. The lime juice would take care of his Vitamin C needs and the banana would be giving him some potassium (although an avocado, apricot, or sweet potato would probably contain more than the banana). This many egg whites would definitely support his protein needs!
4. **A.** Trichotillomania is not exactly rare; many mildly affected patients exist. However, it is rare to have such complete hemi-alopecia in an individual, and the one-sidedness is a clue to her left-handedness. Traction alopecia would result from excessive or tight hair braiding and would likely occur on both sides. Sleeping on one side or the other does not cause hair loss (especially not in the eyelashes and brows). Radiation exposure would cause either a targeted alopecia (as in the case of a brain tumor being treated with radiation) or crown hair loss sparing the fringe and the rest of the body hair (as in the case of epilation after the atomic bombings of Hiroshima and Nagasaki).
5. **B.** Triangular alopecia is similar to congenital aplasia. It is usually seen at birth in a small patch where hair follicles fail to develop. You can safely treat this with hair restoration surgery or excision.
6. **C.** The pustules differentiate folliculitis decalvans from tufted folliculitis. Pseudopelade has an appearance more like that of alopecia areata, and indeed, there is some controversy as to whether that diagnosis is its own distinct entity or the end stage of a different scarring alopecia (like discoid lupus erythematosis). In any case, do NOT perform surgery please.
7. **B.** The reason this is NOT hypotrichosis is that babies with congenital atrichia can be born with all their hair but in early childhood it is lost and does not regrow. Surgery is not an option (where would you get the donor hair?). Interestingly, congenital atrichia is the first human hair loss disease researchers determined was caused by a single gene defect. It is also known as papular atrichia.
8. **A.** Vitamin A is the problem. It is also causing his arthritis-like symptoms. Water soluble Vitamin C is causing his diarrhea, but otherwise is harmless. Excess water soluble B-12 is likewise harmless and flushed from the body (i.e., your body only absorbs a small amount at a time). Vitamin E might also cause nausea and vomiting if too much is taken by mouth, but it is NOT the cause of his hair loss.
9. **C.** This is sadly correct, although A was fun to write. Leprosy can cause loss of eyelashes and eyebrows, but would not fit the pattern described. Head shaving does not eradicate lice, by the way, although if you ever experienced an outbreak of it, shaving off all your hair in order to eradicate these pests is a desperate move you will surely consider.

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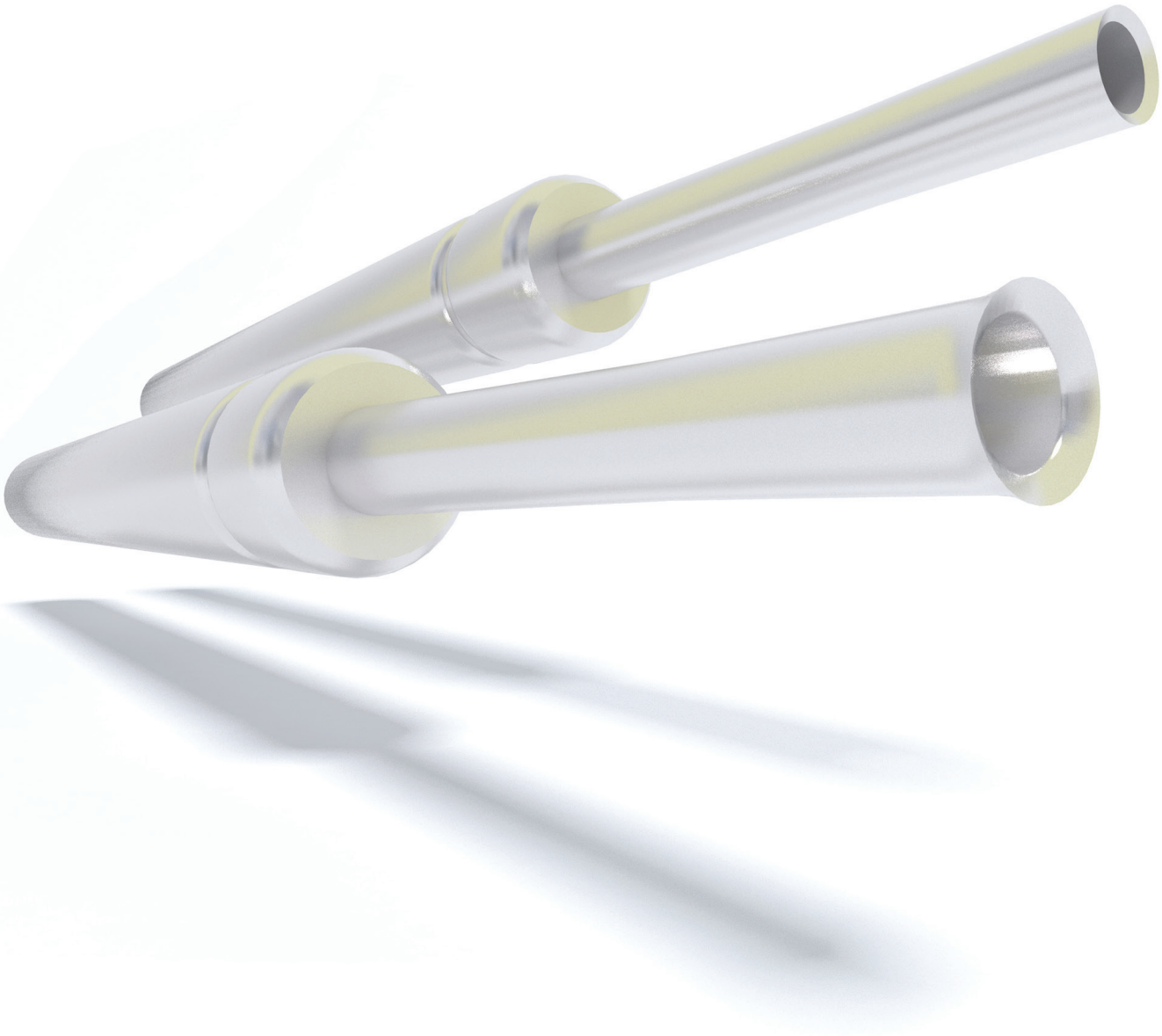

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Message from the ISHRS 2018 World Congress Program Chair

Parsa Mohebi, MD, FISHRS | *Encino, California, USA* | info@parsamohebi.com

We are changing the field of hair restoration forever!

I hope you are ready for the World Congress of Hair Restoration in Hollywood. We have prepared a great program for you!

RAPID CHANGES, FREQUENT UPDATES

We all know how fast our field has changed within the past few years. Older patients who come to us for a repeat/revision procedure are amazed at how different their experience is this time around. They often say if they knew what we had in store for them, they would have waited a few more years to take advantage of today's technology.

Change is not always easy, but it is necessary in every field. It would be easy to keep practicing the way we did 10 years ago, but our patients demand better results than ever before. They do online research and read about the new techniques they can take advantage of today. If we do not keep up with technology, we will not have a practice in a few years.

There is no need to panic as help in on the way! This year, we have a different format to our World Congress. Since our field is going through a vast transformation, we decided to give an overall review of all topics in light of the availability of new concepts and methods. We will cover all of the main topics in hair restoration by key speakers that were chosen as the masters in each category. You cannot afford to miss any session during this year's World Congress. I certainly won't be missing one.

INNOVATIONS YOU CAN'T AFFORD TO MISS

Besides our overall updates in all categories, we have the "best of the best" presentations from doctors from all over the world. Each one tells a new story and has a new angle. They will show us small and big alterations we can make in our practices to serve our patients better. You will discover novel techniques that make your daily lives easier along with methods that can improve both your results and your patients' satisfaction.

STANDARDIZED HAIR RESTORATION

I remember when I became a hair transplant surgeon years ago. We had multiple options to perform hair transplant surgeries. It was different from what I learned in my general surgery training. We did not agree on many facts and everyone claimed they had found the magic formula to get the best results. Today, we find more evidence based medicine in our field. We have studied and documented certain facts that cannot be disputed. We are less reliant on our personal experiences and more on the science of modern hair restoration. We are not quite perfect yet but, like most other fields in medicine, we are moving forward to become more standardized. The World Congress is an unmatched platform to learn the latest in our field every year.

Are you ready to walk on the red carpet?

Finally, Hollywood is THE place for you to look and feel like a celebrity. Our glamorous gala and awards ceremony will give you the chance to look like your favorite superstar. Get your red carpet look ready and be prepared to have fun while being part of the biggest change that our industry has ever experienced. ■


Aileen Ullrich


Deanne Pawlak

Message from the ISHRS 2018 Surgical Assistants Chair & Vice Chair

Aileen Ullrich, MA, Chair | *Portland, Oregon, USA* | aileen@gabelcenter.com
Deanne Pawlak, LPN, Vice Chair | *Calgary, Alberta, Canada*

The countdown to the October 10-14, 2018, ISHRS World Congress in Hollywood, California is almost over. This year will be an exciting year at the Surgical Assistants meeting. It will be full of new and interesting ideas to expand on any assistant's surgical skills. I hope you have made your plans to attend where you will absolutely grow technically and intellectually in hair transplant procedures.

The meeting will begin Wednesday morning, October 10, with our Surgical Assistants Core Skills Workshop. This course explores the basics of assisting in hair restoration surgery, with a focus on developing the associated fundamental skill sets of a surgical assistant. The workshop starts with lectures on hair anatomy and physiology, graft preparation, and graft placement. Participants will then work closely with highly experienced faculty from around the world as they rotate through various practical hands-on stations. At each station, innovative materials will be used to provide a realistic yet challenging opportunity to learn and develop core skills and to practice techniques.

In the afternoon, we will consider advanced topics as assistants from more than 13 countries share practical tips and ideas during our Surgical Assistants Program. The program is formatted as a series of presentations with a strong emphasis on videos. The topics are meant to educate the audience and give a glimpse into how other clinics run. We will examine what a typical surgery day is like in offices from around the world, extract pearls of knowledge from our colleagues during the section "New or Improved," examine thought-provoking scientific topics, get inspired with interesting cases, and engage with each other as we think critically about quality control and improvement.

The chance to gather insight, pick up pearls of wisdom, learn new surgical techniques, and gain surgical knowledge from assistants all over the world only happens once a year, so take this opportunity while you can. Bring with you your enthusiasm and drive to learn and you surely will not be disappointed.

I look forward to seeing you in Hollywood! —Deanne ■

How I Do It

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

California Dreamin'

For this issue, the HIDI column asked local Southern California ISHRS hair transplant surgeons for their recommendations regarding things to do while in Los Angeles. Los Angeles and the surrounding local cities feature many unique cafes, restaurants, and shops, all of which can be found simply by exploring on your own. For those who prefer a more directed focus, the following highlights can serve as a good jumping off point for your visit to the area. ***Images courtesy of the Los Angeles Tourism & Convention Board.***

From Paul McAndrews:

Here are popular spots with our friends, our adult children, and their out-of-town friends:

Griffith Observatory, 2800 E. Observatory Rd., Los Angeles. Impressive views of Los Angeles and the Hollywood sign. Lots of outdoor hiking trails (easy & moderate) with miles of paths throughout Griffith Park. The Observatory has planetarium shows and exhibitions.


Griffith Observatory

Santa Monica Pier, 200 Santa Monica Pier, Santa Monica. Beautiful beach, calm shorelines, great restaurants, big ferris wheel, and fun people watching. Easy to get around on foot or bike (car parking is difficult), and a 26-mile walk/bike path along the beach.


Hollywood Bowl

Hollywood Bowl, 2301 Highland Ave, Los Angeles. Fabulous outdoor amphitheater in the Hollywood Hills. Bring a picnic dinner to enjoy before one of the amazing concerts.

The Getty Center, 1200 Getty Center Dr., Los Angeles. An impressive beautiful museum with some of the finest art in the world. Located on top of the Santa Monica mountains, it offers spectacular views of Los Angeles.


Nobu Malibu

Grand Central Market, 317 S. Broadway, Los Angeles. Huge indoor market with vendor stalls offering various cuisines from various cultures. It's a lively popular foodie heaven with locals & visitors.


Hollywood Hills

Farmers Market & The Grove, 6333 W. Third St., Los Angeles. This old market has lots of food vendors with fresh produce & delicious snacks. Immediately next to it is the massive modern complex The Grove with restaurants, shops, entertainment and special events.

From Marc Dauer:

Favorite restaurants

Dantannas; Nobu Malibu, Craig's

Favorite venues for live music

Troubador; Hotel Café; Greek Theatre; Hollywood Bowl

Best outdoor malls

The Grove; Century City Mall; Third Street Promenade

Best hikes

Runyon Canyon; Tree People

Other fun things

Rent bikes or electric scooters in Santa Monica and ride the boardwalk; surf; sail or rent motor boating in Marina Del Rey; rent a convertible and drive the coast!

From Tim Carman:

San Diego

And for those of you who plan to stay and would care to venture south, San Diego is a fantastic destination only two hours by car from Los Angeles. A summary of highlights:

La Jolla. La Jolla is a quaint coastal suburb within the city of San Diego which is known for its great restaurants, cafés, and absolutely beautiful coastline views.

Gaslamp District. Downtown San Diego, known as "The Gaslamp District," has a plethora of award winning restaurants concentrated in a small five block radius.

San Diego Zoo Safari Park. In northern San Diego, this unique venue allows visitors to travel through the park as the animals roam free in their natural habitat.

Carlsbad, Leucadia, Encinitas. These are all coastal cities worth visiting as they all retain that laid back California beach town vibe. All along the coast you will find unique shops and cafés run by locals who are as unique as their businesses.

"SHOW YOUR BADGE"

The ISHRS was in contact with LA Tourism and they provided information about a program they offer called "Show Your Badge." The Show Your Badge program allows attendees to receive discounts and special offers at over 25 restaurants, plus activities and nightlife establishments in Downtown LA, by simply showing the conference badge. Discounts range from 10% to 20%, half off or free beverages, free $2 tokens—just to name a few. Further details can be found at the following website: https://www.discoverlosangeles.com/meetla/showyourbadge

From Bradley Wolf:

I have a friend in the entertainment industry who has lived in Los Angeles for over 40 years. Here are his recommendations:

Restaurants. Musso and Frank is a must go in Hollywood, you can walk to it for lunch, dinner, or drinks. Old school if you go eat in the bar, all the famous movie stars used to come here. Dating to 1924, it's the oldest restaurant in Hollywood and known for its killer martinis, seafood cocktails, steaks, chops, and retro dishes like Welsh Rarebit.

A recent article on the top 20 restaurants in LA: https://www.hollywoodreporter.com/lists/best-restaurants-los-angeles-hot-right-now-september-2018-1140681/item/dialogue-hollywood-eats-september-2018-1140706.

Nightclubs with entertainment: Three Clubs, Avalon, Hollywood Roosevelt Hotel. The Hollywood Roosevelt Hotel has a hot club and kind of cool for meeting in the lobby bar.


The Broad
Contemporary Art Museum


Universal Studios

Grammy Museum. The Grammy Museum explores and celebrates the enduring legacies of all forms of music; the creative process; the art and technology of the recording process; and the history of the Grammy Awards, the premier recognition of recorded music accomplishment.

Broad Museum. The Broad is the contemporary art museum of Los Angeles.

Staples Center. Located directly across the street from STAPLES Center is LA LIVE, a one-of-a-kind sports and entertainment district in downtown Los Angeles. The 4 million square foot destination features Microsoft Theater, The GRAMMY Museum, Conga Room and The Novo by Microsoft, giving LA LIVE "more music per square foot" than any other location in the world. The district offers a rich mix of local, regional, and national restaurants

Universal Studios Tour. Go behind the scenes of a real working movie studio! Approximate tour time is 60 minutes. Visit 13 city blocks on four acres of historic studio lot in the largest set construction project in studio history, built with creative consultation from Steven Spielberg himself.

City walk. More than 30 places to eat, a hot nightclub, 19-screen theater with state of the art IMAX®, and more than 30 unique shops. It's LA's favorite place to play. CityWalk is located directly next to Universal Studios Hollywood.

UCB Theater on Franklin St. Only go to the Franklin St. theater, the one on Sunset is for tourists and not the same vibe. The shows are cheap and only one hour. It is a really great place to see sketch and improv comedy; it's a small theater so buy tickets online, it sells out. There are good restaurants on the same block so eat and see a show, it's close to the hotel.

Laugh Factory for standup, not as close as UCB and different comedy. If you go it has to be later to see famous talent. Tim Allen and some other famous comedians do a regular weekly show, check the schedule online.

Magic Castle. pretty cool place if you have never been there, all the top magicians are members and do shows each night. It is in a mansion that is also cool to see. You have to have an invitation to get in. The hotel concierge can probably get you in.

Beach towns

Don't forget about the laid back beach towns of SoCal (from North to South):

Malibu. Stretching for more than 30 miles along the Pacific and Highway One, Malibu has achieved almost mythological status among California beach towns. Hollywood stars and top athletes live in oceanfront homes here, under an elegant veil of privacy on long strands of beach. Enjoy front-row seats for surfing and unforgettable sunsets.

Santa Monica. The oceanfront city of Santa Monica, lined with its nearly 4 miles of beaches, feels like a weekend getaway spot. You can hang out on broad beaches or the lively Santa Monica Pier (complete with its own amusement park and rides) without having to stress about traffic or parking. Another great way to get around, rent cruiser bikes.

Venice Beach. No beach in the world is like Venice Beach. Check out the 3-ring urban street circus, complete with philosophizing artists, trash-talking hoopsters, preening weightlifters, barefoot sand sculptors and more. All of this frenetic activity happens on Ocean Front Walk, a 3/4-mile concrete boardwalk with stores, fast-food spots, flea markets and artists.

Huntington Beach. The endless summer lives on in Huntington Beach. Southern California's beach culture thrives along this city's curving shoreline, where you can bicycle down an oceanfront path, play volleyball, and, of course, surf. Go to the International Surfing Museum, and you'll see up close how this Orange County town, with 10 miles of beaches and consistent swells, got its nickname of Surf City, USA.

Newport Beach. Old California charm meets modern glamor. Look one way in Newport Beach, and you'll see oceanfront mansions and a yacht-lined harbor. Look another, and you'll find historic cottages, dive bars, and a friendly controversy about ice cream bars. With its mix of high-end living and world-class surfing waves, Newport Beach offers both luxury and beach-town delights. ■

Review of the IV Latin American FUE Workshop Guatemala City • June 25-27, 2018

Marie A. Schambach, MD | *Guatemala City, Guatemala* | marieschambach@schambach.clinic

The IV Latin American FUE workshop took place in Guatemala City, known as the city of eternal spring. Guatemala offers enormous diversity, from ancient Mayan archaeological sites to active volcanic countryside, colonial architecture, and beautiful lakes.

There were 80 participants from 20 countries at the workshop held under the direction of Drs. Roberto Trivellini (Scientific Director), Marie Schambach (Hosting Director), and Sebastián Yrirart (Workshop Director). From the USA, we had the privilege to learn from Drs. James Harris, Robert True, Parsa Mohebi, T.K. Shiao (part Korea), Michael Vories, and Jorge Gaviria. From Brazil, we enjoyed lectures from Drs. Antonio Ruston, Arthur Tykocinski, Chrisitine Graf Guimaraes, Alan Wells, Fernando Basto, Felipe Pitella, and Gabriel Facchini. From Israel/Argentina, Dr. Alex Ginzburg. We were honored with faculty coming from faraway lands: Drs. Francisco Jiménez and Ramiro Yane from Spain; Dr. Conradin Von Albertini from Switzerland; Drs. Sara Salas and Victor Vallejo from Mexico; Dr. René Rodríguez from Colombia; Dr. Johny De La Riva from Bolivia; Dr. Leoncio Moncada from Venezuela; Drs. Alejandro Chueco, Dr. Sebastián Yrirart, and Oscar Marinacci from Argentina; Dr. Roberto Trivellini from Paraguay; and Dr. Marie Schambach from Guatemala.

DAY 1

The scientific lectures took place at the Westin Camino Real Hotel, 10 minutes from Multimédica Hospital, our surgical centre. There were multiple operating rooms and two additional rooms for A/V display and surgeon interaction.

Dr. Schambach introduced the programme and emphasized the importance of ongoing education in order to provide best practice. Dr. Herrera, Dean of Medicine and Surgery of the University San Carlos, thanked the faculty for attending.

Dr. Pittella talked about the pathophysiology of androgenic alopecia, providing an update on medical treatments. Dr. Salas discussed the first approach to a hair transplant patient. Dr. Jiménez summarized macro- and microscopic anatomy for hair surgeons, explaining the recent discovery of the anatomical involvement of the sweat gland within the follicular unit. He then spoke about isolating the eccrine sweat gland from the follicular unit. He suggested future studies in burns patients: would transplanting the gland be helpful in thermoregulation?

Dr. True gave us a wonderful lecture on GQI (Graft Quality Index). The GQI can add a numerical value to the excision and extraction quality. A higher score indicates more damage to the grafts, and this might then influence implantation techniques (i.e., using implanters).

Next, Dr. Tykocinski showed an innovative video that demonstrated the balance between FUE and FUT. Combination surgery may be used in younger, unstable patients when there is uncertainty about future loss. He did suggest that FUT is indicated in the young patient and to keep inside the safe donor area. This prompted a VERY interesting discussion; Dr. Ginzburg disagreed, saying FUE is preferred for these patients, because if there is significant progression, he can still shave and have no linear scar. Dr. Ruston added that in 10% of all FUT cases, the scar will thicken, and in time, existing hair will thin, and the linear scar will be visible. Dr. Shapiro spoke about extracting the maximum number of grafts combining FUT and FUE.

Dr. Chueco discussed coverage value (CV): CV = Density × (% hairs/FU) × hair-width (mm); a coverage value of 5.4 is desirable either to extract as much as to leave a 5.4 CV or to implant as much as to reach a 5.4 CV.

Dr. Ruston noted that he uses the densitometer to calculate and evaluate donor capacity. Dr. Harris discussed the hair mass index (HMI), which calculates donor availability, noting that it should be kept at 60-70. A single pass may extract 10-25 FU/cm^2, up to 40-45 FU/cm^2 total in Caucasian skin. Dr. Shapiro suggested we should find a way to include partial transections into the CV. Dr. Schambach aims to calculate donor area without having to shave the patient.

Dr. Vallejo summarized how planning can help avoid complications, but he noted it's not a race to get the maximum grafts per surgery: you have to look for the appropriate graft number for each case, causing the least damage for future interventions.

Dr. Marinacci talked about resources available for those with poor donor area. Dr. Mohebi lectured about simultaneous graft extraction and placement; by optimizing space, three technicians are able to work alongside him. Dr. Chueco highlighted that healing is dependent on excision type, depth, and quantity.

Dr. Harris discussed the single-use Hex punch. The following steps are essential: stretch skin, align punch, engage, and punch. Dr. Tykocinski, highlighted the stages of excision using the trumpet punch: 1) provide light compression to allow the skin to surround the punch and reach the cutting edge, 2) start oscillation motion, and 3) release the punch.

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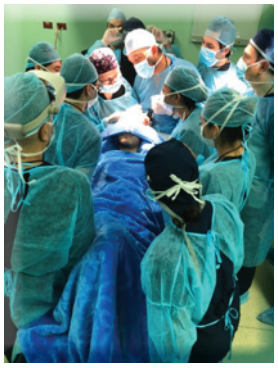
Next, Dr. Trivellini explained the physics of the flared punch. He presented a virtual model, introducing all forces involved during FU excision and factors affecting the results.

Dr. True suggested a new classification of punches, comprising four elements: 1) the tip, 2) the shape, 3) the cutting edge position, and 4) the true external diameter. The ideal is the smallest diameter punch, giving the best quality graft, with least damage to the donor. The ability to use different punches is essential for optimizing results for a wide range of patients.



Dr. Schambach demonstrated non-shaven long hair preview FUE technique by video presentation, using different punches and devices and placing with Lion Implanters. Dr. Gaviria presented upper lip FUE moustache reconstruction. Dr. De La Riva showed several cases of FUE used for repairing scars; he uses fat transfer into the scar pre-transplant. Dr. Ginzburg discussed using FUE for cicatricial alopecia, FUE being preferred since the donor is already compromised. Cases of lichen planus, Pseudopelade of Brocq, radiotherapy, frontal fibrosing, aplasia cutis, and triangular alopecia were presented.

Dr. Harris explained robotics and discussed space required and staff training (user interface, assist procedure, tensioner placement, graft removal, counting and sorting). He noted robotic issues such as its sensitivity to skin differences, acute angle emergence (45 degrees maximum), variable yields/transection rates, and hardware or software failures. Dr. Shiao showed his multidimensional 4D FUE that uses the concept in reverse (sharp punch is relatively dull at a lower RPM): sharp for epithelium and dull for deeper tissue. The foot pedal has two stages—superficial rotation, then deep oscillation—and the handpiece can be altered for acute angles. In the future, there is the possibility of real-time information on distribution of FU, GQI, and storage temperature. Dr. Trivellini presented his TFT (Trivellini FUE technique), which technique avoids the axial movement under the skin, uses the potential elastic energy of the FU, and maintains a suction pressure of 650mmHg to assist the graft into the punch.

Dr. True mentioned difficult cases, including a female with scarring alopecia, where FUE was impossible. Dr. Schambach suggested different punches, with different forces, and even to go to manual if needed. The audience commented on difficult cases including curly hair and afro extra curl, longest graft (8mm), and medication issues.

Dr. Yriart showed different cases of hair reconstruction and discussed choice of extraction method. Dr. Rodríguez discussed hair restoration following radiotherapy. Post-radiotherapy skin atrophy, sclerosis with telangiectasia developed, so he noted that it is important to establish the layer in which to implant to ensure adequate graft perfusion. He saw faster results with FUE than FUT. Dr. Jimenez presented hair transplantation into wounds and scarring alopecia noting a faster recovery (by 50%) when ulcers are transplanted with hair grafts.

DAY 2

Dr. Vories demonstrated working with one technician, counter traction to avoid popping with implanters, and changing needles after 500 grafts. Dr. Shiao showed his percutaneous EZgrafter, which has depth control and fixed graft insertion control, and is cheap to change the needle. He also presented a twin EZgrafter in development. Dr. Ruston showed KEEP Implanters. Dr. Trivellini showed his stick-and-place technique with premade incisions. Dr. Moncada advised how to avoid popping. He calls it "two stepped": first, 90° angle introduction in skin and, next, change to desired angle.

Dr. Von Albertini discussed his study on graft injury, comparing implanters with premade sites and placing, concluding the risk of damage is almost nonexistent with implanters. Dr. Schambach described site creation and placing nightmares along with how to avoid and correct them. Dr. Fachini showed his self-loading hybrid implanter. The objective was to reduce trauma and reduce surgical staff. The original concept was a mix of an implanter with the KEEP Placer. The needle has a V notch for loading the implanter from above with finger similar to the KEEP Placer. It is blunt for premade incisions but a sharper punch is in development for site creation and placing.

Dr. Mohebi discussed achieving a uniform density. Dr. Salas showed corrective cases using SMP and FUE. Dr. Ruston reviewed some precise indications for FUE: donor area with very low density and very fine hair, multiple previous scars, into scars and for recycling previous unnatural implants. He also gave advice on transplanting strategically to create more impact (e.g., border and temporal peaks). Dr. Von Albertini talked about overharvesting, out of safe donor area, patterns of white dots by hypopigmentation, donor effluvium, donor necrosis, and anesthetic overdose. He also noted FUE MINIMAX: minimize donor trauma, maximize graft care.

Dr. Rodriguez emphasized the importance of graft direction during eyebrow transplantation, concluding sharp implanters are preferred for placing. We were reminded of the importance of placing the graft in the implanter with the proper curvature towards the skin and as parallel as possible. Dr. Ginzburg explained the use of beard as both donor and recipient, and later discussed scalp hair transplantation into frontal fibrosing alopecia. Dr. Guimaraes showed how FUE can correct eyebrows, beard, and female androgenetic alopecia.

Dr. Gaviria talked about tissue tension and the use of adequate FUE equipment. Dr. Wells finished the scientific

session talking about small changes for big improvements in FUE performance.

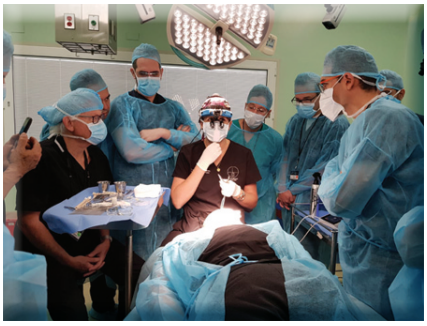
Simultaneous Operating Rooms

Operating Room 1 = Male Norwood Grade V, 2,000g over 2 days. Excisions by Drs. Trivellini, True, and Von Albertini using the Nano Mamba device. Implanting by Dr. Trivellini using the stick-and-place technique; Drs. Vories and Von Albertini using implanters.

On day 2, Dr. Schambach extracted with the MAMBA, Dr. Tykocinski with the WAW, Dr. Shiao with 4D FUE. Drs. Marinacci and Schambach placed using implanters.

Operating Room 2 = Male Norwood Grade III, 2,000g. Excisions were performed by Dr. Harris with the SAFE system and Dr. Chueco with manual FUE. Implantation was performed by Dr. Ruston with KEEP and Dr. Chueco with implanters. Dr. Rushton excised grafts with a sharp motorized punch and Dr. Ginzburg with Jacks FUE punch. Both Drs. Schambach and Ginzburg placed with implanters.

Operating Room 3 = Male Norwood Grade III, 900g. Various participants were welcomed to excise their own grafts. Procedure of excision was supervised by Dr. Schambach, who explained the use of WAW, SAFE and MAMBA. Dr. Marinacci supervised surgeons' organization for hands on. Implantation was done by Dr. Yane using KEEP implanters.



In Operating Room 3 on day 2 = eyelash restoration using eyebrow and sideburns for donor (with long hair FUE) as donor. Drs. Schambach and Yriart excised donor from eyebrow with manual sharp punch, and from the sideburns with Mamba flared punch, using Dr. Schambach's long hair FUE technique. The extractions from the eyebrow were very difficult, but achievable. Implantation was done by Dr. Schambach with premade sites with a curved Frechet needle, and placing was done with 0.64mm diameter Lion Implanter.

Operating Room 4 = patient with alopecia areata totalis who had partial scalp micropigmentation with a microneedling device by Cynthia Pizarro.

Dinner was celebrated without a dress code, so people could relax, at a restaurant called Montano. We enjoyed local dishes with beer or wine. We enjoyed mingling and sharing personal life, and we got a wonderful picture of all of who attended dinner meeting.

The 2019 Latin-American FUE workshop will be held March 17-20 in Buenos Aires, Argentina. ■

Review of the ISHRS Hair Transplant Pre-Congress Course Cairo, Egypt • September 12, 2018

Ahmed A. Noreldin, MD, FISHRS | *Cairo, Egypt* | esprs@hotmail.com; Francisco Jimenez, MD, FISHRS | *Gran Canaria, Spain*

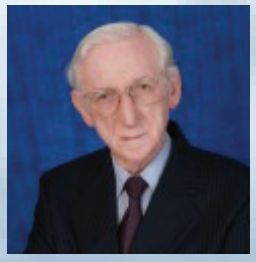
Our society, as an international scientific organization committed to education, is willing to collaborate with our international members in the organization of education in their home countries. In this case, we planned, in agreement with the Aesthetic Academy of Egypt (AAEgy) to organize a pre-congress course on September 12, 2018, the day before of the AAEgy meeting in Cairo. The meeting, which was held at the Nile Ritz Carlton in Cairo, was organized and chaired by Dr. Francisco Jimenez, ISHRS Secretary, and Dr. Ahmed Noreldin, an ISHRS Fellow Member who is a Professor of Plastic Surgery of El Cairo University.

The teaching activity included a full-day (8 hours) didactic course divided into a morning beginner session and a more advanced afternoon session. The faculty included international ISHRS guests such as Dr. Conradin von Albertini (Switzerland), Dr. Konstantinos Anastassakis (Greece), Dr. Jean Devroye (Belgium), and Dr. Francisco Jimenez (Spain). Dr. Noreldin was accompanied by two Egyptian faculty ISHRS members: Drs. Ahmed Youssef and Shady El-Maghraby. Ms. Victoria Ceh, the executive director of the ISHRS, was also invited faculty in this course and presented a briefing on the mission, vision and different activities of the ISHRS. At the same time, she managed the ISHRS booth and gave information to those doctors interested in becoming members.

The course was attended by 62 doctors including 33 plastic surgeons, 26 dermatologists, and the rest from other specialties. Throughout this comprehensive course, attendees enjoyed a variety of talks covering the most important topics for the beginner and intermediate hair transplantation surgeons: follicular unit anatomy, anesthesia, hairline design, strip harvesting, FUE, graft placement techniques, complications in HRS, transplanting into scars, eyebrow transplantation, and body hair transplantation. In addition, there were two discussion panels: one on selecting strip vs FUE harvesting, and another very interesting one on how to get training and setting up a hair transplant practice.

Following the course, a marvelous faculty dinner was held consisting of a cruise on the magical and romantic waters of the Nile River followed by a special Egyptian barbecued style seafood, ending almost at midnight in the sleepless city of Cairo.

During the course, Dr. Noreldin announced the launch of the Arab Association for Hair Transplantation (AAHT), founded by 11 hair transplant surgeons from 7 Arab countries, namely, Egypt, Saudi Arabia, United Arab Emirates, Lebanon, Sudan, Tunisia, and Morocco. We look forward to more collaboration between the ISHRS and the AAEgy, and now the newly born star, the AAHT, for the sake of the hair transplantation specialty and patients in this huge and fast growing region of the world. The goal is to make our patients happy, since a happy patient is good for all of us! ■



In Loving Memory of Dr. Felipe Coiffman Zaicansch

1926–2018

"The forgotten pioneer of hair transplantation."

David Perez-Meza, MD, FISHRS | *Benalmadena, Malaga, Spain*

His best advice to young plastic and reconstructive surgeons looking to make their marks in the industry: Have the self-value and ethics to say NO to patients who are not candidates for plastic surgery.

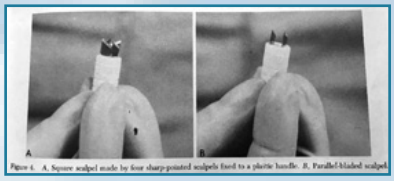
Dr. Felipe Coiffman was born in Nova Sulita, Ukraine, in 1926. At age 6, he and his parents emigrated to Colombia following the anti-semitic issues in Eastern Europe. He graduated with his medical degree from National University in Bogota, Colombia, in 1951 and then completed a plastic and reconstructive fellowship with Dr. Arthur Barsky at Mount Sinai Hospital in New York. When he returned to Colombia, he performed the first sex change surgery in 1958 and the first hair transplant surgery in 1960. Together with other plastic surgeons and colleagues, he founded the Colombian Plastic Surgery Society in 1956.

Dr. Coiffman was a member of many local and international plastic surgical societies, published more than 180 scientific papers, and contributed and produced countless articles, but his masterpiece, undoubtedly, is the six-volume book on plastic and reconstructive surgery he wrote in Spanish. In that collection, he includes one chapter dedicated to hair loss and hair transplantation. He also traveled and gave many lectures in Latin America about his techniques from the 1960s to the 1980s. He loved art and painting. He recently died in Colombia, South America at age 91.

Multiple donor strips and square punch scalp grafts

Dr. Coiffman was a true pioneer—yet his contributions are often overlooked. During his fellowship with Dr. Barsky in 1955, he developed a deep interest in finding creative surgical solutions for hair loss. Dr. Barsky, who likely started to perform hair transplantation in the 1940s, stated that bald spots in the scalp could be improved by implanting small islands of hair in the scalp then letting the hair grow. His interest in hair restoration allowed him to help develop many surgical techniques and tools. Dr. Coiffman was a true innovator, bringing about many of the hair surgery advances of the 1960s through the 1980s such as the following:

- He described the use of a double blade scalpel for the excision of multiple donor strips (4mm width and 10-12cm length). He pointed out that donor strip removal and suturing leave a linear scar, which results in less scarring than the circular punch in the donor. We didn't recognize that he was right until many years later; his donor harvesting technique (multiple strips) is still practiced today.
- He developed a 3-5mm square punch for harvesting grafts from the donor strips and for the creation of the recipient sites. He pointed out that the square punch gets 25% more hair than the round punch. In addition, he developed 20mm × 5 mm square grafts for the recipient area (see photo).
- He described the use of thin hair strips, strip scalp grafts, or free strip grafts for restoring the hairline, similar to what Dr. Charles Vallis has published.
- He used microsurgical techniques to excise the square grafts from the donor strips.



During my Plastic and Reconstructive residency at the General Hospital in Mexico City in the early 1980s, I looked for information about scalp surgery, including hair transplantation, and I was first introduced to Dr. Coiffman through his article in the May 1982 issue of *Clinics in Plastic Surgery* (Square scalp grafts, pp. 221-228).

Dr. Coiffman was an ISHRS member from 2002-2004 and had attended the 1995 ISHRS meeting. In 2003, he registered onsite for the Orlando Live Surgery Workshop. I recall a conversation with a colleague from Latin America that day:

"David, Dr. Coiffman is in the audience!"

And I said, "What? We didn't know that he was coming!"

I told Dr. Matt Leavitt about Dr. Coiffman and together we went to meet him. He spoke generously with some of the OLSW faculty members and participants.

His work help shaped much of what we do today and his different techniques and devices were often ahead of his time. He will truly be missed, but the legacy of his contributions will live on for many years.

Rest in Peace.

Marcelo Gandelman, MD | *São Paulo, Brasil*

I first met Prof. Felipe Coiffman in 1971 when he taught me how to do square grafts instead of the round punch grafts. He removed a strip of scalp from the occipital area and divided it into square segments of 4mm that he called hexahedral grafts. Those grafts where inserted in square perforations made in the receptor area by square punches. He already used magnification and a microsurgical instrument to do it. The donor area was sutured leaving only a single linear scar. Dr. Coiffman inspired us to put aside the round punch harvesting and begin to remove donor scalp strips. He was an experienced plastic surgeon and had the knowledge of the wise and the humility of a great man. A teacher who gathered together colleagues and published several works in the field of plastic surgery. An artist who had an innate talent for all creative pursuits: drawing, oil painting and sculpted in clay and plaster. Sometimes he illustrated his own papers. He has painted more than 100 oil paintings that decorate his home. His plastic, reconstructive, and aesthetic surgery has six extensive volumes with 1,000 pages. The cover of his Treaty of plastic surgery is embellished by a beautiful painting of his authorship.

Walter Unger, MD | *Toronto, Ontario, Canad*a

I never met Dr. Coiffman in person but went to a lecture he gave just before I finished the first edition of "Hair Transplantation" in which he recommended the bizarre idea that obtaining grafts from a strip of scalp tissue was a far more efficient and less scarring way of obtaining hair grafts than punching them out!

Of course, the lecture made it obvious that what he was suggesting was entirely correct!

I was impressed by the concept and immediately contacted him by mail and asked him to write a chapter to be included in the textbook. Unfortunately, to my knowledge, nobody—including me–adopted the method, even though the chapter was included in the book. But why not?

I can't speak for the hundreds of people who read the book and/or were in his lecture audience, but I didn't adopt it because I was VERY disappointed with his recipient area results, was comfortable with punch excision, AND the long-term problems with punch scar noticeability had not yet reared its ugly head. WHAT A MISTAKE!

By the time the latter did start happening, I guess we had all forgotten Dr. Coiffman's ingenuity and its intrinsic long-term advantages over punch harvesting for decades.

Unfortunately, many of us may do it again.

Classified Ads

Seeking Hair Transplant Physician and Technicians

Anderson Center for Hair in Atlanta, Georgia is looking for a full-time hair restoration physician and full-time technicians. We are a state-of-the-art, brand-new boutique center. We perform one procedure per day, with emphasis on quality, ethics, and natural results…not quantity. On-the-job training available for physicians. Technicians will require experience, with references required. Outstanding, friendly working environment, salary, benefits, insurance, 401k, vision, dental, etc.

Please email your résumé to jobs@andersonhsc.com.

For Sale: 2015 ARTAS Robotic System with Chair

2015 ARTAS robotic system for sale including chair. Used only a few times. Originally purchased in 2015 for $250,000 and only used a few times. Excellent Condition. Asking $115,000 or best offer.

Send inquiries to artassale@gmail.com.

Calendar of Hair Restoration Surgery Events

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

DATES	EVENT/VENUE	SPONSORING ORGANIZATION(S)	CONTACT INFORMATION
FEB 22-24, 2019	HAIRCON 2018 *Mahabalipuram, off Chennai, India*	Association of Hair Restoration Surgeons, India ahrsindia.org	secretaryahrsindia@gmail.com
MAR 26-29, 2019 MAY 14-17, 2019 (JUN 26—Exam)	University Diploma of Scalp Pathology and Surgery *Paris, France*	University of Paris VI Coordinators: P. Bouhanna, MD, and M. Divaris, MD www.hair-surgery-diploma-paris.com	Dr. Pierre Bouhanna, Course Director sylvie.gaillard@upmc.fr
APR 19-21, 2019	ISHRS Regional Workshop: FUE Cadaver Hands-On & Live Surgery Workshop *Istanbul, Turkey*	International Society of Hair Restoration Surgery Hosted by: Kayihan Sahinoglu, MD, FISHRS & O. Tayfun Oguzoglu, MD www.ishrsfueistanbul2019.org	info@ishrsfueistanbul2019.org
APR 24-27, 2019	11th World Congress for Hair Research *Sitges, Barcelona, Spain*	European Hair Research Society	www.barcelonahair2019.org
* AUG 2-4, 2019	11th Annual Hair Transplant 360 Cadaver Workshop & FUE Hands-On Workshop *St. Louis, Missouri, USA*	Saint Louis University School of Medicine, Practical Anatomy & Surgical Education In collaboration with the International Society of Hair Restoration Surgery	http://pa.slu.edu
* NOV 13-17, 2019	27th World Congress of the ISHRS & World Live Surgery Workshop: Triple Crown *Bangkok, Thailand*	International Society of Hair Restoration Surgery www.27thannual.org	info@ishrs.org
MAR 19-22, 2020	ISHRS Regional Workshop: Cowgirl Hair Loss Workshop—Art & Perfection, Female Hair Loss *Houston, Texas, USA*	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

26TH WORLD CONGRESS	27TH WORLD CONGRESS	28TH WORLD CONGRESS
October 10-14, 2018 Hollywood, California I USA	November 13-17, 2019 Bangkok I Thailand	October 21-25, 2020 Panama City I Panama

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.

2017–18 Board of Governors

2017–18 Chairs of Committees

Global Council of Hair Restoration Surgery Societies

Membership proudly includes:

American Board of Hair Restoration Surgery
American Society of Hair Restoration Surgery
Argentine Society of Hair Recovery
Asian Association of Hair Restoration Surgeons
Association of Hair Restoration Surgeons–India
Australasian Society of Hair Restoration Surgery
Brazilian Society of Hair Restoration Surgery (ABCRC)
British Association of Hair Restoration Surgery
French Hair Restoration Surgery Society
German Society of Hair Restoration Surgery
Hair Restoration Society of Pakistan
Hellenic Academy of Hair Restoration Surgery
Ibero Latin American Society of Hair Transplantation (SILATC)
International Society of Hair Restoration Surgery
Italian Society for Hair Science and Restoration
Japanese Society of Clinical Hair Restoration
Korean Society of Hair Restoration Surgery
Paraguayan Society of Hair Restoration Surgery
Polish Society of Hair Restoration Surgery
Swiss Society for Hair Restoration Surgery
Thai Society of Hair Restoration Surgery

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

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

Submission deadlines:
December 5 for January/February 2019 issue
February 5 for March/April 2019 issue
April 5 for May/June 2019 issue
June 5 for July/August 2019 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.

Classified Ads cost $100 per insertion for up to 75 words. You will be invoiced for each issue in which your ad runs. The *Forum* 2017 Advertising Rate Card can be found at the following link:

http://www.ishrs.org/content/advertising-and-sponsorship

Submit your Classified Ad to:
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MEETING OUTLINE

As of July 13, 2018

Wednesday/October 10, 2018

Basics Course (full day, hands-on)
Advanced/Board Review Course (full day, lecture and discussion)
Trichoscopy Course (morning, lecture and discussion)
Surgical Assistants Core Skills Workshop (morning, hands-on)

Mini Courses Morning

Mini Course are 3 hours each, small group, intense learning, and limited to approximately 18 students. Extra fee.

- Scalp Micropigmentation (hands-on)
- Decision-Making in Difficult Cases (discussion)
- Experiencing Manual and Motorized FUE Devices (hands-on)

Mini Courses Afternoon

- Scalp Micropigmentation (hands-on)
- Decision-Making- FUE vs FUT vs Combination (discussion)
- Trichoscopy (hands-on)

Board of Governors Meeting (full day)
Ancillary Meeting: ABHRS Recertification Exam (evening)

Thursday/October 11, 2018

Newcomers Orientation

General Sessions

1: Opening Session
2: Hair Follicle Physiology and Growth Factors: New Discovers & Better Understanding *FEATURED GUEST SPEAKER
3: Graft Survival and Graft Preparation
4: Diagnostic Methods *FEATURED GUEST SPEAKERS
5: Body Hair, Eyelash, and Eyebrow

Exhibits
Posters
Welcome Reception

FEATURED GUEST SPEAKERS

Cheng-Ming Chuong, MD, PhD | USA
Professor of Pathology
University of Southern California,
Los Angeles, CA, USA
Pulling Hair and Hair Restoration

Mario E. Lacouture, MD | USA
Dermatology Service, Department of Medicine
Memorial Sloan-Kettering Cancer Center,
New York, USA
Chemotherapy Induced Alopecia and Endocrine Therapy Induced Alopecia

Marsheila DeVan, MBA | USA
Communication Specialist
How to Present for Medical Professionals

Apostolos Pappas, PhD | Switzerland
Head of Program, Nestle Skin Health – SHIELD
Luasanne, Switzerland
Understanding the Importance of Lipid Pathways for the Existence, Health, and Development of the Hair Follicle

Carolyn Goh, MD | USA
Assistant Clinical Professor of Dermatology
Director of Hair and Scalp Disorders Clinic
David Geffen School of Medicine
University of California, Los Angeles
Pattern Hair Loss or Not, That is the Question: Identifying Alopecia Areata and Other Non-Scarring Alopecias

Antonella Tosti, MD | USA
Fredric Brandt Endowed Professor of Dermatology
University of Miami, USA
Trichoscopy: Why, When, and How

ACCME ACCREDITED WITH COMMENDATION

CME CREDIT The International Society of Hair Restoration Surgery is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.
The International Society of Hair Restoration Surgery designates this live activity for a maximum of 34.0 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Friday/October 12, 2018

Discussion Table Topics

General Sessions

6: Hairline & Implanters
7: FUE Instrumentation & Surgical Techniques *FEATURED GUEST SPEAKER
8: Difficult & Challenging Cases

Workshops First Bank

One workshop in each bank comes with the price of congress registration. Some workshops are limited to physicians only. The workshop occurring in the general session room will have simultaneous interpretation.

101: Non-Surgical Adjunctive Treatments: PBM, Minoxidil, Finasteride, Microneedling, Nutraceuticals
102: Train the Trainer: Tips on Giving Excellent Medical Presentations *FEATURED GUEST SPEAKER
103: Avoiding Poor Techniques, Poor Planning, Poor Growth, and Bad Results (physician only)
104: Transgender Patients (physician only)
105: PRP for Hair Restoration [simultaneous interpretation]

Workshops Second Bank

111: Donor Area Limits in FUE: Taking it Too Far
112: Train the Trainer: Tips on Giving Excellent Medical Presentations *FEATURED GUEST SPEAKER
113: Implanters
114: Social Media, Reviews, Photos, Consents, Filming Surgery
115: Hair Care Products and the Science Behind Them [simultaneous interpretation]

Exhibits
Posters
M&M Conference (evening)

Saturday/October 13, 2018

General Sessions

9: Chemotherapy Induced Alopecia & Female Pattern Hair Loss *FEATURED GUEST SPEAKER
10: Medical Treatments for AGA
11: Pulling Hair and Donor Area *FEATURED GUEST SPEAKER
12: Organization & Quality Assurance

Live Patient Viewing
General Membership Business Meeting
Exhibits
Posters
Red Carpet Gala

Sunday/October 14, 2018

General Sessions

13: Anesthesia
14: Selection of Interesting Topics
15: Open Microphone: Congresses Best Topics

11:00AM Congress Adjourns

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