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What's New in Robotic Hair Transplantation

Does the use of implanters affect the quality of grafts?

What is a hair transplant megasession?

In Memory of Dr. Jonathan L. Ballon



Check out more memories from the beginning of the ISHRS—pages 121–123.

The Role of the Scalp Microbiome in Health and Pathogenesis

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INTRODUCTION

There is significant scientific and industrial interest in human-associated micro-organisms, the "human microbiome," even being listed by the World Economic Forum among the "Top 10 Emerging Technologies – 2014." Furthermore, the skin microbiome is increasingly implicated in many common diseases, with global direct/indirect costs estimated as >$20 billion USD. The consumer skin and hair care markets of >$350 billion USD/year are also strongly affected by skin microbiology. On careful consideration, a significant fraction of all consumer care markets are impacted by the skin microbiome—the surfactant and softeners deposited on clothing fabrics, the lining of diapers, both cloth and disposable, and all soaps and detergents, at a minimum. Understanding the skin microbiome therefore represents both a chance to improve human health and a compelling economic opportunity.

So far, limitations of sampling skin and the genetic complexity of eukaryotes (including fungi) have limited human microbiome investigations primarily to gut and bacteria, leaving the skin microbiome, and particularly the eukaryotes, poorly understood. This crucial knowledge gap needs to be addressed, as fungi have key roles in common skin conditions such as seborrheic dermatitis (likely *Malassezia*) and diaper rash (*Candida*). Importantly, skin fungi metabolize lipids and considerable data implicate lipids in skin homeostasis and disease. This makes the face, scalp, breast, and central back high potential sites for unfavorable conditions generated by the lipid metabolizing skin microbiome.

"Dandruff" and "seborrheic dermatitis" are disorders characterized by flaking and itching of scalp.[1] More than 50% of adults are afflicted, and everyone harbors the *Malassezia*, which cause the problems.[2,3] The anti-dandruff shampoo business alone is >$10 billion USD per year. Dandruff research is in the midst of a resurgence, re-invigorated by the discovery of the causal fungal species (*Malassezia globosa* and *restricta*) and recent availability of multiple complete *Malassezia* genomes.[3]

WHAT IS DANDRUFF?

Normal scalp has few flakes and healthy appearing, smooth skin. Dandruff is characterized by loosely adherent flakes and itching. Specifically, dandruff has no inflammation and is confined to the scalp, while seborrheic dermatitis has yellowish, piled adherent flakes that can extend beyond the scalp to beard, moustache, and eyebrows accompanied by visible inflammation.[1] Seborrheic dermatitis is more than superficial flaking, including hyperproliferation, excess lipids, and poorly differentiated corneocytes across the scalp.[4] Dandruff requires three factors: fungi (*Malassezia*), sebum, and individual susceptibility. While there remains much debate in the current medical literature, upon review, the vast majority of evidence points at the very least to a fungal "initiator," most likely *Malassezia* fungi.[5]

The microbiome

The role of microbes has been defined by "Koch's Postulates,"[6] developed in 1890 to guide researchers to understand the role of microbes in disease, as the following:

1. The microorganism must be found in abundance in all organisms suffering from the disease, but should not be found in healthy organisms.
2. The microorganism must be isolated from a diseased organism and grown in pure culture.
3. The cultured microorganism should cause disease when introduced into a healthy organism.

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President's Message

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A popular daytime talk show in the United States, "The Dr. Oz Show," ran a piece entitled, "Oz Investigates: Hair Restoration Scams: How Far Would You Go to Reverse Your Thinning Hair?" (May 9, 2017). The show had originally been working with the ISHRS to construct a meaningful episode, but, inexplicably, chose to run the episode using nonmember physicians. Although the show emphasized the ISHRS message of the dangers of the growing number of hair restoration surgeries performed by unlicensed individuals around the world, the overriding tone of the program was one that portrayed our specialty in a very poor light.



Despite the fact that the program used information, and actual images, provided by the ISHRS, there was no acknowledgment of the role of the ISHRS in the field of hair restoration or of its presence as a resource for patients or physicians. Instead, the field of surgical hair restoration was presented in a fashion that made it sound wantonly inferior to other areas within organized medicine. While our cooperation with the show stressed the role of the ISHRS in providing a foundation for education, establishment of best practices and ethics in hair restoration, this was not acknowledged by the producers of the episode.

See page 113 for a reprint of the ISHRS's letter to Dr. Oz.

We recently sent correspondence to Dr. Oz to voice our concerns and to offer the ISHRS's expertise in producing a follow-up piece. In an effort to keep you informed, we have reprinted a copy of the letter that was sent, which can be found on page 113. We encourage you to review our response and to feel free to contact us if you have questions concerning this television episode or the ISHRS's response to the program.

We will continue our outreach to media around the world and are grateful for the support from our members. Together, we are hopeful that we will be able to deliver the message to all prospective hair restoration patients that there are highly trained, educated and ethical physicians in our field who have their best interests at heart. ■

Follow-up: On May 15, 2017, Dr. Oz acknowledged the ISHRS's concerns.
See posting: http://www.doctoroz.com/page/statement-international-society-hair-restoration-surgery.



Co-editors' Messages



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For hair growth, a healthy scalp is like the fertile ground. A balanced bacterial and fungal environment may be important. Thomas Dawson's article describes the current knowledge about the role of the microbiome, especially Malassezia fungus. Perifollicular micro-inflammation has been found in more than one third of biopsies in androgenetic alopecia. Increased biomarkers of inflammation and impaired skin barrier have also been found in dandruff and seborrhoeic dermatitis. These conditions cause itching and may potentially affect hair growth. There are some studies indicating a positive impact of anti-dandruff shampoos on hair loss. It may be smart to add them to the pre- and post-op routine even if no signs of dermatitis are present.

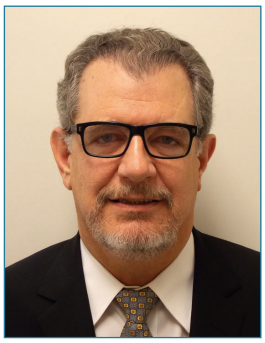
The article by Drs. Rassmann, Pak, and Knudsen aims to quantify the size of a megasession in FUT and FUE. The maximum graft yield certainly depends on many individual factors. A healthy scalp also involves a good blood supply, especially in large sessions. Could it be true that sometimes less is more, and a gradual approach with several smaller sessions may be wiser? Especially in progressive hair loss and with respect to a cosmetically acceptable donor harvest and the optimum growth in the recipient area? Or is a megasession on a virgin scalp the better approach? What are your opinions on this controversy?

Can we "fertilize" the scalp with PRP? In Cyberspace Chat, experienced users share their opinions.

Regarding new tools, improvements of robotic graft harvesting are described by Drs. Bernstein, Wolfeld, and Krejci. And a study by the von Albertinis nicely evaluates graft quality when using sharp implanters. For both devices, we need studies comparing their results to those of manual techniques.

This issue is complete with very helpful advice from our fellows, a literature review, smart calculation tasks, meeting reports, and great memories from 25 years ago.

It concludes with an exciting outlook to the workshop in Poland and the World Congress in Prague, the Golden City, where you may feel like a Bohemian when sitting in a café reading your own *Forum* article or comment. Send them to forumeditors@ishrs.org. ■



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I would like to thank all the authors and columnists who contributed to this issue. Tom Dawson gives us a fascinating look at the role of microorganisms, the "skin microbiome," that reside on and can affect our working surface, the scalp. I was surprised to read that 50% of adults have dandruff or seborrheic dermatitis and everyone harbors the fungus that causes these problems. Maybe we should think more about scalp health before surgery. In Ask the Fellows, Steven Gabel discusses his routine for perioperative scalp cleansing. Special thanks go out to the all the ISHRS Fellows who took time out from their busy schedules to answer.

The von Albertinis present a well-designed study that examines the ways a sharp implanter can affect grafts when used by an experienced team. Although not the popular, implanter into premade incisions, it portrays sharp implanters in a positive light and adds to our knowledge concerning implanters in general.

Science is full of controversies particularly at its frontiers. Rather than being a bad thing, the debate and eventual resolution of controversies often contribute to the advancement of science. In Controversies, Rassman et al., give their view on the seemingly eternal FUT vs. FUE controversy.

The ISHRS was incorporated exactly 25 years ago on April 29, 2017, so we have officially begun our 25th year. The Jubilee celebration is continued in this issue with more recollections of the 1993 Dallas meeting and thoughts on how our specialty has changed over the years. We are fortunate that we can get insights from, and celebrate this anniversary with, many of the founders of our society.

Make sure to leave some room in your suitcases for souvenirs on your visit to Prague. Marionettes and puppetry have been part of Czech culture for centuries with puppeteers travelling from village to village to entertain the locals. Puppetry has a part in the folk arts of many European countries but it is the Czech Republic that has embraced it the most deeply in terms of the skills involved and its place in the nation's social fabric. Bohemian crystal is glass produced in the Czech Republic and it has a centuries long history of being internationally recognized for its high quality, craftsmanship, beauty, and innovative designs. Champagne flutes, ornaments, figurines, and other glass items are among the best known Czech exports and immensely popular as souvenirs. For more information about restaurants, tourist attractions, and happenings in Prague, check out www.expats.cz. Don't even think of not coming to Prague.

California here we come! Please mark your 2018 calendars for the 26th ISHRS World Congress, scheduled for October 10-14 in Los Angeles, California, at the Loews Hollywood Hotel in the heart of Hollywood. ■

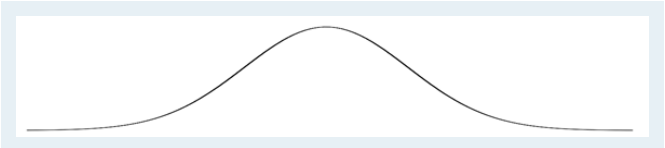


Notes from the Editor Emeritus, 2005–07

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One of my favorite quotes is from Oliver Wendall Holmes, who said, "I would not give a fig for the simplicity this side of complexity, but I would give my life for the simplicity on the other side of complexity." But what does this really mean? An essay by entrepreneur Jon Kolko does a nice job of explaining how this can be applied.[1]

Imagine a bell curve. Moving from left to right is understanding, and the vertical axis represents complexity. When new to a particular area, we reside on the left, we have a sense of the complexities ahead of us. Without experience and knowledge, we may have simplistic beliefs that are based on faulty assumptions, inadequate evidence, and various types of biases. We don't know what we don't know, and we may be dangerous at this point if we are dogmatic in our opinions. One clue that we are at this point is that our communications to others about the topic are confusing and contradictory.



As knowledge and experience grow, we climb up the complexity curve and our understanding does in fact increase. We are beginning to have a thorough grasp of the subject matter and may start to be viewed as experts. But we can't necessarily communicate this information clearly to others, especially those further to the left of the curve. Unfortunately, this is in fact when many experts try to teach and lecture about the subject matter. Some may remain stuck here indefinitely.

But some may continue progressing to the right, achieving greater understanding through more experience, through an open-minded and dynamic relationship with the subject matter, and by interacting with others who have progressed to "the other side of complexity." At this point, you not only have a clearer grasp about the subject matter and what your beliefs are, but you've been able to distill complex ideas into a coherent message that can be clearly communicated to others who are beginning at the other end of the curve. Many of us can recall teachers, professors, lecturers who, while brilliant and evidently in grasp of complex subject matter, had a special gift for communicating this subject matter to us in a clear, concise, and understandable way. And this helps shortcut our journey to the other side of complexity. Certainly a worthy goal for all of us, whether our goal is to become better educators to our colleagues or, more practically, to become more effective in communication with our patients.

Reference

1. Kolko, J. Simplicity on the other side of complexity. 2016. http://www.jonkolko.com/writingSimplicityComplexity.php ■



CONTINUED FROM FRONT PAGE

4. The microorganism must be re-isolated from the inoculated, diseased experimental host and identified as being identical to the original, specific causative agent.

Koch's postulates led to a renaissance of discovery and understanding and provided the framework for modern microbiology. However, new genomic technology and informatics have upped the game, unlocking a world of unknown complexity, including "unculturable" organisms and insight into interactions between both each other and the host. This complexity has led to difficulties with application of Koch's original postulates.

Fungi—the "forbidden kingdom"

One difficulty with Koch's postulates is with fungal infections and fungi as "opportunists." Fungi can be benign or even helpful, and other times can cause disease.[7] One example of broad import is *aspergillus*. While *aspergillus* is ubiquitous as airborne particles, and we are all exposed with every breath, very few healthy individuals develop chronic or invasive pulmonary *aspergillosis*. However, few would argue that *aspergillus* is "causal." Fungi are also notoriously difficult to meaningfully culture, and their similarity to human cells makes design of antifungal treatments complex. Hence, research into fungi and disease lags behind that of bacteria and infection.

Malassezia

The vast majority of evidence supports a role of *Malassezia* in scalp health. While all humans, and all warm-blooded animals surveyed, have a complex microflora including *Malassezia*, a series of experiments in the 1960s and early 1970s clearly support fungal involvement. Nystatin, a specific antifungal with low antibacterial activity, was compared to neomycin or tetracycline, both specific antibacterials. These papers showed removal of fungi decreases dandruff, removal of bacteria does not, removal of both is equally as good as antifungal treatment alone, and reintroduction of a resistant *P. ovale* (likely *Malassezia globosa*) causes the dandruff to return. The studies revealed the following:

- Subjects treated with a combination of both antifungal and antibacterial agents showed a significant decrease in scalp flaking.[8]
- The effect of a separate antibacterial (tetracycline), an antifungal (nystatin), or a combination was tested for efficacy.[9] Application of nystatin plus tetracycline was similar to before, but nystatin alone reduced flaking while tetracycline alone did not. Further, application of a suspension of *P. ovale* (likely *M. globosa*) in the presence of tetracycline actually increased flaking.
- A final study was conducted where individuals were treated to remove all microbes (fungi via nystatin, bacteria via Neomycin). As expected, flaking dramatically decreased. Then, while continuing the antimicrobial treatment (both nystatin and neomycin), a nystatin-resistant *P. ovale* was applied. The resistant strain induced flaking.[10]

Collectively, these data support the role of *Malassezia* in dandruff and fulfill three of four of Koch's postulates. Only his first postulate is not fulfilled, as all humans carry *Malassezia* as part of their commensal microflora. Even Koch himself learned that the first postulate could remain unfulfilled, as he observed in asymptomatic cholera carriers.[11]

It is worth mentioning that a contemporaneous study conducted with another common antifungal agent, amphotericin B, did not improve flaking.[12] It was only much later that many *Malassezia* were shown to be resistant to amphotericin B,[13] and that in the Kligman study the antifungal treatment may have been ineffective.

A possible counter to the antifungal hypotheses is steroidal antiinflammatory agents, such as clobetasol proprionate Clobex® shampoo. While effective and not antimicrobial, this does not subvert a fungal hypothesis of dandruff genesis. Removing the fungi removes the inflammatory insult, thereby improving dandruff. Inhibiting the inflammatory response is effective, it is intervention downstream of the original insult.

Individual susceptibility

An oft-cited confounder in the *Malassezia* dandruff hypothesis is that they are found on all humans but not all are affected. As for *aspergillus* and pulmonary *aspergillosis*, the most parsimonious explanation is a host susceptibility difference. The host susceptibility hypothesis is supported by a study where dandruff and non-dandruff individuals were treated with a dandruff-initiating *Malassezia* metabolite,[14] oleic acid.[5] Oleic acid applied to the scalp induced dandruff-like flaking in susceptible individuals, but not in non-susceptible individuals. This provides evidence supporting an underlying "susceptibility" predisposing the development of dandruff, as well as a direct role of fatty acid metabolites.

Sebum

Sebum is implied to be required by several reasons: 1) a temporal correlation with sebaceous gland activity, including scalp flaking during infancy (cradle cap), little dandruff from infancy to puberty, and an increase with puberty, 2) dandruff occurs exclusively on sebum rich areas, and 3) an animal model of dandruff shows a requirement for both sebum and *Malassezia*.[15]

Human sebum is a complex mixture of triglycerides, fatty acids, wax esters, sterol esters, cholesterol, cholesterol esters, and squalene.[14] When secreted, sebum consists of triglycerides and esters, which are broken down by microbial enzymes into glycerides, monoglycerides, and free fatty acids. Sebum is also responsible for the stress and hormone-related increase in dandruff, it being well known that they effect sebum secretion and impact dandruff.

OTHER SCALP DISORDERS AND THE MICROBIOME

Multiple other scalp and skin disorders are likely affected by the microbiome, exacerbating the lesions if not being causal. Atopic dermatitis can affect many body sites, and a recent study showed that the skin microbiome is altered in affected individuals even when not expressing overt disease (between "flares"). Bacteria including *staphylococcus aureus* as well as two species of *Malassezia* are changed in susceptible subjects.[16] It has also been shown that a profile of the skin microbiome can be predictive of healing or non-healing progression in wounds,[17] and that the fungal community in wounds correlates to a non-healing phenotype.[18]

Of particular relevance to the hair restoration surgery community is the role of scalp microbes in a recent report of scalp infection post FUE surgery.[19] There are few reports of infection post hair transplantation, but management of the skin environment could be beneficial in minimizing folliculitis that can be caused by *Malassezia* inhabiting the deep follicle.[20,21]

MAINTAINING SCALP HEALTH

Dandruff is best treated by antifungal shampoos, including pyrithione zinc, selenium sulfide, or ketoconazole. In severe or refractory cases, this can be supplemented by anti-inflammatory agents, but usually only for a brief initial period followed by maintenance with antifungal shampoo. We must understand that as *Malassezia* are commensal, they are essentially impossible to permanently remove. Hence, for maintenance of the best scalp health, chronic therapy is required. Even short-term use of an effective antifungal scalp therapy may potentially promote scalp health during and after scalp surgeries, but further study would be required to understand if the benefit would be useful and reproducible.

SUMMARY

The vast majority of clinical evidence supports the hypothesis that scalp *Malassezia* negatively impact scalp health, breaking down sebum into toxic unsaturated fatty acids that induce flaking and inflammation in susceptible individuals.[3,22] This should lead to their classification as "pathogens" in the recent "Damage-Response Framework"[23] or as "commensal opportunistic pathogens" in classical microbe/host literature.

It will be necessary to conduct significantly more research into the scalp microbiome and *Malassezia* in particular to fully elucidate the role of the microbiome and the host immune system in multiple microbe-mediated diseases. As new pathways are elucidated, new intervention targets will arise. The new, groundbreaking research in microbiomes, commensalism, and pathogenesis will enable new treatment technologies that may not depend fully on broad spectrum antifungals.

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Does the use of implanters affect the quality of FUE grafts?

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INTRODUCTION

Until recently, implanter pens were the Sleeping Beauty of hair restoration surgery. After Choi introduced the placing devices more than 25 years ago, only a few trod the thorny path toward using them.[1,2] Not only is placing grafts with implanters trickier than with forceps, but it also increases the workload for the surgeon. The drawbacks of implanters seemed to offset their supposed beauty—that is, causing less graft damage during placing than forceps. In many clinics, the pens landed in the famous "closet for useless surgical gadgets," waiting there for years to be awakened.

Nevertheless, with the portion of FUE procedures growing, the interest in implanters has surged. Because FUE grafts are more frail and smaller than FUT grafts, even seasoned teams struggle with placing them. Many surgeons have therefore turned to implanters to prevent the frequent crushing and hooking of FUE grafts.[3-6] The option to pre-make the incision and delegate placing with flexible[3,7] or dull needle[4] implanters to technicians has further increased the popularity of the device.

Amid the new hype, however, concern is growing that implanters cause their own set of complications.[8] The allegations vary, but they mostly fall into two broad categories:

1. Loading issues: damage caused by inserting the grafts into the pen. A typical worry is that grafts suffer "needle squeezing," a crushing injury that occurs when grafts are pressed into the groove of the implanter needle. Another concern is that teams encounter difficulties with loading and can injure the grafts.
2. Placing issues: growth failures caused by planting grafts with the device due to, for example, implanters causing grafts to hook or break on a regular basis.

Unfortunately, with scant scientific data available, the discussion about the benefits and limitations of implanters remains mostly anecdotal. For instance, only limited evidence supports the claim that implanters are less traumatic to the grafts than forceps. Early studies on the survival of 1- and 2-hair follicles in Asian patients suggested that implanters increase the chances of graft survival.[9,10] However, similar results may not be seen with larger 3-hair grafts or in Caucasians.[8] Existing research on graft trauma and graft quality is not helpful either because it is based on or assumes placing by forceps rather than implanters.[11-14]

OBJECTIVES

The goal of this study was to provide new evidence on graft quality after the use of implanters. The study addressed the following questions:

1. Are there graft injuries, such as follicle crushing, paring, transection, hooking, or breakage, that appear after placing with implanters and were not present before placing the graft?
2. Do difficulties regularly arise with the use of implanters, for example, a long time out of solution (TOS) or multiple attempts to load implanters?

The study results will enrich current discussion about the benefits of using implanters when placing FUE grafts with particular emphasis on the practical implications of the findings.

MATERIALS AND METHODS

This in-depth study was based upon FUE procedures performed on the frontal region of seven Caucasian men. In all cases, the donor and the recipient hairs were fully trimmed to a length of 1mm. A total of 15,147 grafts were transplanted, with an average of 2,009 grafts per patient (Table 1).

TABLE 1. Demographics of analyzed cases

Case	Age, years	Total FUs, count	Treatment area, cm^2	Density, FU/cm^2	OP time, h:min	Analyzed FUs, count	Share of total FUs, %
1	25	2,388	64	37.3	8:15	100	4.2
2	25	2,296	65	35.3	8:25	90	3.9
3	52	2,214	58	38.2	8:55	95	4.3
4	35	2,131	56	38.1	7:25	54	2.5
5	40	2,187	56	39.1	8:20	56	2.6
6	26	2,190	62	35.3	8:20	56	2.6
7	39	1,741	50	34.8	7:00	31	1.8
Total		**15,147**	**408**			**482**	
Average	***35***	***2,009***	***58***	***37.2***	***8:05***	***69***	***3.2***

Extraction was performed with a motorized sharp serrated punch, and sharp needle implanters were used for placing without premade incisions. Extraction and implantation were done in multiple sweeps to ensure a time out of the body of less than 2 hours. The grafts were not split or trimmed. A physician performed the extraction and the implantation. Both he and his team are experienced implanter users (> 1,000,000 FUs within 7 years). Two separate approaches were used to assess the quality of the grafts and the implanting process:

1. *Analysis of the graft quality before and after implantation.* The study included 1,292 hair follicles (hairs) on 482 grafts (FUs), accounting for 3.2% of the 15,147 planted FUs. The grafts were chosen randomly. We analyzed an average of 69 FUs (31 to 100) before and after implantation in each case. First, we photographed each FU under 10× magnification and from various angles. Next, each FU was placed with an implanter, directly re-extracted, and photographed again. We assessed the pictures of the grafts before and after implantation. Finally, we conducted data analysis and statistical modeling.
2. *Analysis of the quality of the implanting process.* The loading by two technicians and the placing by the physician were video-documented for approximately 10 minutes. We examined the sequences for the implantation speed, the number of loading attempts, and the TOS (i.e., how long it takes from the moment a graft is seized for loading until it is placed). Loading and placing were also scrutinized for unexpected issues.

RESULTS

Both analyses support the claim that implanters protect denudated FUE grafts.

Graft quality before and after implantation

The data indicate that implanters leave grafts intact. After implantation, only 6 hair follicles (0.5%) displayed damage that was not previously present, and 99.5% of the hair follicles remained unchanged (Table 2). In short, implanters have a negligible impact on the quality of grafts, which was confirmed in statistical analysis. In an ANOVA test, the use of implanters did not significantly affect the graft quality ($F_{1,962}$ with p-value 0.73). Furthermore, the graft quality did not differ significantly between patients ($F_{6,956}$ with p-value 0.17).

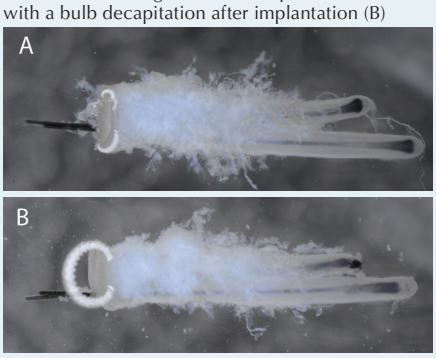
TABLE 2. Hair counts and damage assessment

	Hairs in total	Pared	Transected	Broken	Hooked	Crushed	Decapitated	Damaged in total	Damage by implanters
Before	1,292	49	54	2	-	-	-	105	
In %	*100%*	*3.8%*	*4.2%*	*0.2%*	-	-	-	*8.1%*	
After	1,292	49	54	4	3	-	1	111	**+ 6**
In %	*100%*	*3.8%*	*4.2%*	*0.3%*	*0.2%*	-	*0.1%*	*8.6%*	***+ 0.5%***

It is important to note that some hair follicles had preexisting damage. About 8.1% of the hair follicles presented with transection, paring, or breakage prior to implantation.

After placement, the rate of damaged hairs increased to 8.6%. Remarkably, none of the hairs displayed any crush injuries. Moreover, the device did not pare or transect any of the grafts; however, hooking occurred in rare cases: 3 previously intact hair follicles (0.3%) were hooked after implantation and 2 (0.2%) were broken, possibly as a result of hooking. Furthermore, 1 follicle (< 0.1%) presented with an unexpected, implanter-specific injury, which we dubbed "bulb decapitation" (Figure 1).

FIGURE 1. Intact graft before implantation (A) and with a bulb decapitation after implantation (B)



Quality of the implanting process

The videos recorded the implantation of 150 grafts in 590 seconds and showed a smooth process without systematic issues. With an average of 1,019 grafts per hour, the implantation speed was high. Moreover, loaders needed to reload a graft only once, accounting for 0.6% of the observed implantations (Table 3). On average, the TOS lasted 8.2 seconds.

More surprising are the insights into how implanters cause hooking (Figure 2). Hooking occurs when one of the bulbs protrudes from the needle's groove. As the loaded needle enters the skin, the bulb remains stuck on the surface. Eventually, the follicle folds into what is best described as a "distal hook" as it affects the upper portion of the follicle.

While splayed and large follicles are at risk for proximal hooking, the video revealed another culprit: trimmed hair growing around the recipient sites. Like little spears, the hairs enter the groove of the approaching implanter needle, lift a bulb, and cause a hook (Figure 3).

FIGURE 2. Intact graft before implantation (A) and with proximal hooking after implantation (B)

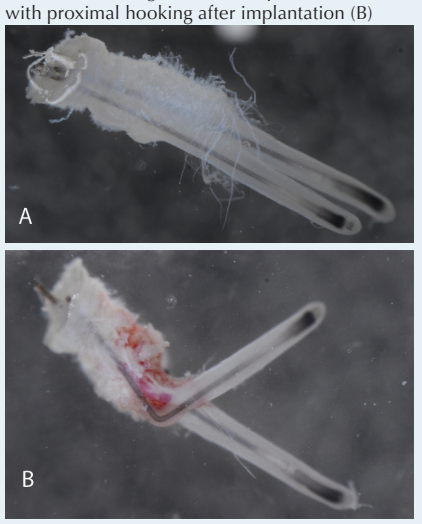
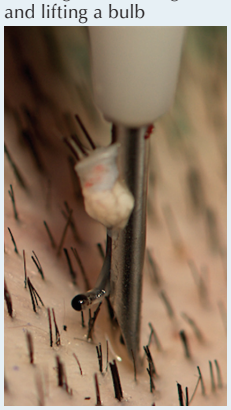


FIGURE 3. Trimmed hair entering the needle groove and lifting a bulb



DISCUSSION

The evidence suggests that implanters protect the integrity of denudated FUE grafts. They leave the grafts intact, with no visible loading injuries, and placing injuries are extremely rare. This outcome has several interesting implications for the implanter practice.

Loading injuries are absent, even in untrimmed grafts of multiple follicles

One of the most surprising results of this study is the complete absence of visible loading injuries.

Most importantly, we found no indications of needle squeezing. If needle squeezing had occurred, it should translate into at least some crushing injuries, which, however, were also entirely absent. No other damage attributable to the event was visible.

This outcome refutes the hypothesis that grafts are damaged because they are "pressed" into the needle's groove. Intriguingly, the FUs were relatively large (Table 4), which could have increased the risk for needle squeezing. The average hair/FU ratio was 2.7, whereas 61.2% of the FUs had 3 or more follicles. The transection rate (as % of expected hairs) was 4%. None of the FUs were split or trimmed. Moreover, Table 4 shows that in 5 of the 7 cases, the implanter sizes were smaller than the punch sizes (Δ = –0.05mm to –0.20mm), which counters the notion that the implanter and the punch need to be matched by size to avoid needle squeezing.

Although the findings seem counterintuitive, it is important to remember that FUs were extracted with a depth-controlled sharp punch. Thus, the punch defines the diameter of the graft only until a scoring depth of approximately 2.5mm. No further dissection occurs at a greater depth because the FUs are de-tethered with forceps, a process that strips the lower portion of the

TABLE 3. Implantation process

ID	Video, s	Implants, count	Speed, implants/s	Speed, implants/min	Speed, implants/h	TOS, s	Reloads, count
7	280	84	0.30	18.0	1080	8.3	1
8	310	83	0.27	16.1	964	8.1	0
Totals	**590**	**167**					
Average			***0.28***	***17.0***	***1019***	***8.2***	***0.6%***

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TABLE 4. Graft size parameters, punch and implanter diameters

ID	Expected hairs[1]	Actual hairs	Transection Hairs	Transection rate[2]	Hairs/ FU	FUs	FUs of 3-5 hairs	FUs of 2 hairs	Punch, mm	Implanter, mm	Δ, mm
1	273	259	13	4.8%	2.6	100	55	45	1.00	0.8	-0.20
2	244	236	7	2.9%	2.6	90	57	33	0.95	0.8	-0.15
3	275	267	5	1.8%	2.8	95	69	26	1.00	1.0	-
4	161	151	8	5.0%	2.8	54	32	22	1.10	1.0	-0.10
5	140	129	11	7.9%	2.3	56	16	40	1.05	1.0	-0.05
6	157	154	3	1.9%	2.8	56	40	16	1.00	1.0	-
7	99	96	3	3.0%	3.1	31	26	5	1.05	1.0	-0.05
Ø	**1349**	**1292**	**50**	**4.0%**	**2.7**	**482** *100%*	**295** *61.2%*	**187** *38.8%*			

[1]Number of follicles before transection; [2]Transected hairs/expected hairs

follicles from their surrounding tissues. As a result, the bare follicles are smaller than their epithelial plugs. Even large and untrimmed follicles fit comfortably into the needle—with their epithelial plugs resting outside of the groove (Figure 4).

FIGURE 4. Loaded graft with epithelial plug resting outside of the needle's groove



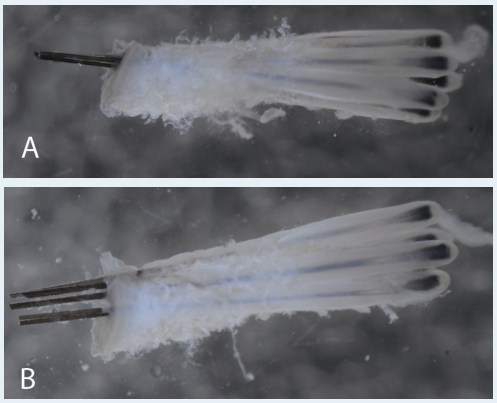
In other words, needle squeezing is a non-issue for denudated FUE grafts. Reducing the size of the grafts or matching the diameters of the needle and the punch are rarely necessary. Surgeons should choose the implanter needle to fit the follicles, not the epithelial plugs.

Less surprising is the finding that no regular issues occurred during the loading process. In a team with precise loading skills, the TOS lasts only seconds. Multiple loading attempts are an exception. However, practice is necessary, and physicians need to train their teams properly with small trials before using implanters in larger procedures.

Placing injuries are a rarity—distal hooking and bulb decapitation revealed

The claim that implanters are atraumatic to the grafts mostly refers to their ability to place follicles without crushing or hooking, two complications of placing FUE grafts with forceps. The assertion is that the implanter needle acts like a splint, which allows the follicles to be inserted into the recipient site without direct pressure on the bulb and without folding or distorting the follicle.

FIGURE 5. Graft before (A) and after (B) implanter use



The evidence of intact hair follicles in this study overwhelmingly supports the contention that implanters avert placing injuries of FUE grafts (Figure 5).

Most importantly, implanters successfully prevent crush injuries to denudated follicles. None of the grafts presented with crushing damage after implantation. However, in contrast to common belief, implanters do not entirely prevent hooking because—in extremely rare instances—they cause distal hooking. The better known "proximal hooking" occurs when forceps fold the lower portion of the follicle deep inside the incision, creating a small hook near the bulb, which remains hidden until the graft eventually fails to grow. In contrast, distal hooking affects a higher portion of the follicle and happens in plain sight. It occurs when a bulb remains stuck on the surface as the implanter is inserted, eventually folding the follicle (Figure 3). Distal hooking is immediately visible and, more importantly, it is instantly rectifiable, which probably explains why the damage affected only a few hairs in this study.

Because the placer needs to recognize and address distal hooking as it happens, a lack of experience is a risk factor, especially with closely trimmed but hairy recipient sites or grafts with splayed follicles. Physicians, particularly those delegating the placing with dull needle implanters to technicians, should be aware of this issue.

The other implanter-specific injury revealed in this study was bulb decapitation, which occurs when a bulb protrudes from the anterior opening at the needle's tip. As the needle enters the skin, the bulb slides underneath the sharp tip, which then slices off the bulb. Fortunately, this damage affected less than 0.1% of the hairs in this study. Nevertheless, surgeons need to be aware of the risk, especially when grafts are large. A placer should always check the loaded needles for "low-lying" bulbs and, if necessary, return the device to the team to reload it properly.

Focus on planting denudated FUE grafts—more research needed

The findings suggest that placing with implanters protects denudated grafts. However, more research is necessary for a full picture. First, we did not compare implanters with forceps; therefore, endorsing one method over the other is not possible. Second, the outcomes apply to sharp needle implanters and may not be entirely transferable to devices with dull or flexible needles. Third, we analyzed only denudated grafts extracted with a sharp punch. It remains to be seen if the findings also apply to the chubbier grafts resulting from hybrid or blunt punch extractions or even to FUT grafts. Fourth, while unlikely, the re-extraction of the grafts could have led to injuries unrelated to the device. Finally, the 10× magnification in this study is not sufficient to exclude injuries on the cellular level.

CONCLUSION

Sharp needle implanters seem to be safe and efficient for placing denudated FUE grafts obtained by a sharp punch. We found no indications that grafts suffer from loading and that graft damage from placing was nearly nonexistent. The device can indeed cause two rare injuries, distal hooking and bulb decapitation, but with sufficient experience and caution of the physician and team, the risk is negligible. Moreover, the findings lead to some useful hints for implanter practice:

Loading implanters:

- Damage from "needle squeezing" is unlikely with denudated grafts—the choice of the implanter needle should be dictated by the dimensions of the proximal follicles, not the punch size.
- Multiple loading attempts or slow speed are a sign of insufficient experience—loaders should practice in smaller cases before using the pens in larger procedures.

Placing with implanters:

- Implanters prevent crushing and most of the hooking when placing FUE grafts—in experienced hands, the risk of "distal hooking" and "bulb decapitations" is marginal.
- Risk factors for distal hooking are splayed follicles and shaved, but hairy recipient sites—the placer needs sufficient practice to recognize and immediately rectify hooking.
- Bulb decapitation is more likely to occur with large and splayed follicles—the placer has to watch for "low-lying" bulbs and if necessary return the implanters for reloading straightaway.

In summary, even if it is too soon to tell the end of the story, implanters appear beautiful enough to be awakened by the kiss of denudated FUE grafts. Time shall tell if they will live happily ever after.

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What's New in Robotic Hair Transplantation

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Disclosure: Dr. Bernstein and Dr. Wolfeld hold equity interest in Restoration Robotics, Inc. Dr. Bernstein is a medical consultant to the company and is on its medical advisory board.

The ARTAS® Robotic System (Restoration Robotics, Inc., Mountain View, California, USA) was first available for commercial use in 2011. Continued improvements in both its hardware and software have made it an increasingly valuable tool for physicians performing follicular unit extraction (FUE). Over 180 hair restoration surgeons worldwide currently use robotic technology to assist them in their FUE procedures. Recent advances in the robotic system have increased its speed and precision and new modifications have made it more user-friendly. The robotic system can be used for both harvesting and site creation. This article focuses on improvements to robotic graft harvesting.

TOUCHSCREEN USER INTERFACE

The robotic system is an interactive, computer-assisted suite of hardware and software that uses optical-guidance robotics to identify and isolate FUs in the donor area and create sites for grafts in the recipient area. In the earlier iterations, doctors used a mouse to control the operations of the robot. This required the physician to be seated with one hand resting on the mouse, which slowed down the procedure. A touchscreen has been developed to make operating the robot more intuitive and to speed up the ability to make real-time adjustments while the physician is standing and observing the patient. Most of the controls are aggregated to one area on this screen for ease of use. The touchscreen can be used alone or with the traditional mouse and keyboard, depending upon the user's preference (Figure 1).

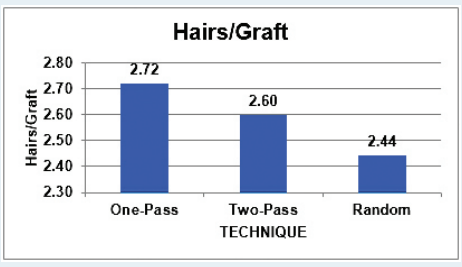
FIGURE 1. Touchscreen user interface



FOLLICULAR UNIT GRAFT SELECTION

The FU graft selection capability of the robotic system has been added to enable physicians to select FUs based on hair content. The physician now has the option to harvest larger FUs and skip over smaller ones, particularly 1-hair units (Figure 2). The purpose is to harvest the most hair through the smallest number of wounds. FU graft selection has two main benefits: 1) it can generate a greater number of larger FU grafts to maximize the fullness of the restoration, and 2) it can be used to harvest larger FUs that can be microscopically dissected to generate a greater number of smaller grafts with a minimal number of donor wounds. Skipping over 1-hair FUs increases the number of hairs per graft by 11.4% over prior iterations.[1]

FIGURE 2. Follicular unit graft selection



LOCKING TENSIONER TOOL

The tensioner is a compressible, polycarbonate device that is used to assist the vision system and to stretch and stabilize the skin prior to extraction. Fiducials, on the top of the tensioner's rectangular surface, are used by the robot's optical system to orient the arm for harvesting and to record the location of previously harvested grafts. (A fiducial is a marker placed in the field of view of an imaging system for use as a point of reference or a measure.) The undersurface has pins that grip the skin (Figure 3). The tensioner is compressed with a handle placed on the donor scalp and then allowed to passively expand, stretching the skin (Figure 4). It is secured with elastic straps to the patient's headrest (Figure 5). The redesigned tensioner tool has a thumb-activated catch and release mechanism, so that once the tensioner is grasped, constant pressure is not needed. This makes it easier to operate and places significantly less stress on the physician's hands. It also allows the tensioner and handle to be loaded and placed on a stand that holds the instrument and protects the pins when not in use. This keeps the handle in a position to be grabbed easily (Figure 4). The handle can thus be set up in advance, increasing the speed of this step of the procedure.

FIGURE 3. Pins on undersurface of tensioner

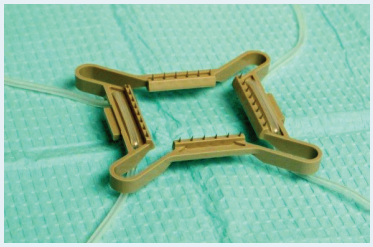
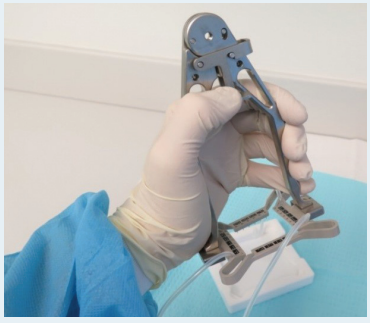


FIGURE 4. Tensioner with locking tool and stand



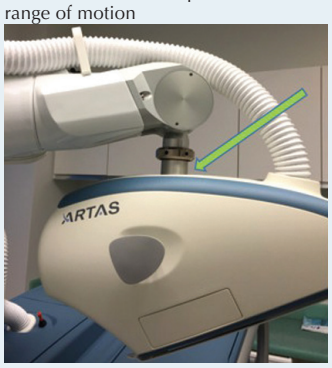
IMPROVED HALO

The tensioner is held in place by 1) pins that grip the skin, 2) the recoil of the compressed tensioner, and 3) elastic straps that are stretched and secured in grooves located on the base of the headrest and/or on a halo device. The advantage of a halo is that the forces are lateral (rather than downward) and thus more comfortable for the patient. It also causes less torque on the tensioner, allowing it to better

FIGURE 5. Double-notched halo to secure elastic straps



FIGURE 6. One-inch spacer to increase range of motion



follow the contour of the patient's scalp. A newly designed halo has a double-notch and central protuberance that makes the bands more secure and enables the physician to more rapidly secure the bands using one hand (Figure 5).

ARM SPACER TO INCREASE RANGE OF MOTION

A 1-inch extension of the robotic arm allows the instrument to harvest at a more acute angle than was previously possible. It also increases the range of motion of the robotic arm. The greater reach increases the number of grafts that can be harvested without repositioning the patient, thereby saving operating time and leaving the patient undisturbed (Figure 6).

IMPROVED IMAGE PROCESSING FOR GLARE

Glare that can interfere with the optimal functioning of the optical system can be caused by the lights of the needle mechanism or the natural light of a bright operating room. When glare is present, it affects the way the system identifies the hair and can prevent the system from recognizing hair that would be eligible for harvesting. With improved digital image processing, the system can better visualize existing hair, even in areas of glare within the grid. As a result, the number of grafts harvested per grid is increased.

ASSISTED FORCE-DRAG

For the robotic arm to engage with the donor scalp, it must be aligned with the fiducials on the top of the tensioner. In the past, this alignment had to be performed manually. The new "Assisted Force-Drag" technology enables the robot to self-align to the tensioner as soon as the fiducials are detected by the vision system. This feature obviates the need for the manual step and allows for an overall faster workflow.

PUNCTURE DEPTH (PD) BAND DETECTION

The robot uses a two-step, sharp/blunt punch technique based on the ideas of Dr. Jim Harris. Puncture depth bands enable the robot's computer to measure the depth of the needle (punch) in the scalp. The robot then uses this information to improve the accuracy of the subsequent puncture. Puncture depth band detection may be affected by the presence of blood, hair, and shadows from the tensioner. Improved algorithms that guide PD band detection have increased its accuracy by 9% compared to earlier versions, even in the face of these artifacts (Figure 7).

FIGURE 7. Bands on 2- and 4-pronged needles



4-PRONG NEEDLE

The robot was initially designed with a 2-pronged, sharp-punch. The advantage of this design was that the long prongs were able to anchor lax skin. A disadvantage was that it was less efficient when the scalp was tighter, or more fibrotic, and when the arm had to operate at a more acute angle to the surface of the scalp. To mitigate this limitation, a 4-prong needle was developed. The 4 prongs allow for cleaner incisions with better anchoring to tissue at acute angles. This advance results in improved yield, especially in areas below the occiput and on the side of the head. It is also more effective in patients with tougher tissue (Figure 7). A 3-pronged needle is currently being developed for tight and/or fibrotic skin as well as lax skin.

6MM PUNCH

The original robotic system used a 4mm rotating dull-punch to dissect the body of the graft from the surrounding tissue. The limitation of this design was that it was less effective in patients with longer hair follicles (i.e., greater than 4.5mm). With longer hair follicles, the collar of the 4mm punch pushed on the skin and, as a result, splayed the grafts and/or bent the bulbs.

The new punch is 6mm tip-to-shoulder so that full dissection of longer follicles can be accomplished with less distortion of the skin. This modification avoids damage to the lower portion of the grafts (Figures 8 and 9).

FIGURE 8. 6mm punch

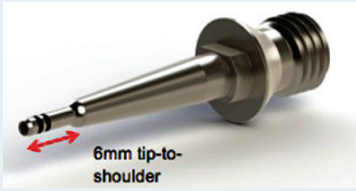
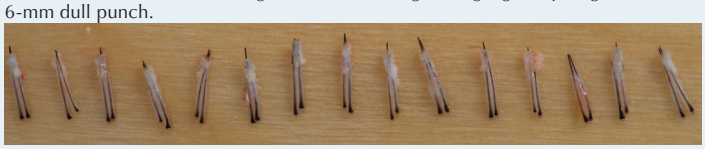


FIGURE 9. Grafts 7mm in length harvested using a 19-gauge, 4-prong needle and 6-mm dull punch.



THE FUTURE

A host of new modifications are in the pipeline. In addition to the 3-prong needle, a color camera is being developed that allows the robot to read white-light, which will make the operating field easier on the eyes (compared to the current red lights). Other advances include improved dissection, a smaller punch (0.8mm), an automatic scar detector, a 20% increase in harvesting speed, the ability for the physician to harvest at an angle as low as 30 degrees from the scalp, and a variety of advances that will make site creation more user-friendly.

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Controversies

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What is a hair transplant megasession?

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The term megaession has gone through a significant evolution in the 25 years this author (Rassman) has been performing hair transplantation. I remember when I did my first hair transplant in November 1991 with small grafts. It was about 500 grafts and took me all day. After not suffering enough pain at that time, I increased the next surgery to about 750 grafts; again it took all day and I had far too much bleeding, even for me (a general surgeon). Over the next couple of years, I kept increasing my suffering with 1,000, then 2,000, 3,000, and eventually 4,000 grafts in late 1993-1994. I quickly realized that it took a huge labor force to cut and place these grafts, and by mid-1992 I had developed a very large staff of about 35 people who were doing as many as four surgeries a day. Like others of my era, I set the standard on cutting and placing speed by mastering it myself. Drs. Ron Shapiro, Brad Wolf, and Paul Rose also became masters of cutting and placing. It was these large sessions, in particular, that set my practice apart from others at that time.

For the recent Asian Association of Hair Restoration Surgeons (AAHRS) meeting in Bangkok, I was asked to discuss FUE megasessions and it quickly became apparent that what constitutes a megasession for strip surgery is different than what constitutes a megasession for FUE. It was clear to me that the megasession is not an absolute number of grafts. It is a number that is relative to 1) the type of surgery (strip vs. FUE) and 2) the overall donor density as measured by the average number of hairs per follicular unit.

By definition, a megaession implies something huge, very large, above the ordinary. So, the 2,000-graft strip surgery, which now fits into the world of the ordinary surgical hair transplant, does not have the same meaning it had in 1993. After considerable thought, I realized that there is a mathematical relationship between the two variables listed (type of surgery and density) similar to $E=MC^2$. This relationship is evident once we agree that the average human scalp has 50,000 follicular units (FUs). I will make this presumption to define a megasession as a surgery that exceeds the absolute number defined in this mathematical relationship:

Strip Megasession = KD^2 where
D = Density and K = Constant of 800

We suggest that an FUE megasession can be calculated by reducing a strip megasession by one-third and that a human scalp can easily heal the number of grafts equal to two megasessions over two or more sessions. An example of megasessons is defined as follows:

Donor Density Hairs/mm²	Strip Megasession (M)	FUE	K
2.2	3,872	2,556	800
2	3,200	2,112	800
1.8	2,592	1,711	800
1.6	2,048	1,352	800
1.4	1,568	1,035	800

(Example: $M = K \times D^2$: Density (D) of 2.0 hair/mm²: $2^2 = 4 \times$ (K) 800 = 3,200 × 0.66 = 2,112)

What does this mean with regard to the total follicular unit donor availability for transplantation? Assuming that the donor area reflects 20% of the total hair population and that no more than 66% of the donor site can be harvested over time, a single strip megasession will harvest (according to this formula) approximately one-third of the total extractable donor follicular unit supply. FUE and strip surgeries are very different with regard to the density of FU extraction. In a 2,000 or smaller graft FUE session, the larger FUs are cherry-picked from the entire available donor area generally without causing depletion, while a 5,000 graft FUE megasession causes depletion by taking half the available FUs in the donor. These FUE donor removal patterns are markedly different than a 5,000 graft strip surgery in which all grafts are taken from a much smaller, specified area. Donor site depletion, therefore, is clearly more evident from an FUE megasession than from a strip megasession, and that justifies the lower graft limit for an FUE megasession.

Each surgeon can decide the constant, K, that is appropriate to his or her particular agenda. This type of analysis is important as we focus on a common language to address donor site depletion and donor area scarring. From the numbers of the above table, it is clear that there are limits for patients with lower donor densities (a problem with Asians and Africans) more than for people with higher donor densities (Caucasians). For the surgeon who routinely exceeds twice the above megasession numbers over time, more problems may appear and greater medical/legal problems may be harder to defend. It may be reasonable to say that two megasessions, as defined above, are a reasonable limit for the donor area in an average patient because this seems to be today's practice; however, the safe number may actually be lower than what is being done today. There are always exceptions to this rule, but that is where clinical judgment comes in to play. I believe that the risks of exceeding the

FUE megasession numbers in a single surgery increase the problems with vascular supply, the overall integrity of the donor area, and the degree of post-op scarring. I have not gone far enough in this discussion to address the combined strip/FUE procedures, which are now pushing the envelope for donor site harvesting even further.

I have performed more than 10,000 grafts per patient in multiple sessions on dozens of patients over the past 26 years, and I have observed the impact of pushing the donor area harvesting to greater and greater numbers. These were all strip surgeries, and I have always kept the scars in the sweet spot just above the posterior occipital protuberance. With each subsequent surgery, when possible, the strips were removed at or above the surgical scars. This approach has kept the donor area above the scar pristine. Eventually, FUE harvesting of this pristine area becomes possible. Some people tolerate these large sessions with minimal scarring and some do not. All of these strip surgery patients have had their donor area skin stretched so that a uniform proportional reduction of the remaining donor density throughout the donor area is seen in each successive surgery.

Large FUE sessions are another situation altogether, because rather than take the grafts from a localized discrete anatomic area in the center of the donor region and having the donor skin stretch in the surgical recovery phase, the FUE scars probably do not stretch in proportion to the increased area of the FUE wounds themselves when compared to a strip scar. Repeated FUE sessions produce visible punctate scarring at the FUE sites and some of this scarring extends below the skin to alter the directional growth of the FUs in the area where the FUs were removed (possibly collagen dependent). There is almost certainly some damage to the microvasculature of the donor scalp itself, more and more as the FUE megasession numbers are exceeded.

In a presentation at the Asian Association of Hair Restoration Surgeons (AAHRS) meeting in April 2017, some surgeons reported that adding FUE above and below a donor wound reduced the tension on a tight wound closure. Tension measurements were offered to confirm this belief. In a previous publication, Dr. Bob Bernstein and I discussed the variations in collagen among people in a study of 200 patients and I am certain that these collagen differences impact the FUs next to the extracted follicles as the supporting stroma for each FU extracted interacts with the remaining FUs. As the FUE session numbers significantly increase above the numbers defined in the proposed formula, many of these patients may show extensive patchy macroscopic scarring that appears significantly larger than the FUE (Figure 1.)

FIGURE 1. Patient who had 5,000 FUE grafts in a single session



Hair shaft thickness alters what we see because coarser hair covers FUE punctate scars better. People with high donor densities don't show the patchy punctate FUE scars either because there is enough hair bulk present to hide the scars.

CONCLUSION

Hair transplant megasession surgeries are attractive to patients because they reduce the number of procedures that a patient may have to undergo to achieve any given result. The mathematics of the megasession sheds light on the upper limits of hair transplant planning from a "master plan" perspective, something that always should be discussed with the patient. The donor supply is absolutely finite for each patient and it is our responsibility to teach our patients what these limits actually are. Megasession FUE surgeries have a distinct pathology that impacts all subsequent FUE surgeries that are offered to the patient.

Editor's note from Dr. Wolf:

Some experienced hair movers who perform both FUT and FUE (including me) have noticed that for some reason or reasons FUT seems to be more efficient, causes less scarring, and, during multiple sessions, more total hairs can be harvested using FUT. Here, Drs. Rassman, Pak, and Knudsen give us their reasoning as to why this is.

Others have attempted to explain this phenomenon. Walter Unger wrote, "When I do the math for a 24cm long strip that in many patients could be expected to produce 2,000 (or more) FUs, I get a total incision length of 48cm plus a little more for the tapering ends, whereas if you used FUE with a 1mm punch for 2,000 FUs, the total peripheral LENGTH of the incisions would be 628cm!!" He continues, "The total AREA of scar from 2,000 1mm punches vs. a not uncommon 1mm-wide, 24cm-long strip are respectively 17.5cm^2 vs. 2.4cm^2, and many of us typically get scars that are less than 1mm wide. Could someone please explain what I'm not understanding?"[1]

Carlos Puig stated: "The variable contributing to these FUE cases not yet mentioned is the absence of biological creep in FUE surgery. Just as with scalp reduction, strip harvesting stimulates some small degree of biological creep in the donor, thus creating new skin, which reflects light less than scar. I believe this is more significant than most realize, especially in patients who have more than 5,000 grafts harvested."[1]

Bill Reed echoes the words of Jim Arnold in that "taking a strip of hair from the donor included taking out the interfollicular alopecic skin as well as the follicle. What was placed back in the recipient area was only the hair without the bald interfollicular skin, hence the 'scalp reduction.' … This principle, as it applies to the FUE harvesting of donor hair, means that with FUE, only hair is removed from the donor leaving behind the bald interfollicular skin that would have been removed with the strip harvest."[2]

More and more physicians are offering FUE only. We welcome their opinions on this matter at forumeditors@ishrs.org.

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Literature Review

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PFS: Is it real or imagined?

Fertig, R., J. Shapiro, W. Bergfeld, and A. Tosti. Investigation of the plausibility of 5-alpha reductase inhibitor syndrome. *Skin Appendage Disord.* 2016; 2:120-129.

The Post-Finasteride Syndrome (PFS) Foundation is funding research projects to help understand the condition better. It includes urologists, endocrinologist, psychiatrists, and psychologists but no dermatologists. In this paper, four prominent dermatologists band together to investigate the medical literature to identify evidence-based research supporting the presence of permanent sexual dysfunction and mood changes during treatment with 5-ARIs. They performed a MEDLINE search from 1950–2016 using relevant search terms and graded the data based on the American College of Physicians outcome study grading system. In the PLESS study, 15% of finasteride subjects and 7% of placebo patients had sexual AEs (adverse effects), but over years 2-4 the rate became the same for each group (7%). They hypothesize that neurosteroids (allopregnanolone, dihydrodeoxycorticosterone, dihydroepiandrosterone, and pregnenolone) can serve as anxiolytics, antidepressents, and memory enhancers. When 5-ARI's block 5-alpha reductase needed to stimulate these neurosteroids, psychiatric adverse events may occur; however, psychiatric side effects have not been documented in high-quality, randomized trials. One uncontrolled prospective trial following 128 men on finasteride 1mg daily showed a small but statistically significant increase in the BDI survey score and the HADS-D score (higher score, more depression). The same study showed no statistical increase in HADS-A score (measuring anxiety). A retrospective study examining the U.S. FDA Adverse Event Reporting System (FAERS) database showed 4,910 finasteride-related adverse events, of which 39 (.79%) were for suicidal ideation. In comparison with other drugs, this was found to be a disproportionate association with finasteride. The authors discussed how selection bias and recall bias are major factors in the studies on anxiety and depression, especially where patients were recruited from the website www.propeciahelp.com. Control groups were lacking in all but one of the studies related to mood disorders. It was also unclear from the data whether depression was a side effect of the drug itself or a corollary of sexual dysfunction resulting from the use of 5-ARIs.

Comment: The bottom line from this paper is that cases of persistent sexual side effects were only documented in low-quality studies with strong bias selection (patients were recruited through the website www.propeciahelp.com, which ultimately served as a clearinghouse for 742 Propecia® lawsuits). The authors point toward future studies by the NIH that may help document more unbiased epidemiological data. (Disclosure: Three out of four of these authors once served as consultants and speakers for Merck!) ■

An International Perspective on the Etiology and Treatment of Hair Loss

The Alopecias: Diagnosis and Treatments. Pierre Bouhanna and Eric Bouhanna, Editors. October 23, 2015; CRC Press.

This book is an extremely well-written text that provides an international perspective on hair loss and hair transplantation. Its authors hail from France, Italy, Spain, Mexico, Germany, Switzerland, Poland, Thailand, and the United States. It is a very manageable text at 245 pages with innumerable color photos and excellent, up-to-date references.

It begins with an overview of hair biology by basic science expert Dr. Ulrike Blume-Peytavi and her associates. This chapter includes many helpful figures and tables related to hair follicle density, diameter, and duration of hair cycling. The editor, Dr. Pierre Bouhanna, then provides an overview of hair and scalp investigations, considering personal and family history, clinical and laboratory tests, and recommendations for digital phototrichograms. Dr. Lidia Rudnicka provides excellent photographic examples of the alopecias in trichoscopy. What follows are more detailed chapters on hair dysplasias, alopecia classifications, and individual chapters on the management of MPHL, FPHL, diffuse alopecia, and noncicatricial circumscribed alopecia (congenital triangular alopecia, alopecia areata, pressure alopecia, trichotillomania etc.).

Most of the surgical chapters are toward the latter half of the book. Dr. Damkerng Pathomvanich provides an excellent overview on Asian hair restoration, touching on variations in anatomy and hair density with a nod towards both surgical and medical treatments. Dr. Pierre Bouhanna discusses management of hair loss in African Americans. Next Dr. Alfonso Barrera discusses hair surgery in the reconstruction of the face and scalp, and editors Drs. Pierre and Eric Bouhanna together discuss hair surgery of the scalp and body hair with special attention to eyebrows.

Newer techniques in cellular therapies are also covered. Dr. Jerry Cooley gives an excellent research update on hair cloning. Drs. Gilbert Amgar, Joseph Greco, and Fabio Rinaldi discuss PRP and stem cells summarizing the best data presently available. The final two chapters focus on prosthetic and cosmetic approaches to hair loss, including camouflage, pigmentation, and prosthesis.

While there is slight repetition between the chapters, each one provides a different perspective based on each author's experience. For doctors who are new to hair surgery and with little experience treating hair loss, this book is a must read. The photographs in the chapter on management of acquired primary cicatricial alopecia are particularly helpful. Careful study of these photos will keep the new hair surgeon out of trouble and help him or her to avoid complications from surgery in the areas of inflammation, fibrosis, and scarring. But for even the most seasoned hair loss expert, this book will likely provide new information and helpful advice. ■



Cyberspace Chat

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Platelet Rich Plasma (PRP) and Its Use in Hair Restoration

During the past few months, there has been a lively discussion online regarding the use of PRP in hair restoration. The conversation was started by Bob Haber who is "daily bombarded with requests for PRP" and was asked to review an article on the subject. He reached out to ask colleagues which device and protocol they are using and their impressions regarding efficacy. The system and protocol for PRP and its efficacy is an extremely pertinent topic currently, and it has been a subject that is very difficult to present in an honest and fair manner to patients. The variables are many and include (but are not limited to): the systems used to produce PRP, whether ACell is added or not, whether it is "activated" externally or not, how it should be injected, whether using a microroller is important, and what the ideal concentrations of various blood components are.

I have submitted an IRB (Investigational Review Board) study to try to find answers and there are others who have done, and continue to do, research to study the effects of PRP on hair growth. PRP is believed to act through the activation of alpha granules of platelets that release many proteins, including platelet-derived growth factor (PDGF), transforming growth factor (TGF), vascular endothelial growth factor (VEGF), insulin like growth factor (IGF), epidermal growth factor (EGF), and interleukin (IL)-1.

There are some studies thus far that have given hair loss patients hope. However, the diversity in the methods used and the efficacy reported confuse the issue considerably. Uebel, in 2006, was one of the first to report the use of PRP in connection with hair transplant surgery. He noted a marked improvement in the yield of follicular units at 7 months on the half head treated with PRP as compared to the control side.[1]

In vitro studies have indicated that PRP induces a considerable initiation and prolongation of the hair growth cycle. It also helps induce angiogenesis, which improves growth and healing. Cervelli et al. studied 10 men; there was a control side and biopsies of the scalp were evaluated. The study revealed a significant increase in mean hair counts as well as terminal density, as compared to the control side. Microscopic evaluation showed an increase in epidermal thickness, increase in number of follicles, increase in follicular bulge cells, and increase in Ki67+ basal keratinocytes.[2]

Given that the efficacy of PRP is secondary to the growth factors produced by the PRP, it would be important when choosing a device to be certain what concentrations of various growth factors are present and then to determine what the optimal concentrations are. Testing of growth factors is performed with ELISA testing and is fairly expensive, thus most doctors rely on the data provided by the device companies.

What about the addition of other products or adjunctive medications? I personally use ACell with my PRP. My rationale is that it is a product that has shown considerable impact on cellular regeneration and it also acts as a scaffolding to help hold the PRP in the area into which it is injected. Some doctors have patients simultaneously start other medications such as minoxidil or finasteride. I have patients try those prior to and independent of the PRP, so we can properly assess the efficacy of each. If other medication is effective, it may eliminate the need to "try PRP" or we can build upon its results, without a significant confounding variable. In addition, I am aware of many doctors who perform PRP and then prescribe medications to reduce the potential for swelling, which most probably negates much of the potential of the PRP.

Bob Leonard asked many pertinent questions:

This must be a "Bob" thing because I feel exactly how our esteemed colleague from Cleveland, Bob Haber, feels about PRP. I'm usually one of the first ones out of the box with something new that I believe will help my patients.

I've been waiting and watching and asking questions and, until this fall, had not been convinced by any photographic evidence that PRP was all that effective for patients. Now, add to the fact that different devices and wildly different protocols and fee structures are being used; this throws havoc into a decision about what to do with which device.

Adding insult to injury, every single person who has had this treatment in New England done by local doctors whose first interest unfortunately is NOT the patient but, instead, their bank accounts, and who has come in for a consultation with me, has been completely disappointed!

Ken Williams is convinced that the EmCyte device is the one to go with; Ed Epstein loved the EmCyte as well but changed his preference to the Eclipse since it is easier for his staff to use. I don't know the other devices well.

I much prefer simplicity, but not at a cost of delivering less "product" to the patients to give them the biggest bang for their treatment. I figure, the more PRP that can be injected in each treatment session, the better to provide more platelet concentration and to cover larger areas for scalp.

Varying protocols from *one treatment a month for four months followed by every quarter year* to *once now and then again in nine months* have shown good enough before and after results for me to consider offering it to my patients.

But… which device? Which protocol? What to charge?

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Jerry Cooley, who has a great deal of experience with PRP, was one of the first to answer some of the questions:

I first learned PRP from Joe Greco 10 years ago, and I used his protocol with the Harvest centrifuge and thrombin activation. I learned about ACell from Gary Hitzig in 2009 and was convinced its addition to PRP makes it work better and longer. Per John Cole's suggestion, I switched to the Angel system in 2012 and have never felt the need to try anything different. Those who have come to visit and then go back to their clinic and replicate my protocol consistently report the same observations I have. As one might predict, the response is variable. I believe the duration and degree of benefit vary according the extent and degree of miniaturization, the genetic rate of loss, and what hair maintenance medications the patient is on. I have checked my PRP against whole blood several times at the hospital and consistently get 5-7× platelet concentrate. John Cole has done some work looking at not only platelet counts with different devices but also quantification of growth factors and the Angel system fares well in his studies. I generally use 75-100mg of ACell per case, and I believe calcium/thrombin activation is necessary with the microtrauma of microneedling as well. I don't believe we will see a large, well-done study that gives us the magic protocol, although I believe PRP development will come from us doing it differently and sharing our clinical observations, which will accumulate slowly over time, much like FUT and FUE developed.

Figure 1 shows a 45-year-old male 5 months after PRP/ACell treatment. Subjectively, he feels his hair is thicker and has had others tell him so. I sometimes see better and sometimes see worse results, but I would call this typical. His HairCheck went from 58 to 72. Some patients, who might compare PRP against the yardstick of hair transplants, will say this is not worth the money, while others will gladly pay the fee every year or two to maintain this improvement. I show prospective patients a range of responses from minimal to above average, and I emphasize I can't accurately predict their degree of improvement. Those who are tight on money and want a guaranteed percentage improvement should not receive this treatment.

FIGURE 1. 45-year-old male 5 months after PRP/ACell treatment



I've been getting PRP done on myself since Joe Greco did it on me 10 years ago and have been my own guinea pig. I need to repeat every 2 years to maintain the benefit, which has been substantial.

Dr. Cooley further elucidated:

I draw 120cc of blood from the patient and run in the Angel system at 3% hematocrit. I then take whatever PRP the machine gives (3-4cc) and add enough PPP (platelet poor plasma) to make 8cc, which on random checks with the hospital lab is >6× baseline PRP concentration. After a ring block, I first inject ACell 100mg/8cc Plasmalyte very superficially with a 1cc syringe/25g needle. Then I inject the PRP similarly. Then I activate with 2cc of calcium chloride/dilute thrombin (500 units) and inject throughout with a microneedling "jack hammer" motion. It seems that everyone I talk to who is disappointed with their PRP have several things in common: inadequate platelet concentrate, no ACell, and no activation.

I consider PRP a complementary treatment, not a standalone replacement. It's good for what it is, but nothing more. I think we would all agree that a patient using only topical minoxidil is missing out, and I'm not sure why PRP should be considered any differently. I tell all my PRP patients that they will get better and longer results if they use finasteride (or spironolactone) and minoxidil; it's part of the consent process. It also just seems like common sense to me. If you're adding all these stimulatory factors, but doing nothing to oppose the inhibitory factors (i.e., DHT), you will not get as good of a result, and it will not last as long.

Bob True added:

One popular approach with PRP is to give it alone, monthly for three months and every 4–6 months thereafter. I see a good number of patients who have been treated in this way who have seen no benefit. I have not seen a good explanation of the rationale for giving the injections so frequently. This is not what I do.

My approach is very similar to Jerry's: PRP plus ACell then wait 8 months to assess the result. If there is no response, I don't advise a repeat; if there is a good response, I continue minoxidil/ finasteride and observe. If there is an intermediate response, I will re-inject. In the long term, we re-inject if, over time, despite maintenance drug therapy, we objectively see deterioration. So far, we are not having to do many of these maintenance injections as long as patients are optimized with minoxidil and finasteride.

Robin Unger responded with a clarification:

Maybe I was not clear. I don't do a series of injections—just one injection. I assess results at 4-6 months and don't repeat if I see no improvement. I don't do multiple injections in a short time as that never made sense to me, although it seems to be common here in New York City. I also never anticipate/nor counsel patients that one PRP treatment will cure their hair loss. I assume the effect will wain—sooner or later—and leave it to patients to let me know when they think that point has arrived.

Regarding medical therapy, many have been on minoxidil and/or finasteride and/or antiandrogens for years and I tell them to continue. Others have had side effects that make those medical therapies unacceptable, which is why they sought out PRP in the first place. If they have not tried medical therapy, I tell them to do so and return for evaluation in 9 months, and they can do PRP then if they choose. I try not to mix starting medical therapy at the same time as PRP because then we are unable to assess the efficacy of either treatment alone.

I repeat injections when the patients come back feeling the effect is decreasing and they are starting to look thinner again.

I didn't know how else to decide on a time frame. Sometimes 9 months and sometimes up to 24 months. I do think it varies quite significantly. I have a group I am "holding" now for up to 4 years—they made initial gains and we have held onto those for 4 years with re-injections approximately every 9-12 months and sometimes longer. It's what I have found has happened for me personally as well; like Jerry Cooley, I get PRP injections myself. In my case, I feel I can start seeing more of my scalp about 10-12 months after the PRP. I don't think more injections produce more benefits (although I don't know for sure), but so far we seem to be able to keep initial gains.

Jim Vogel added his opinion:

I use the EmCyte system as it is cheaper, more versatile, and faster than the Angel and also uses less blood. There is also a mechanism to check the platelet concentration. I use Jerry Cooley's basic protocol as well and have adopted a few other things. There is no question in my mind that PRP works, but not all PRP is the same nor is the technique or the protocol, which is important.

Nicole Rogers succinctly described her opinion regarding the population of patients seeking PRP:

It seems to me that there are two groups of people who want PRP: 1) those who have tried EVERYTHING and just want to see how adding PRP can help, and 2) those who have tried NOTHING and are totally opposed to ongoing medical therapy or hair transplant surgery.

PRP is also kind of like a "loss leader." For example, you can start with fillers or Botox, but eventually the patient may need a facelift. You can start with PRP, but tell patients beforehand that hair transplant surgery +/- medical therapy will probably give them the best results, and explain that there is still a lot of variation in technique and protocol when doing PRP. We are still watching the data. If patients still insist on PRP, that is their call, but at least you have advised them properly.

After **Sharon Keene** expressed all of our frustration with the lack of a clear direction, **Robin Unge**r then responded:

I too am frustrated by the lack of evidence and good data on PRP. I am doing it for my patients who are without other options or are non-responders. I am not trying to take advantage of patients who will "do anything" for hair. And my results have been good. We have been working on our IRB and still getting through red tape (as I use ACell, which adds another layer to the approval process). But my paper will explain exactly how I do it and hopefully the images taken with optical coherence tomography (OCT) will be definitive. We will tattoo the areas. The OCT technology is amazing, it is like taking ultrasound images and according to my co-investigator will show number of follicles, allow measurement of caliber, and show changes in dermis, collagen, vascular structures, etc.

My hope is that there will be a clear explanation of the changes that occur over at least a 6-month period and that more doctors will be able to confidently offer an effective PRP therapy.

There are some articles that may be of interest to those who wish to read more on the topic and they are included here with the references.[3-6]

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Letter to the Editors

Re: Using goat skin for training

William R. Rassman, MD | *Los Angeles, California, USA*
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We have just incorporated Dr. Garg's goat skin module into our Scalp Micropigmentation training course and it has been very valuable. (See: Garg, A.K., and S. Garg. Training module in hair restoration surgery: a simple method for beginning physicians and assistants. 2017; *Hair Transplant Forum Int'l.* 27(2):58-60.) Dr. Russell Knudsen was taking our SMP course this week (pictured), practicing first on synthetic skin and then on Dr. Garg's goat model. He had the opportunity to analyze the depth of the SMP needle by sliv-



ering sections of the goat skin and identifying which of his "spots" were correctly placed and which were not. The ability to control the depth and match it with the "feel" of the depth was an amazing addition to our training course. A warm thank you to Drs. Anil and Seema Garg. ■

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Hair's the Question

Sara Wasserbauer, MD, FISHRS | *Walnut Creek, California, USA* |
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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.

Grab your calculators again! It's time for part II of our calculations.

Calculations in Hair Transplant Surgery: Part II

1. Your patient received 1,885 grafts: 463 single FUs, 1,388 double FUs, and 34 triple FUs. There were no 4-hair grafts and no transections. How many hairs did your patient receive?
   A. 1,885 C. 3,341
   B. 2,191 D. 3,831

2. You are performing an FUE procedure and want to calculate your transection rate. Your staff shows you 10 grafts under the microscope with the following number of intact hairs per hairs in the complete follicular unit:
   2/3 ½ 2/2 1/1 1/3 2/2 3/3 3/3 ¾ 0/1
   All the grafts are usable with a good amount of tissue and no "skeletonized" or "stripped" grafts. All hairs in these grafts are terminal hairs. What is the total transection rate (TR or FTR)? (HINT: Non-intact [transected] hairs out of the total number of hairs extracted.)
   A. 25% C. 75%
   B. 50% D. 100%

3. The calculated number of follicles per graft expected (CFG Expected) and the calculated number of follicles per graft achieved (CFG Achieved) can also be used to calculate transection rate (TR or FTR as above). Using the above example, calculate the CFG Expected. (HINT: The total number of hairs [follicles] extracted divided by the number of grafts [attempts].)
   A. 25% C. 24/10
   B. ½ D. 100%

4. Using the above example, calculate the CFG Achieved. (HINT: The number of intact hairs [follicles] extracted divided by the number of grafts [attempts].)
   A. 25% C. 18/24
   B. 6/24 D. 18/10

5. How can the CFG Expected and the CFG Achieved be used to calculate the transection rate?
   A. (CFG Expected minus CFG Achieved) divided by CFG Expected = Transection Rate
   B. CFG Expected divided by CFG Achieved = Transection Rate
   C. CFG Expected minus CFG Achieved = Transection Rate
   D. (CFG Achieved plus CFG Achieved) divided by CFG Expected = Transection Rate

6. Your patient returns having shaved their head and counted every single dot scar on their head and there are 2,160. You know you obtained 2,021 grafts. What is this patient's missing graft rate (MGR)?
   A. 6% C. 139%
   B. 94% D. 139 grafts

7. Your patient has a scar in the donor area from a previous linear "strip" surgery. It measures 2mm wide and 20cm long for a total area of 4cm^2. The average density in your patient's safe donor area is 80 FU/cm^2. If you excise a second strip containing this original scar, by how many grafts is it likely to decrease your yield?
   A. 200 FU grafts even C. 360 FU grafts
   B. 320 FU grafts D. 400 FU grafts even

8. Your patient has scars from a previous FUE surgery. His safe donor area is 8cm high and 20cm wide. His previous FUE surgery left 2,000 circular scars 1mm in diameter. What is the total scar area currently in his donor area? (HINT: Formula for area of a circle is pi r^2 where r = radius and pi= 3.14.)
   A. 0.157cm^2 C. 15.7cm^2
   B. 63cm^2 D. 630cm^2

9. If your patient has a baseline density of 100 FU/cm^2, and you only start to notice thinning after at least 70% of this hair mass is gone, to what approximate density would you need to replace the hair in order for it to look full?
   A. 35 FU/cm^2 C. 70 FU/cm
   B. 50 FU/cm^2 D. 30%

10. A patient presents to you wanting hair placed into an old strip scar 1cm wide and 15cm long. The patient has very elastic skin and a low density of 50 FU/cm^2. You intend to perform FUE to obtain the required number of grafts and intend to transplant to a density of 20 FU/cm^2 into the scar. Approximately how many grafts will you need?
    A. 750 FU grafts C. 300 FU grafts
    B. 200 FU grafts D. 30 FU grafts

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1. **C.** Here is how you calculate it:

463 single FUs = 463 × 1	= 463 hairs
1,388 double FUs = 1,388 × 2	= 2,776 hairs
34 triple FUs = 34 × 3	= 102 hairs
Total: 1,885 FUs	**= 3,341 hairs**

Why is this even important? Since follicular units can contain such a variety of hairs, comparing FU grafts alone does not give the whole picture of a patient's transplant. (What if one patient has 1,000 single FU grafts and the other has 1,000 triple FU grafts? The second patient got three times as much hair!) That is why comparing the numbers of HAIRS is more accurate and allows a more valid comparison across patients (even though individual hair characteristics will still vary). This is also important when you start submitting abstracts to the ISHRS for the *Forum* or the World Congress meetings: hair numbers are the preferred metric, and while for now it is simply requested that all your data be reported this way, in the future it is likely to be required—so you just might want to start calculating it now!

2. **A.** The strict definition of follicle transection rate (FTR, or simply TR) as put forth by the FUE Terminology Subcommittee (whose reports parts 1-4 were featured in *Forum* issues September/October 2013, November/December 2013, May/June 2014, and January/February 2016) is: **total number of transected hairs (follicles) divided by total number of extracted hairs (follicles) (intact + transected)**:

$$\frac{1 + 1 + 0 + 0 + 2 + 0 + 0 + 0 + 1 + 1 = 6}{3 + 2 + 2 + 1 + 3 + 2 + 3 + 3 + 4 + 1 = 24}$$

So the follicle transection rate (FTR or TR) is equal to 6 divided by 24, or 25%.

3. **C.** CFG-Expected is defined as Total number of extracted hairs (follicles) (intact + transected) divided by Total grafts (transplantable + completely transected).
With this example, CFG Expected is 24/10 = 2.4 hairs per graft expected.

4. **D.** CFG Achieved is defined as **total number of intact follicles divided by total grafts (transplantable + completely transected)**.
With this example, CFG Achieved is 18/10 = 1.8 hairs per graft achieved.
Why are these numbers important? To quote Dr. Jean Devroye, one of the authors of the FUE Terminology Subcommittee: "Because it gives an idea of what we try to reach. Obtaining a low transection rate of 5% when using a 0.9mm punch to try to yield 2.4 hairs per graft is more impressive than having a 5% transection rate with a 1mm punch to try to yield 2.1 hairs per graft… It gives a graduation of the difficulties."
Another example: You try to obtain 3 hairs per graft with a 0.9mm punch and you obtain 2.7. Now you have 0.3/3 = 10% transection rate. You decrease your goal and try to reach 2.5 hairs per graft and you reach 2.3 hairs per graft. The rate of transection is 0.2/2.5 = 8%. Which is the best? 10% transection but you achieved 2.7 CFGA or 8% transection but you achieved 2.3 CFGA?

5. **A.** In this case, (CFG Expected minus the CFG Achieved) divided by the CFG Expected = Transection Rate. Therefore, (2.4 – 1.8)/2.4 = 0.6/2.4 = 25%, which is the same answer as question 9! Whichever way you choose to calculate this important number, you will get the right answer.

6. **A.** The missing graft rate is defined as the number of missing grafts divided by the total number of punch insertions (i.e., attempts) × 100. In this case, there are 2,160 – 2,021 = 139 missing grafts. Thus, the formula for the missing graft rate is 139/2,160, which equals 6%.
How would this number ever be relevant? Aside from knowing your missing graft rate as a personal metric of your own efficiency in performing FUE (time is money!), consider the case where a patient is being charged by the graft, or a patient develops significant cysts and ingrown hairs in their donor area, or you simply need to make every graft count—all of these cases deserve data-driven solutions. Staff can do the counting for you or you can count for yourself, making a mark every hundred. Multiple inventions for counting also exist. This calculation also helps when you are trying to monitor the graft density you plan to harvest and to calculate yield and remaining grafts for future planned surgeries.

7. **B.** This is another area calculation: 0.2cm × 20cm × 80 FU/cm^2 = 320 FUs. Alternatively, you could have multiplied 4cm^2 × 80 FU/cm^2 = 320 FUs. I could have made it tough by making you calculate how much it would have decreased your strip harvest FU graft yield, but I am too nice. (I will save that one for the ABHRS Board Exam.)

8. **C.** You don't need the data for the dimensions of the safe donor area to answer this question, just the number of scars (attempts) and the formula for the area of a circle. Remember: 1mm = 0.1cm. The radius is half the diameter (0.05cm in this case). Here's the rest of the calculation:
$$3.14 \times (0.05\text{cm})^2 \times 2{,}000 \text{ scars} = 15.7\text{cm}^2$$
This seems like a lot if this is the first time you are calculating it, but the calculation is correct.

9. **A.** This is based on an old study (Unger, W.P., et al. *Hair Transplantation*, 4th edition) that demonstrated if you count and then pluck out half of a person's hair, the results are visually indistinguishable. It is only when you get lower than that in the ~30% lost hair mass territory that you start to visually see the loss. Hence, we as hair surgeons only have to replace to a density above that in order to have acceptable facsimile of the real thing.

10. **C.** The area of the scar is 15cm × 1cm = 15cm^2. The density you are trying to achieve is 20 FU/cm^2 (NOT his current donor area density of 50 FU/cm^2). So 15cm^2 × 20 FU/cm^2 = 300 FUs. ■

PLEASE NOTE

In Part I (March/April *Forum*, pp. 71-72), in order to account for the potential for area to change with shape, Question 4 should have read:

4. If you have a string 40cm long and you tie the ends together and shape it into a circle, approximately how many square centimeters will be covered inside its boundaries?
A. 10cm^2 B. 125cm^2
C. 200cm^2 D. 400cm^2
The answer is still B.

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May 12, 2017

Mehmet C. Oz, MD, FACS
Columbia University
Director, Integrative Medicine Center
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177 Fort Washington Avenue, Suite: 7-435
New York, NY 10032 USA

Dear Dr. Oz:

We praise The Dr. Oz Show for sharing an important "buyer beware" message with consumers about hair restoration surgery (May 9, 2017 show). The International Society of Hair Restoration Surgery (ISHRS) has worked diligently to educate consumers and medical professionals about the numerous challenges individuals face when considering hair restoration services, and most abhorrently, the problems of the unlicensed practice of medicine that have recently infiltrated this profession. It is of the utmost importance for patients to thoroughly research potential treatments, procedures, and medical providers.

We are disappointed that you chose not to include the ISHRS on your show after we worked with your producers so closely and provided information that you used. As a result, there were numerous inaccuracies. The ISHRS could have helped you fact-check.

We respectfully ask that you provide updated information to your viewers, perhaps on your website, to correct the inaccuracies and provide consumers with information to help them in their research. You may wish to direct consumers to: www.ISHRS.org. The ISHRS website includes excellent information about how to vet a doctor, what questions to ask, and the Red Flags to watch for.

- The physician interviewed stated that hair transplantation is not considered "a true surgery". This couldn't be further from the truth. Even minimally invasive hair restoration procedures are, in fact, surgery requiring medical expertise. 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. ISHRS Position Statement on the Qualifications for Scalp Surgery
- You mentioned that there is no regulatory body and you encouraged "the FDA, the AMA or the ASPS to get involved." The ISHRS has published the core curriculum and core competencies in hair restoration surgery (*Dermatol Sur*g. 2006; 32:86-90; and *Dermatol Surg.* 2009;3 5:425-428), has and is developing practice standards (*HT Forum* 2015; 25:162-165) and offers continuing medical education activities and fellowship training programs that are 1-year in length. The ISHRS has brought the issue of the unlicensed practice of medicine in hair restoration surgery to the forefront with an extensive outreach to every state medical board, the states' attorney generals, several other countries' ministries of health, and a resolution to the AMA and the CEN (European Standardization Committee). The ISHRS is leading the effort to protect patients.
- The following is an example that we could have easily helped check. The dermatologist who was interviewed stated that "5% minoxidil is not approved for women" so she prescribes the male strength for women. In fact, 5% minoxidil foam for women was approved in 2014.

Again, we support your efforts to educate consumers about using qualified professionals, a message that ISHRS members so fully embrace. We welcome a meeting with you and your staff to further discuss this important topic. And we ask that you inform your viewers and website visitors about the International Society of Hair Restoration Surgery, providing them with a link to our site and information about the valuable resources we offer to help consumers – www.ishrs.org.

Sincerely,

Ken Washenik, MD, PhD, FAAD, FISHRS
President

Victoria Ceh, MPA
Executive Director

Ask the Fellows

We are pleased to continue our Ask the Fellows (FISHRS) series in which unanswered clinical questions identified by participants at the Las Vegas meeting are answered by our Fellows. It is a wonderful quick reference to the learned opinions of the ISHRS fellows. Read or keep for future use. Thanks to the Fellows who participate in this ongoing series.

How do you avoid burying grafts when using blunt/hybrid motorized FUE?

James A. Harris, MD, FISHRS

The primary cause of buried grafts when using blunt/hybrid punches is the premature insertion of the punch before it has made a complete incision around the targeted graft; I have called this process "engagement" in previous descriptions of the technique. When the punch is inserted before engagement, the targeted unit is depressed below the skin level, and when the skin incision is completed, the graft is below the surface and buried. There is also the likelihood that the follicles have bent and may actually be inverted in the wound.

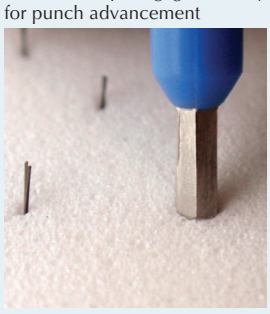
The steps to prevent burial due to improper engagement are the following:

1. Apply skin traction opposite the direction of hair growth. This will allow the punch to make contact with the skin in a more positive way and allow the engagement to occur more quickly.
2. Apply pressure of the punch against the skin enough to create an indentation, but DO NOT advance the punch. Allow the punch to rotate and look for the moment the punch tip, the beveled leading edge (Figure 1), has entered the skin completely. When using SAFE System punches, that moment is when the beveled leading edge has entered the skin (Figure 2).
3. Once the leading edge has entered the skin, the punch can be advanced in a smooth fashion to its full depth.

FIGURE 1. Beveled leading edge

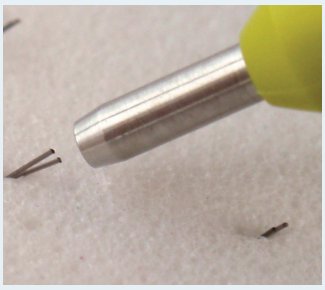


FIGURE 2. Tip "engaged," ready for punch advancement



The second cause of graft burial is when the punch alignment is incorrect and the typical burial results from the punch not being acute enough relative to the skin. The adjustment would be to lower the insertion angle for proper alignment (Figure 3).

FIGURE 3. Proper alignment



HOW TO TREAT BURIED GRAFTS

The first step is prevention, and that would be to follow the guidelines mentioned in the preceding description. These are the steps to treat a "buried" graft:

1. Inspect the punch lumen for a complete extraction.
2. Apply pressure with forceps or fingertips to the skin surrounding the site, especially at the lateral and superior positions.
3. Insert forceps or ATOE extractor into the site and attempt to dilate the site and remove the graft if visible.

If these steps all fail to obtain the graft, I leave them *in situ*. In 14 years of performing FUE and hundreds of thousands of extracted grafts, I have only had to remove 2 problematic cysts. The rate of complications from buried grafts is exceedingly small.

Can scarring alopecies be successfully treated with PRP and/or stem cell therapy?

Robert J. Reese, DO, FISHRS

According to the medical textbook, *Disorders of Hair Growth—Diagnosis and Treatment* (2nd edition): "Clinical features of permanent alopecias include inflammatory and noninflammatory changes. In the late stages of permanent alopecia common histologic features are 1) reduced or absent folliculo-sebaceous units, 2) hyalinization or fibrosis of the fibrous tracts, and 3) ectasia or absence of sweat ducts" (Olsen, E.A. Scarring vs. nonscarring alopecia depends on whether there has been permanent destruction of the hair follicle vs. temporary cessation of hair growth. Chapter 4, p. 76, and Chapter 12, pp. 363-364). Based on Dr. Olsen's description, I do not believe that PRP would be useful for reversing or treating scarring alopecia. PRP is NOT regenerative in nature, but has demonstrated utility for wound healing via neovascularization. Some studies suggest that PRP can, to some degree, reverse the miniaturization process occurring in genetically susceptible follicles, but this possible benefit occurs in anatomically normal follicles.

I do think that PRP could theoretically be helpful to treat early stage cicatricial alopecia by directly reducing inflammation. A biopsy would be needed to see if the process is inflammatory vs non-inflammatory. However, I'm not aware of any study where early onset cicatricial alopecia has been treated with PRP injections in this fashion.

Ken L. Williams, Jr., DO, FISHRS

No study has been performed using regenerative human mesenchymal stem cells (hMSC) on scarring alopecias (SA). The sole existing published study on alopecia areata (AA) using hMSCs was a recent study published by Ibrahim (University of Cairo, Egypt).[1] He evaluated the safety and efficacy of the use of autologous bone marrow–derived mononuclear cells (including stem cells) for the management of resistant cases of androgenetic alopecia (AG) and alopecia areata (AA). Six months after stem cell therapy injections, there

was a significant improvement in hair density, confirmed by immunostaining and digital dermoscopy. The study demonstrated the use of hMSCs therapy to be a safe, tolerable, and efficient treatment for the management of AA and AGA.

There are other studies that suggest that PRP may serve as a safe and effective treatment option in alopecia areata.[2]

We are currently conducting two studies in which we hope to demonstrate the potential safety and efficacy of high-density PRP (HD-PRP), AD-SVF, and emulsified adipose-derived stem/stromal cells (ADSCs) in patients with AGA, SA, and AA. Data from these studies is currently unavailable.

References

1. Ibrahim, Z.A., et al. Stem cell therapy as a novel therapeutic intervention for resistant cases of alopecia areata and androgenetic alopecia. *Journal of Dermatological Treatment*. 2016(Aug); 24:1-30.
2. Trink, A., et al. A randomized, double-blind, placebo- and active-controlled, half-head study to evaluate the effects of platelet-rich plasma on alopecia areata. *British Journal of Dermatology*. 2013; 169:690-694.

What criteria do you use when deciding whether to use FUE or FUT, especially in the young patient?

Arthur Tykocinski, MD, FISHRS

We have to consider that nowadays both techniques cover a similar spectrum of patients and there is a personal preference from patients and surgeons that "bias" the decision. Young patients (under the age of 30) are not the best candidates for any technique: they have higher expectations and less predictable hair loss patterns. Considering we can equally offer both FUE and FUT techniques, we have some obvious decisions to make on young patients, such as the following:

- *Family history of Norwood VI and VII*. I would just perform FUT if the goal is maximum coverage. It is safer to stay inside the most permanent donor zone and leave FUE for when the donor area is more defined. If the goal is just frontal coverage and to use short hair and SMP at the back, then FUE is possible. But, in this case, I would try not to maximize the coverage to avoid donor area depletion.
- *Hair length*. For patients who have very short hair, you have to do FUE. It is best for patients that will have complete bald areas of a maximum of 100cm^2. The problem is that identifying future hair loss is difficult and can be tricky. Be aware of future problems.
- *Undefined baldness*. Uncertain borders yield less predictable future. I tend not to do any surgery on patients with undefined baldness. Microneedling every 3 months could be a nice treatment for these patients to get them engaged, along with topical treatments. It is important to wait until the balding borders are defined to proceed with a more global and definitive approach.
- *Small recessions*. Some patients show up to repair parietotemporal recessions they don't like. Some of them are not actually presenting with androgenetic alopecia, but simply a male adult recession pattern and they feel inadequate. Many patients have a hairline that they never liked and now, with further progression of the recessions, they just hate it. Having no antecedents of baldness in the family or signs of miniaturization at the exam (dermoscopy), they are less likely to develop medium to advanced baldness in the future, making them great candidates for FUE.
- *Well-defined bald areas*. These patients are likely to understand our considerations about the real possibilities. They usually present with lower and more realistic expectations, making them adequate candidates. The more I need to cover, especially if they have good laxity, I tend to go with FUT, leaving FUE for a future second or third session. I prefer FUE for patients with smaller needs or lower laxity who don't improve much with two months of scalp massage. Of course, here personal preferences rules!

Keep your distance from young patients who present themselves as arrogant, ultra experts made from the internet. They believe because they are paying you they can treat you as an employee and say to you, "I don't care about the future." Every word you say, they interrupt to question and they act like a spoiled child! Postpone the hair transplant but never say NO to them… I prefer to tell them: "I am not yet sure about the best approach to your case because it is still changing. We should give you a little time to see how it defines." If the patient agrees and stays under your treatment, the patient will become much nicer and more mature. Otherwise, it is better for the patient to look for someone else. I don't think I've lost a patient. I think I've saved myself from a huge headache!

How do you avoid shock loss in the recipient area?

Sharon A. Keene, MD, FISHRS

The issue of shock loss in the recipient area is easy to avoid in patients receiving grafts in areas with no hair. Frequently, however, hair restoration doctors are asked to augment density in areas of thinning. Over a period of years, I have learned lessons about dealing with "preexisting" hair and planning surgery—particularly with the consideration for the risk of shock loss.

Importantly, patients must be made aware of the risk of telogen, or "shock loss," and the possibility it may be permanent. Graft numbers in a given area must be able to "stand on their own" in the event that hairs "shocked" do not grow back. The following are steps I have come to utilize to help reduce the risk of shock loss.

First, I recommend finasteride to all patients with thinning hair caused by AGA. Even those who may not plan to take this long term are advised to use it for at least 6 months to a year after surgery—and to start it at least a month prior to surgery. If they tolerate it for 6 months, many will continue to use it for stabilization. This may help make miniaturizing hairs last at least another growth cycle.

Second, I rarely use epinephrine in any of the tumescent fluid I inject. Although there are no studies to indicate this makes a difference, it seems likely if the trauma of surgery causes shock loss, some of that is due to vasoconstriction from wounding. I therefore avoid the vasoconstricting effects of epinephrine except for local anesthesia. Instead, I use plain saline with anti-inflammatory medication (kenalog).

Finally, recipient sites I create are depth-controlled, sagit-

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tal incisions in areas where there is preexisting hair in order to avoid under cutting hair follicles and to reduce damage to underlying vasculature. Determining per square centimeter density is akin to walking a tight rope—higher density creates more trauma and probably risks more shock loss; however, placing lower density can still result in loss of miniaturized hairs, and if insufficient grafts have been placed the end cosmetic result will be too thin.

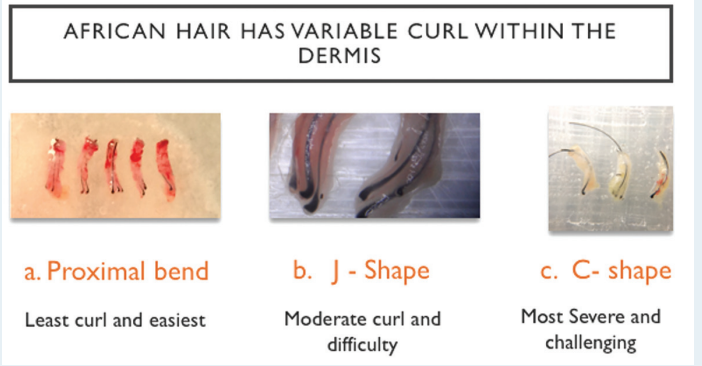
Placement of grafts in areas of visible thinning must always take into consideration the risk that preexisting hairs will be lost—and this may also provide a less visible appearance of change in density. Patients should be counseled about this in advance. Some will be happy to know that they have supplanted healthy hairs for those that were vulnerable. Others will want to plan for higher density despite the increased risk of shock loss in order to ensure improved cosmesis. This is especially true for female patients who seem more sensitive to permanent loss of hair from surgical shock loss.

What FUE techniques are used for patients of African ancestry?

Robert H. True, MD, MPH, FISHRS

Standard FUE techniques must be modified to be successful when treating patients of African ancestry. The main reason is that the hair curl that is observed externally is also present internally (under the skin). The degree of internal curl varies from slight, to a distal hook or "J" shape, or to an extreme proximal curl or "C" shape (Figure 1). All curls are more difficult than straight hair to extract without transection, but the most difficult is the extreme "C"-shaped internal curl.

FIGURE 1. Variable curl of African hair



After trial and error using different techniques over the past 15 years, I have settled on a technique that consistently produces high-quality grafts with minimal transections in African patients (Figure 2). The components include:

1. Using the hybrid trumpet punch and oscillating motor developed by Dr. Jean Devroye.
2. Using 0.9 and 0.95 diameter punches.
3. Recognizing that the internal curl is a continuum of the external curl in direction and shape (Figure 3).
4. Aligning the punch near vertical for initial penetration (Figure 3).
5. Aligning the targeted hairs toward the front of the punch rather than the center (Figure 4). This allows deeper punch penetration.

While sharp punches can be used in African hair, the punches must be inserted very shallowly, especially with C curls, or transection will occur. Thus, more force is required to remove the grafts risking trauma in the process, and the lower portion of the follicles are stripped of any tissue making them more vulnerable during storage and placement. The only way to get around this with a sharp punch is to go "large"—1.1 or greater diameter—and the negative consequence of this is larger scars in the donor area.

FIGURE 2. Typical grafts



FIGURE 3. Proper alignment and orientation with curl

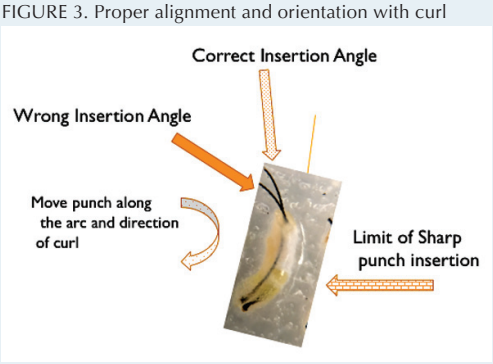
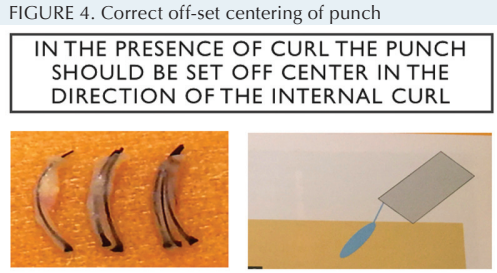


FIGURE 4. Correct off-set centering of punch



With the hybrid, it is typically possible to go 3-4mm deep without transections and the grafts are easy to remove and have tissue protecting the lower portion of the follicles. With this approach, I feel that African patients are usually easy and ideal patients for FUE. We get great healing with the 0.9 and 0.95 punches, and we get a lot of grafts with 3-4 hairs producing great results for the patients.

How do you deal with an unhappy patient?

Lawrence Samuels, MD, FISHRS

It is important to find out why the patient is unhappy. There are times when the unhappy patient begins by what went wrong with his or her transplant. I try not to be defensive, but rather I try to find out what I can do to make the patient happy. Many times, it just involves education about expectations and the time needed to see results. However, there are patients who have specific issues about the transplant that cause them to be disappointed. My response is, "What would you like me to do to correct the problem?"

Typically, the most common complaint is patients feel they did not get the coverage or density they expected. Issues such as pain, folliculitis, itchy scalp, and others can be treated and rarely create an unhappy patient. Once I understand why the patient is unhappy and what he would like, on my part, to remedy the situation, I have to address

a solution in a non-confrontational manner. In the unhappy patient world, they see the solution as a refund, free grafts with another surgery, or both. Again, I try not to be confrontational or defensive, but rather I try to assess what I believe to be the psychology and behavior of the patient. I discuss what I feel would be the best option to make the patient happy. I feel with education and the medical treatment available today, such as PRP, topical follicle stimulators, low level laser light treatment, and Propecia®, I can offer the patient treatments to stimulate growth and provide more time for transplant results. There are times when a small area does not create the results desired by the surgeon, and in my career I have put in a few extra grafts for free, but the norm would be another surgical procedure to create more coverage and density but with some extra free grafts.

Dr. Sam Lam lectures that education is something you tell the patient before the transplant and excuses are what you tell the patient after the surgery. This means the best way to deal with the unhappy patient is to educate the patient prior to the surgery so you avoid the unhappy patient. I have not had an unhappy patient that I could not make happy, however, if I had a situation where a patient was not happy or satisfied, the ISHRS has colleagues who I would not hesitate to call for advice and who would be happy to assist advising me of other options to make the patient happy.

Which complications can I expect from FUE, and which are the most common?

Paul Shapiro, MD, FISHRS

When learning FUE, the most common complication is low graft yield. This can be due to high transection rates, capping, and/or burying grafts.

The physician needs to learn the right angle, correct depth, and sufficient force to apply to the punch to avoid transection. High transection rates happen when trying to get too many grafts for your skill level. Initial surgeries should be kept small, about 500 grafts, and as you get more skilled, continue to increase the number of grafts per session.

Capping occurs when the top part of the graft comes off leaving the rest of the graft behind. Due to fear of transection, the physician does not go deep enough with the punch. It is difficult to eyeball the ideal depth the punch should go. To aid inserting the punch to the correct depth, the physician can put surgical tape around the punch to mark the correct depth. Also, many punches or FUE mechanical devices come with depth limiters. Capping can also occur when the grafts are removed with too much force or in directions not aligned with the angle of the graft. Technicians must be properly trained to remove grafts.

Buried grafts occur when grafts are accidentally pushed under the skin using a dull punch. If left under the skin, these grafts can cause ingrown hairs or cyst formation.

There is the possibility of a smaller percentage of the FUE grafts surviving compared to FUT cases due to the fragility of the grafts. FUE grafts often lack the protective tissue that surrounds FUT grafts, and they are more easily damaged when planting. I tell patients that it is possible to get the same survival as in FUT, however, there is greater likelihood of suboptimal growth in our FUE cases.

Shock loss can occur in the donor region. Usually it is minimal or mild, but occasionally it can be severe and the donor area will look depleted. Severe shock loss is rare, and in the 10 years we have been performing FUE, we have seen it two times. In both cases, all the shocked hair grew back. Shock loss is more common in large cases.

Hypopigmentation can also be a complication. In most cases, the donor scarring of the small punches is minimal and difficult to see. But in some cases, there is hypopigmentation of the scars. The white dots of hypopigmentation will be visible if the donor hair is cut too short. Hypopigmentation is more common when using larger punches and in patients with darker skin.

Lastly, overharvesting also can cause complications. If too many grafts are harvested, the donor site can eventually have a moth-eaten appearance and the advantage of minimal scarring with FUE is lost. Also, in order to get higher yields, it is tempting to harvest outside the safe donor area. This may appear normal at first, but there is the possibility with future hair loss there will be no hair to cover the small round scars from the punch. Another way of overharvesting is to take too many grafts from a small area of donor scalp. When doing a small session, it is tempting to take all the grafts from this small area. That area of donor will grow back thinner than the surrounding donor, and this difference in density can limit how short the donor hair can be cut. It is better to try and spread the extractions out over the entire donor area when possible.

What is the best treatment for frontal fibrosing alopecia, and if and when should it be transplanted?

Bernard Nusbaum, MD, FISHRS

Generally, our treatment protocol for FFA consists of the following three steps:

1. Orally administer finasteride (2.5-5mg) or dutasteride (0.5mg) daily.
2. Use minoxidil foam 5% topically in the morning (it is becoming apparent that follicles that have not been completely obliterated can be "rescued" and some regrowth achieved).
3. Use tacrolimus 0.1% ointment at bedtime.

We try to avoid high-potency topical steroids, such as clobetasol or intralesional steroids, as the frontal hairline skin is already atrophic in this condition. Intramuscular kenalog can be administered in some cases, especially if significant signs of inflammation are evident. As clinical signs of inflammation are often difficult to discern, follow-up should include dermoscopy and also measurements of frontal and temporal hairline position from landmarks in addition to photographs.

There is much debate regarding transplants in these patients. Post-transplantation, grafts can grow well, only to be lost 18-24 months post-surgery, presumably due to disease re-activity. If transplants are considered, I believe there should be a longer time interval (3-5 years) of observation without demonstrable disease activity as compared to the usual 12-24 months empirically recommended for other scarring alopecias. In addition, patients who undergo

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transplants need to be compliant and continue to adhere to their medical therapy regimen. Lastly, test grafting should be undertaken prior to embarking on a larger transplant session.

How do you prevent postoperative infections following hair restoration surgery?

Steven Gabel, MD, FISHRS

Postoperative infections following hair restoration surgery are rare, and the use of perioperative antibiotic prophylaxis has been debated for years. However, if a patient develops an infection in the transplanted area, it could have devastating consequences on the outcome of the surgical procedure resulting in poor growth, the loss of transplanted hairs, and scar formation. Furthermore, if the patient happens to develop an infection with MRSA, the treatment may require a prolonged course of antibiotics and wound care that the patient and physician were certainly not anticipating or desiring.

To help minimize the risk of a postoperative infection, I have developed specific preoperative and postoperative guidelines that have minimized the incidence of infection in my practice. Starting the evening before surgery, I have my patients remove any make-up and shampoo their scalp for at least 3 minutes with regular shampoo. In the morning prior to arrival at the office, they will shower and shampoo with regular shampoo. When the patient arrives to the office, my staff will assist them in performing a 3- to 5-minute shampoo using 4% chlorhexidine gluconate (HIBICLENS®) being very careful to avoid any contact with the patient's eyes.

Next, we have the patient start oral antibiotics the morning of surgery. If the patient does not have a history of MRSA, then we start a 5-day course of cephalexin. If they have had a history of MRSA, or if I feel they are at greater risk of developing the MRSA infection (i.e., they are a healthcare worker), I will use either clindamycin or trimethoprim 160mg-sulfamethoxazole 800mg. In the operating room, we use a surgical scrub of chlorhexidine gluconate on the donor and recipient sites.

Most importantly, after the procedure, we review how to care for the recipient and donor areas, and stress the importance of hand washing prior to cleaning these areas. My staff and I educate the patient on the signs and symptoms of an infection (redness, pain, drainage), and ask them to report these to the office immediately if they should occur. ■

Dr. James Harris FUE Instruments

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Meeting Review

Review of the 1st Congress of the Sociedad Ibero-Latinoamericana de Trasplante de Cabello (SILATC) September 27, 2016 | Las Vegas, Nevada

David Perez-Meza, MD, FISHRS | *Benalmadena, Malaga, Spain* | drdavid@perez-meza.com

MISSION ACCOMPLISHED

Finally, after several years of preparations and cancelations, the 1st SILATC (Iberolatinamerican Society of Hair Transplant Surgery) meeting was held in Las Vegas, Nevada, in conjunction with the annual ISHRS World Congress.

Thank you to the ISHRS BOG and specifically to Dr. Sharon Keene (ISHRS Immediate Past President) for believing in my proposal to organize a Global Council Society meeting for the first time during the same week of the ISHRS annual meeting. It was a win-win situation for both societies and history was made.

SILATC Board *(l to r):* Dr. Luis Ortega (Vice President), Dr. David Perez-Meza (President), Dr. Bruno Szyferman (Secretary), Dr. Luis Nader (Treasurer)



I want to thank the co-chairs of the meeting, Drs. Bruno Szyferman, Alejandra Susacasa, and Nicolas Lusicic, and the Organizing Committee, Drs. Luis Nader (SILATC Treasurer) and Erika Elizondo-Nader, for their tireless dedication to the meeting.

We had 80 participants including 17 faculty members; participants came from 15 of the 22 Spanish and Portuguese countries of Ibero-Latin America in addition to the United States, Puerto Rico, and Israel. The speakers presented their lectures and sessions in their own "language," Spanish or Portuguese, and this simple but important detail was one of the highlights of the meeting as the faculty was able to approach the topics without language barriers and we were able to understand one another without any translating issues.

According to the ISHRS's 2015 Practice Census, there was a noticeable increase in hair transplant surgeries in Ibero-Latinamerica from 2012-2014. So, the SILATC members were interested in sharing and learning about new techniques, new concepts, new medications, and new treatments from our region and around the world.

Our hair loss patients in Ibero-Latinamerica include multiple racial groups such as Caucasians, those of African descent, mestizo (indigenous and Europeans), and all mixes that you can imagine. So, with different scalp and hair color, hair characteristics (wavy, straight, curly), face and scalp shapes, etc., and hair loss causes, it is critical to keep those in mind for hair loss treatment and surgical planning.

I organized and divided the meeting into nine modules to discuss all the topics of hair loss, hair restoration, medical and non-medical treatments, research, and complications and difficult cases.

The first module included the initial critical aspect of the consultation, hair loss etiology, scarring, non-scarring alopecias, and ethics. The second module included donor harvesting with strip and FUE techniques. The third module concentrated on the recipient area while the fourth module went over alternative treatments for hair loss including treatment with PRP, the use of autologous fat transplantation, and stromal vascular fraction (SVF) with and without PRP. Two studies about the use of low Level laser therapy (LLLT) for hair loss patients and after wound healing following hair transplant surgery were presented. During the fifth module, clinical cases were presented.

SILATC faculty



The sixth module was organized by Dr. David Perez-Meza and covered the six steps of hair restoration surgery. The seventh module was about difficult cases and the eighth module discussed complications.

Each session and panel included a Q&A from the audience. The meeting always had great communication and camaraderie between the moderators and panelists with the audience.

A Latin cocktail party was the perfect ending to our meeting. Thank you to everyone who participated in the 1st SILATC meeting. ■



A LIFE CUT SHORT
Jonathan L. Ballon, MD, FISHRS
6/11/51—4/30/17

Melvin L. Mayer, MD FISHRS

Jon has been part of the ISHRS family since 2005. He chaired the Basics Course in 2012 and 2013, has participated as a panelist and speaker at multiple meetings, and has served on numerous ISHRS committees. He is known by many of us for his keen mind, and his passion for performing hair transplant surgery with the utmost care for his patients. His great sense of humor to go along with his warm personality will persist in our memories. There has not been a better example of an ethical, quality hair surgeon as Jon.

Jon passed quietly at home with his wife Linda in Alpharetta, Georgia, on Sunday, April 30, after placement of a coronary artery stent the previous week.

Jon graduated with a degree in psychology from Oberlin College in 1974 and received his MD from New York Medical College 1980. Following medical school, he pursued residency training in neurosurgery at the University of Connecticut where he was Chief Neurosurgical Resident his last year and continued as Assistant Clinical Professor from 1987-2004. He told me he was the first surgeon in the state of Connecticut to perform endoscopic cervical discectomies.

It was in 2004 that Jon was accepted by Matt Leavitt, Director of the MHR Hair Transplantation Fellowship, and he completed his training with Carlos Puig, Bob Niedbalski, David Perez-Meza and me. He stayed on with MHR until 2009 when he transferred to Hair Club until 2013 after which he transferred to Bosley Medical. In 2014, he founded Aesthetics Hair Restoration in Alpharetta, Georgia, where he practiced until his death.

Jon had other interests outside medicine. He loved animals, especially dogs. He volunteered at Canine Assistants in Alpharetta to help adapt dogs to become service dogs for the disabled. He was a Founder of "Bikers for the Cure" (to benefit the Susan G. Komen Breast Cancer Foundation). In Connecticut, he had served on the Board of Directors of the Connecticut Affiliate, Susan G. Komen Breast Cancer Foundation.

Excerpts from numerous emails that circulated upon news of his passing magnified the love and respect that we all had for Jon:

Sara Wasserbauer: "Jon was so encouraging. He had a great laugh. He and I would steal each other's jokes to make to patients during hair surgery (It ain't brain surgery… but it is thiiiis close!)

Matt Leavitt: "I am deeply saddened to let you know that we have lost one of our family members. Jon Ballon passed away yesterday. It was unexpected and sudden; we have lost a vibrant part of the MHR and hair restoration community."

David Perez-Meza: "He was a great MHR Fellow, very respectful and always listened to advice. He participated at several OLSWs including his last one in 2014. He was a great human being, great neurosurgeon and hair surgeon. Rest in peace."

Grant Koher: "I spoke to Jon on Thursday after hearing the news from Valerie and Dr. Rodillo (stent placement). He was resting at home and in good spirits. He and I laughed over past experiences. We agreed to talk later this week about the conference. A great friend, wonderful personality and excellent surgeon. Very sad news. You will be missed by many. RIP my dear friend."

Cary Feldman: "Jon's death is a surprise to us all. Our society and colleagues have lost a very special friend and teacher."

Duncan Simmons: "He was my good friend!"

Victoria Ceh: "I was just talking about him last week at an ACCME conference I attended. We were talking about bringing together different specialties to further medical education, and I was bragging about the ISHRS and its multi-specialty nature. I specifically thought about Jon and mentioned to my small group about our 'neurosurgeon member' who brought insight into transplanting individuals who had previous neurosurgery and titanium skull implants, and how his knowledge and contributions furthered the field. The ISHRS staff loved him, and he will be dearly missed."

Ken Washenik: "I noticed Jon's name on the attendee list for the 2017 Orlando Live Surgery Workshop and looked forward to seeing him. It was always one of his favorite meetings. When I got home, I found out that our field had lost a wonderful contributor and that I had lost a good friend who I had gotten to know through our lives in hair. Patients and doctors loved Jon. He was a warm, engaging man with a giant brain and giant heart. You are already missed my friend."



Jon with Eugene Rodillo

The ISHRS community of hair surgeons is truly a worldwide family that when one is lost, we are saddened. May we all find strength in our professional and personal relationships as well as our faith. ■

Celebrating Its 25th Year: A Look Back to Where It All Began

ISHRS Dallas 1993: An Eye-Opening and Life-Changing Experience for Me and for the World of Hair Transplantation

Robert T. Leonard, Jr., DO, FISHRS
Boston, Massachusetts, USA

I began in the field of hair restoration surgery in 1986 having been trained by the late Dr. C.P. Chambers, a true pioneer and innovator in our field. The problem was that Dr. Chambers, though he trained a large number of currently very famous and respected surgeons, never attended meetings until many years later. I, therefore, had never learned of any formal educational programs in hair transplantation.

Fortuitously, I somehow heard of a new society being created with its first meeting to be held in Dallas, Texas, in 1993. I searched for information about it, which was a lot more difficult in those pre-Google days! I tracked down Dr. Dow Stough and offered my help in organizing the meeting. I became the first Exhibits Chairman for the International Society of Hair Surgeons.

What an exciting meeting for me to meet and to learn from other hair surgeons who utilized very different methods than I had been using. A nice thing for me, however, was to discover that some of Dr. Chambers' techniques I was performing were superior to what I was seeing in lectures.

As a young surgeon in this field, it was truly exhilarating for me to meet and to share ideas with giants in the field! In recalling some of the presentations, particularly about flap methods and scalp reductions, it amazes me that they had been commonplace then and are nearly extinct today. Also, this meeting predated Propecia® and low level laser therapy (LLLT), which are critical today in treating the progression of androgenetic alopecia. Just think about how much they have helped us to provide better results for our patients.



Please note: Sajjad Khan was incorrectly identified as Damkerng Pathomvanich in this column on page 74 of the March/April issue. We sincerely apologize for any confusion this may have caused.

Socially, what an event! I learned what Texas formal was: the upper half of a tuxedo and the bottom half consisting of blue jeans and cowboy boots accompanied by the requisite cowboy hat. To this day, I have the hat and boots I bought in Dallas 25 years ago. Medicine wasn't all that we were practicing in Dallas as we all went to a huge dance hall to learn and to practice line dancing and the Texas two-step… it was a new and exciting experience for this Boston boy!

The incredible and long-lasting result of this meeting was the establishment of the International Society of Hair Surgeons, which was soon changed by the initial Board of Governors to the International Society of Hair Restoration Surgery. I was blessed to have been elected the founding secretary and became president two years later. It has been a great honor and sincere pleasure to be closely involved with the ISHRS for all these years.

Finally, and most importantly, I established lifelong friendships that I dearly cherish a quarter century later. Happy Birthday, ISHRS!

Has the ISHRS changed the world of hair restoration?

Richard C. Shiell, MBBS | *Melbourne, Australia*

PRELUDE

A privately organized meeting with live surgery was convened in Rio de Janiero in October 1992 by Dr. Wagner de Morares. In addition to Mexican and South American participants, he invited an international faculty from the United States, Canada, the United Kingdom, France, Austria, and Australia. During the three days, it became apparent to us all that hair transplantation was not a North American "fad" but of truly international concern. Furthermore, we had board certified specialists from many disciplines mixing on equal terms with earnest transplanters with minimal surgical qualifications or, as in one case, no medical qualifications at all.

FORMATION OF THE ISHRS

Things were moving quickly, and because of an invitation issued in September 1993 to a four-day meeting in Dallas, Texas, 430 including 80 Assistants assembled at the Grand Kempinski Hotel, which I described in the March/April issue of the *Forum* in this same section (The ISHRS: It's Evolution and Foundation, pp. 74-75).

INFLUENCE OF THE INTERNATIONAL SOCIETY

By 1993, traditional 4mm "plug grafts" and "quarter grafts" had virtually disappeared. Minigrafts, dissected with the aid

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of magnifying loupes from scalp strips, were being planted in ever-increasing numbers per case, and 1,000-1,200 grafts were not unusual. Some surgeons had even adopted Bobby Limmer's meticulous dissection techniques using binocular dissecting microscopes to isolate the follicular units of 1-4 hairs. This later became known as follicular unit transplantation (FUT).

The rapid exchange of ideas in the *Forum* and at meetings plus the success of the megasession techniques helped seal the fate of flaps and scalp reductions, the popularity of which had been declining for a decade.

SPREAD OF NEW TECHNIQUES

Multi-blade scalpel handles for harvesting **donor strips** seemed a great idea. These developed from 2 blades spaced 10-20mm apart to 10 blades spaced 2mm apart yielding 9 narrow strips that could be quickly dissected allowing for rapid graft production. This technique was difficult to master and there was a high follicular transection rate, particularly in the lower strips. Five blades creating four 2mm strips became the most favored compromise. By the mid-1990s and after the formation of the ISHRS, meticulous microscopic dissection of follicular units from a single strip had become the "Gold Standard" and anything less was declared to be *"Follicular Holocaust."*

While this was being debated, follicular unit extraction (FUE) burst on the scene, was refined, and was eventually accepted as an alternative to single strip harvesting. This was a return to punch grafting using punches as small as 0.8mm in diameter with much debate over whether these should be sharp or blunt (or a mixture of both), and hand or machine operated. Everyone agreed that the technique was exceedingly difficult to perform, but some surgeons managed to get their transection rate down from 30% to a very commendable 1.2%. At the same time, the expensive ARTAS® robotic machine was being developed to select and cut the tiny grafts to pre-set specifications. This concept that the difficult selection and extraction of follicular units could be delegated to a machine by surgeons who may not have the ability to do the same procedure by hand in the event of a breakdown is still very much debated.

SOME TECHNIQUES SLOW TO BE ACCEPTED

While some new concepts were grasped and adopted with alacrity, others were slow to be adopted and have faded from the scene. The rapid interchange of ideas within the ISHRS has been largely responsible for this.

Alopecia reduction was quick to gain acceptance from the late 1970s, but within a few years the drawbacks were being recognized. Many attempts were made to circumvent these problems over the next decade. Despite several favorable papers, the Frechet Triple-Flap and Extender techniques failed to attract more than a small group of devotees. This was principally because they were difficult to perform and alopecia reduction had become less popular with surgeons and was being gradually replaced by small-graft techniques.

Implanters were also introduced. Dr. Y.C. Choi of South Korea presented his implanter at the ISHRS inaugural meeting in May 1993, but its use has remained mostly in Asia. Several variants of the Choi device are now available and there have been many improvements. It was recognized early on that implanters enabled fast and efficient placing, and in countries where the placing could be done by non-medical assistants, the constant attendance of the surgeon in the operating room was not necessary at all stages of the operation.

Left to right: Daniel Rousso, Marcelo Gandelman, and Bob Limmer — 1993



COLLEGIALITY

Surgeons performing the same techniques in the same city are competitors for clients, but this does not mean that they should be enemies. On the contrary, by becoming friends and sharing our knowledge at the ISHRS's annual congresses and other meetings, together we can "lift the bar" on standards for the entire city or state. By increasing the acceptance of the procedure, it is possible to ensure that there is more work for everyone. The advent of the ISHRS and regional hair transplant societies brought many rivals together and lifelong friendships have resulted. It is only now, when I have been retired from these meetings these past 10 years and many of my old surgical buddies have died, that I realize how much I gained from my 40 years of hair transplant collegiality. This was particularly the case after the formation of the ISHRS in 1993.

A Little Piece of History

William R. Rassman, MD | *Los Angeles, California, USA*
Russell Knudsen, MBBS, FISHRS | *Sydney, Australia*

The ISHRS was formed in 1993 by a young dermatologist in Arkansas named Dow Stough, and it went head on for the educational market against established competitors from the AACS (American Academy of Cosmetic Surgery), AAFPRS (American Academy of Facial Plastic and Reconstructive Surgery), ASPS (American Society of Plastic Surgeons), and the dermatology meetings. These "Craft Unions" continued from 1993-1995 until the recognition of large sessions of small grafts gained traction. In parallel with this ISHRS growth, the scalp reduction and flap surgeries as a primary treatment for genetic hair loss started to wane. In 1993, new doctors entering hair restoration were confronted with too many surgical options, some requiring more surgical skills than others. By 1995, the recognition that large sessions of small grafts were a reasonable primary surgical treatment for genetic balding moved physician presentations at the meetings more and more in the hair transplant direction. The first major live patient viewing of megasession results was

presented in 1995 in Las Vegas and it changed the field. New doctors from multiple backgrounds found something that they could learn and manage in developing a hair restoration practice. Surgeries that used many small grafts became the easiest and most favored technique because results were better and the surgery was easier to do. These grafts could also be done in anyone's office without a lot of experience. More complicated surgeries that were more difficult, took more experience to perform, and needed to be done in a hospital operating room, like flaps, reductions, and lifts, were done less and less as they fell out of favor. These surgeries are rarely done anymore.

Over the years since, the ISHRS has produced a more well-focused teaching agenda around follicular unit hair transplantation, first by strip and eventually by FUE. The reach of the ISHRS, which started as a more limited U.S.-based organization in 1993, has become progressively internationalized. More doctors from around the world attended these meetings and solidified the role of the follicular unit transplant. In 1995, the ISHRS purchased the *Hair Transplant Forum International* newsletter from O'Tar Norwood for $50,000, which he promptly donated back to the ISHRS to be used for educational purposes. With the ISHRS and the *Hair Transplant Forum International,* hair restoration surgeons worldwide could participate in the technical and aesthetic progression that has driven the field that we know today. ■

Left to right: Patrick Quinlan, Dow Stough, O'Tar T. Norwood, Robert Leonard, and Paul Straub — 1993





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Message from the ISHRS 2017 World Congress Program Chair

Jean Devroye, MD, FISHRS | *Brussels, Belgium* | prague2017ishrs@gmail.com

The warm weather arrives in Europe, and the 2017 ISHRS World Live Surgery Workshop and World Congress are coming very soon!

As you know, the World Congress will take place in Prague from October 4th till October 7th 2017, while the World Live Surgery Workshop (LSW) will take place in Polanica Zdrój, Poland, on October 1st and 2nd.

We did receive many propositions for abstracts, posters, videos, and live patient viewing cases.

The subjects of the sessions are almost all chosen. There will be, among others, the past, the present, and the future of cell therapy, a large session of videos, and different sessions about FUE news, innovation and research, concomitant therapy, difficult cases, corrective procedures, storage solutions, implanters, long hair FUT, and FUE.

Particular attention will be paid to the posters. Some of the submitted topics are very likely to be converted into posters. This year there will be a session for the poster authors to defend their topic, and comments on very interesting ones will also be made during the general session.

Last year, the portion reserved for mini-courses for beginners or intermediate levels, workshops, lunch symposia, and discussion table topics was such a huge success that the next meeting will continue in this direction.

Among the featured invited guest speakers, already confirmed are Dr. Dominique Van Neste for a very interesting topic regarding the difficulty to judge the evolution of a hairy zone, and also Drs. Claire Higgins, Tom Dawson, and Ralf Paus.

New techniques will also be described, such as PRP, injection of ACell, and the use of oral minoxidil or of finasteride in solution.

As the FUE session will be largely developed in Polanica Zdrój at the World Live Surgery Workshop on the days preceding the congress, the FUE session will also consist in a summary of the best moments and tips given during the workshop. Another session—FUE News—will be directed by Bob True.

For FUE lovers, I warmly recommend you to reserve your seat for the LSW in Polanica Zdrój on October 1st and 2nd from now on.

For assistants, remember we have a robust Surgical Assistants Program, and this year's chair is the wonderful Emina Vance. There is also a limited-seating Surgical Assistant Core Skills Workshop (hands-on) being led by vice chair Salome Vadachkoria.

We have also on Wednesday many activities: the Basic Courses for beginners, the Advanced/Board Review Course for experts, an FUE Mini Course, SMP Mini Course, and Half-Day Course on a variety of topics.

I am delighted to have you all gather in this wonderful city of Prague and attending the big mass of hair transplantation surgery, marked with a sharing and conviviality spirit. And I am especially delighted to see that year after year, the search for quality is the main purpose of our organisation. ■

Congratulations to David Perez-Meza, Matt Leavitt, Ken Washenik, Eugene Rodillo, Valarie Montalbano, and the entire Orlando organizing team!

In case you missed it!
In the next issue of the *Forum*…

Highlights from the ISHRS's 21ST ORLANDO LIVE SURGERY WORKSHOP
April 26-29, 2017



OLSW21





Message from the 2017 Surgical Assistants Chair

Emina Vance | *Plano, Texas, USA* | emina@hairtx.com

As we are finalizing the program and confirming the faculty, I am proud to say that we are getting ready for another great meeting. A very important part of creating this year's program is that I'm working with two amazing people, Dr. Ken Williams and Salome Vadachkoria, whose passion for hair restoration and teaching are immeasurable. I am excited to share that we have assembled an amazing faculty from five continents. My hope for the program was to engage a larger international faculty and the response I got from surgical assistants around the world willing to participate and serve as faculty exceeded my expectations.

This year, we are revamping the program so that the workshop focuses on the novice and the main program on the experienced assistants. Over the years, I organized and led many programs and workshops always focusing on beginners. Creating a program that is engaging for seasoned assistants but not excluding the beginners was a challenge. While reflecting on previous meetings and the memorable things I have learned over the years, I realized that it was often the little things that made a difference, such as a new instrument, a different way to sort grafts, or a better way to structure surgical flow. So, this year's program is filled with pearls, the tricks of trade that may not be revolutionary for the industry but could certainly make a big difference in one's practice.

As many of us are visual learners and not everyone is proficient in English, the program is filled with pictures and videos. The first part of the program, called *Assisting Around the World*, features videos of surgical setups from hair transplant practices in the United States, Brazil, Belgium, the Philippines, and Australia. Imagine being able to visit five offices at the same time! The middle part of the program is titled *New or Improved,* and has physicians and assistants present on various topics relating to a new or a better way of performing our tasks. Finally, the last two sections are *Quality Control* and *Interesting Surgical Cases*. I sincerely believe that the program should be interesting and enriching for all attendees regardless of their skill level, and I sincerely hope that you and your assistants will find it of value. ■



Message from the 2017 Surgical Assistants Vice Chair

Salome Vadachkoria, BBA, MBA | *Tbilisi, Georgia* | salomevadachkoria@gmail.com

I am happy and honored to have a chance to serve as vice chair and lead the Surgical Assistants Core Skills Workshop. I remember when I was a newcomer how welcomed I felt, and ever since the ISHRS has become my family. I am sure that if you have attended an ISHRS meeting at least once, you have experienced this magical feeling of being received by your peers. I will always remember my first visit.

The Surgical Assistants Core Skills Workshop will be offering innovative models created with the leadership of Emina Vance, which has become an evolutionary standard for practical teaching. The workshop is designed to teach students the basics in assisting in hair restoration surgery, and it gives every participant the opportunity to get involved in practical education. The students will receive immediate feedback from experienced faculty members as they learn and practice tissue slivering, graft dissecting, graft placing, and graft removal after FUE harvest. They will learn tips and tricks and demonstrate critical thinking in all of these aspects. As is the theme of the meeting, we will focus on quality control in all of the steps of which the assistant is involved in hair transplantation surgery.

We would like to encourage hair transplant surgeons attending this year's meeting in Prague to bring their assistants, and we encourage you to become more involved in the most important meeting of the year in the field of hair restoration. I am looking forward to seeing you in Prague. ■

2018 ISHRS World Congress!

MARK YOUR CALENDARS

October 10-14, 2018 (Wed.-Sun.)

26th ISHRS World Congress

Hollywood (Los Angeles), California, USA





Message from the ISHRS 2017 World Live Surgery Workshop Program Chair

Arthur Tykocinski, MD, FISHRS | *São Paulo, Brazil* | arthur@cabelo.med.br

FUE Immersion is on fire! Think unique program—and "go for it"!

Ten surgeries with multiple demonstrations and "revealing" tricks… Not enough? Then check out the program below; it is based on dialogue and discussion panels to present all the shades involved in the FUE technique. There is no absolute truth. There are no gods; no one right way. We are looking to new horizons. Having an open mind is the only way to ensure continued learning and the progressing of any technique. We can all fail, but if we strive to do our best, we will always keep learning.

Now, for the first time, below is a preview of the program. ■

Saturday/September 30, 2017

3:00PM–6:00PM **Basic Course I: FUE Immersion**

- FUE History Overview
- Basic Concepts on FUE and Nomenclature
- Follicular Unit Anatomy and Anchoring Attachments
- Punch Types
- Loupes and Vision
- Donor Area Limits
- Position Yourself: Body and Hand Stable Positions
- Staff and Patients Ergonomics/Comfort
- Incision Techniques and "Feeling" the Attachments
- Follicular Unit Dissection and Depth Control
- Different Extraction Techniques
- Handling the Extractions: Where to Touch, Where Not to Touch and How
- Tips on Extractions
- Complications and How You Avoid Them

6:30PM–8:00PM **Welcome Cocktail**

Sunday/October 1, 2017

7:00AM–8:35AM **Basic Course II: FUE Immersion**

- Donor and Recipient Areas Anaesthesia and Safety; Ring, Nerve Block, and Tips from My Experience
- Donor Area Approach: Higher and Lower Limits, Extraction Pattern and Rate, Strategy in 3 Sessions and Intervals
- Hair Mass Concept and Coverage Index, Math on Hair Mass and Donor Area Evaluation,
- Recipient Area Planning, Tips and Advice

8:45AM–12:20PM **Advanced FUE Immersion WLSW: Day 1**

- Dialogue Panel 1 – We Are Surgeons, Not Gods: Being Humble, Changing Concepts Over Time, Learning from My Mistakes
- Debate Panel 2 – Patient Selection: Ideal FUE Candidate, Is finasteride enough to stabilize baldness? Not a Good Candidate for FUE: Grey Zone
- Debate Panel 3 – Transection Rate: Evaluating and Counting It, Can we rely in regrowth? What Is Acceptable, How to Minimize It
- Debate Panel 4 – Punch Types, Movements and Speed: Go Sharp Manual (with oscillation or without oscillation), Go Sharp Motorised (rotation or oscillation), Go Blunt with Rotation, Go Hybrid with Oscillation, Adding Suction
- Dialogue Panel 5 - Exhausted Donor Areas: Why It Happens, Limits to Avoid It, Treating the Problem, Dealing with Severe Depleted Donor Areas

12:20PM–1:30PM **Lunch**

2:00PM–6:00PM **5 Surgeries; many techniques demonstrated and grafts analyzed; hands-on stations at exhibit tables**

8:00PM **Folk Party in Park**

Monday/October 2, 2017

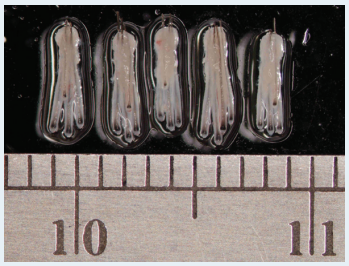
8:30AM–12:20PM **Advanced FUE Immersion WLSW: Day 2**

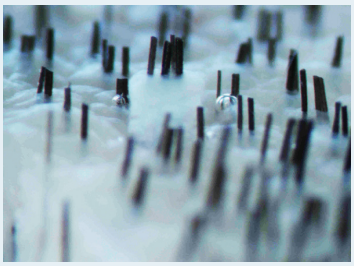
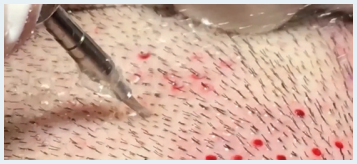
- Debate Panel 6 – Reasonable Limits: Donor Area Limits in Size and Numbers, Punch Size and Selection, Session Size and Duration, Intervals Between Sessions and Total Number of Sessions
- Debate Panel 7 – Combining FUE and FUT: All FUE Ends in FUT and All FUT Ends on FUE? I Never Combine, Pure FUE, I Mostly Start with FUT, Combining FUE and FUT in the Same Session, Reasons NOT to Combine FUE and FUT in the Same Session
- Dialogue Panel 8 – Beard and BHT: Beard to Beard: Technique and Tips, Beard to Scalp: Technique and Tips, BHT: Sources and Technique
- Dialogue Panel 9 – Implanters Basics: Implanter Concept and Advantages, Different Models, Handling and Adjustments, Using Forceps, Not Implanters
- Dialogue Panel 10 – Graft care: Storing and Handling the Fragile FUE Grafts, Grafts Analysis and Classify on This WS
- Dialogue Panel 11 – New Trends: Hybrid punch, Sharp Implanter Fever, Dull Implanter Technique, Long Hair Preview FUE

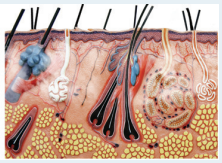
12:20PM–1:30PM **Lunch**

2:00PM–6:00PM **5 Surgeries; many techniques demonstrated and grafts analyzed; hands-on stations at exhibit tables**

8:00PM **Finale Conclusion Party**





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This never before used ARTAS system includes: ARTAS robotic system, ARTAS chair, software, controls. Selling price is $225,000. 00 US. ARTAS hair studio training program. Selling price is $40,000.00 US. We are willing to negotiate and accept reasonable offers.

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- Female Hairline Design
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- Consulting
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LIVE SURGERY WORKSHOP



FUE IMMERSION

POLANICA ZDRÓJ OCT 1–2, 2017

INTERNATIONAL SOCIETY OF HAIR RESTORATION SURGERY



25TH WORLD CONGRESS

OCT 4–7, 2017

NEWCOMERS ARE WELCOME!

We offer a "Meeting Newcomers Program" to orient those who are new to the ISHRS meeting. Newcomers will be paired with hosts. We want to welcome you, introduce you to other colleagues, and be sure you get the most out of this congress.

SIMULTANEOUS INTERPRETATION

English to Spanish

GENERAL SESSIONS

- Hair Biology – Past, Present and Future
- FUE – A Review of the Polanica World Live Surgery Workshop
- FUT – Is Follicle Unit Transplantation still important?
- Recipient Area: How to manage?
- How to manage a study?
- Hairline Design – Quality of the Placement, Implanters, Strategy
- Medical Treatments – Pearls and Future
- Storage Solutions
- Non-Surgical Adjunct Therapies, PRP
- Small Group Discussion Tables on a Variety of Topics
- Surgical Pearls to Achieve the Best Results

OTHER OFFERINGS

- Lunch Symposia and Small Group Workshops
- Basics in Hair Restoration Surgery Course
- Advanced/Review Course
- FUE Mini Course
- SMP (Scalp Micro Pigmentation) Mini Course
- Live Patient Viewing
- Surgical Assistants Program
- M&M Conference
- Exhibits Program
- Scientific Posters
- Networking Opportunities

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Marcelo Pitchon, MD BRAZIL — *Immediate Past Chair*
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Mission: To achieve excellence in medical and surgical outcomes by promoting member education, international collegiality, research, ethics, and public awareness.

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Polish Society of Hair Restoration Surgery
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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:
June 5 for July/August 2017 issue
July 15 for September/October 2017 issue
October 5 for November/December 2017 issue

Please note new submission address:
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Calendar of Hair Restoration Surgery Events

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

	DATES	EVENT/VENUE	SPONSORING ORGANIZATION(S)	CONTACT INFORMATION
	MAY 9-12, 2017	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
	MAY 18-21, 2017	FUE Europe *Ankara, Turkey*	FUE Europe www.fue-europe.org www.fueeurope2017.com	Dr. John Cole, Program Chair john@forhair.com Dr. Ozgur Oztan, Director drozgur@hlc.com.tr
	MAY 20-21, 2017	7th Annual Scientific Meeting of KSHRS *Seoul, Korea*	Korean Society of Hair Restoration Surgery (KSHRS) www.kshrs.org	kshrs@naver.com
	MAY 27-28, 2017	Society for Hair Science/ ISHR International Scientific Meeting *Venice, Italy*	Italian Society for Hair Science Hosted by Andrea Marliani, MD http://eventi.sitri.it/en/	segreteria@sitri.it vincenzogambino@vincenzogambino.com
	JULY 20-22, 2017	3rd Latin American Hair Transplant Workshop FUE Workshop 2017 *Asuncion, Paraguay*	Paraguayan Society of Hair Restoration Surgery (SPACREC) and Paraguayan Society of Plastic & Reconstructive Surgery (SPACPRE)	http://workshop-latc.com/
*	OCT 1-2, 2017	ISHRS World Live Surgery Workshop *Polanica Zdrój, Poland*	International Society of Hair Restoration Surgery www.25thannual.org	info@ishrs.org
*	OCT 4-7, 2017	25th World Congress of the ISHRS *Prague, Czech Republic*	International Society of Hair Restoration Surgery www.25thannual.org	info@ishrs.org
	OCT 20-22, 2017	ISHRS Advanced FUE Workshop L.A. *Los Angeles, California, USA*	International Society of Hair Restoration Surgery	drumar@dru.com
	OCT 31-NOV 3, 2017	10th World Congress for Hair Research (WCHR2017) *Kyoto, Japan*	The Society for Hair Science Research–Japan http://www.congre.co.jp/wchr2017/	wchr2017@congre.co.jp
*	NOV 16-19, 2017	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	Dr. Samuel L. Lam, Course Director Emina Vance, Asst. Course Director http://pa.slu.edu

*2017 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 (Los Angeles), California I USA	November 13-17, 2019 Bangkok I Thailand	October 21-25, 2020 Panama City I Panama

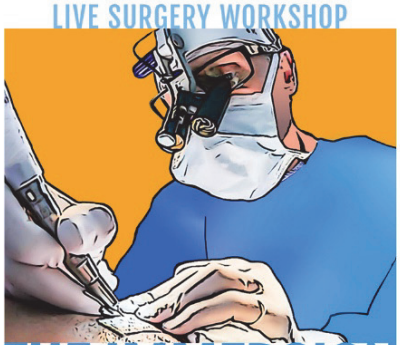
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25TH WORLD CONGRESS
OCT 4-7, 2017