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Cannula Assisted Transdermal (CAT) Anesthesia: A Novel Approach to Donor and Recipient Area Anesthesia

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ABSTRACT

Introduction: Surgeons and practices utilise several methods of anesthesia for the donor and recipient areas during a hair transplant procedure. There are broad variations in techniques used as well as the agents and needle types used. Anesthesia during a hair transplant is probably one of the most crucial parts of the procedure with patients experiencing different levels of tolerance to it. In this study, we implemented a well-described technique in aesthetic medicine to seek to improve the patient experience and pain tolerance during hair transplant surgery. We sought to assess whether cannula assisted transdermal (CAT) anesthesia for both the donor and recipient areas provides better pain scores compared to the conventional (control) method we currently use.

Methods: The donor and recipient areas of 20 consecutive hair transplant patients were each divided into two equal zones and randomized, giving a total of 40 donor test areas and 40 recipient test areas. Our conventional (control) method of articaine 4% infiltrated using a dental syringe and a 30g needle was used in one side, and 2% lidocaine using a 25g (38mm long) cannula was used in the alternative side. Patients, who were blinded as to the technique used in each area, were asked to provide a pain score based on a numerical rating scale for each test area immediately after injecting.

Results: We analysed 40 donor test areas and 40 recipient test areas. A numerical pain rating scale was implemented and the Wilcoxon Signed Rank Test showed a significant difference between techniques in terms of pain scores in both the recipient ($z=-3.956$, $p=0.00$) and donor ($z=-3.879$, $p=0.00$) areas.

Discussion: The CAT anaesthesia technique in both the donor and recipient areas during a hair transplant procedure was seen as a suitable and safe technique to anesthetize patients. A larger number of patients and assessment using several pain scores can add further validity to this technique in the future.

Keywords: cannula assisted transdermal (CAT) anesthesia, follicular unit excision (FUE), follicular unit transplantation (FUT), local anesthesia

INTRODUCTION

There are several methods of anesthesia surgeons can use for the donor and recipient areas during a hair transplant procedure. The variations can extend to needle types and gauge, the type of local anesthetic agents used, and even whether to use a nerve or ring block. Anesthesia is probably one of the most important components of hair transplant surgery. Not only can it improve the overall patient experience, but it also limits the cardiovascular effects of pain and anxiety. Patients should be both physically and psychologically comfortable during the procedure. Fortunately, the current techniques and agents provide a relatively pain-free procedure. The various agents used and duration of action of each is beyond the scope of this article. Nonetheless, the administration of anesthesia is still considered to be one of the most feared parts of the procedure with patients experiencing different levels of tolerance to it.

Pain is a complex response, determined by numerous factors and multiple regions of the central nervous system (CNS). It is influenced by both physical and emotional stimuli. Several techniques have been employed over the years to limit the pain from injections in infiltrative anesthesia. This includes concomitant physical stimulation through vibration, buffering, warming, using small needle calibers, reducing the rate of injection, adjusting the depth of injection, using a topical anesthesia prior to injection, and, last but not least, providing a tranquil office environment.^{2,5,6}

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President's Message

Paul J. McAndrews, MD, FISHRS | Pasadena, California, USA | president@ishrs.org

As my first official message as ISHRS president, I would like to state how much of an honor it is to serve as president for the next year. It is also intimidating following in the footsteps of Paco Jimenez, as he leaves big shoes to fill. A sign of a great leader is not how a person performs when everything is easy and going their way. A sign of a great leader is when everything is falling apart around them and adversity is everywhere, but he/she calmly navigates the ship through the storm. That is just what Paco did as president. When COVID shut down the world, Paco had some exceedingly difficult decisions to make for the ISHRS. His first concern was how he could help members navigate their practices through the shutdown and then how to open again safely. He had to shut down all our in-person ISHRS workshops and meetings. He had to put a lot of the committees on hold so the limited resources could be used on the most essential work. He had to limit the ISHRS budget. He increased the number of Board of Governor meetings and Executive meetings in order to brainstorm ideas about educational webinars, COVID related webinars, and making the difficult decision to make our World Congress meeting virtual.

I was skeptical about the success of a virtual World Congress meeting. I was proved very wrong. The attendance was amazing, scientific information was top-notch, and

the platform was easy to use. The experience could not have been better. I now love the "on demand" section of the Virtual World Congress. I am going back at my leisure to watch the lectures I missed and rewatch the lectures I enjoyed most—what a benefit. Paco, Brad Wolf, Victoria, Melanie, and all the ISHRS staff created a first-rate virtual experience on the fly in the face of adversity. Thank you, an amazing job was done.

I am confident 2021 will have smoother waters, and we will be able to get things back to normal. The lessons we learned from the year of COVID have been a blessing. We are going to continue virtual webinars that will be CME approved. We will hopefully have a live meeting in St. Louis for the hands-on cadaver workshop. We will do everything in our power to meet in person in Lisbon for the 2021 World Congress. Even though this year's Virtual World Congress was wonderful, nothing replaces the camaraderie of being in each other's presence, eating meals together, laughing with each other, and picking each other's brains. The amazing quality of the virtual meeting this year has made us realize we will make the 2021 World Congress a hybrid. A hybrid meeting will make it more inclusive since we can still meet the needs of our members that cannot attend live and the people who attend live can re-watch lectures on demand. It will be the best of both worlds.

Thank you, Paco, for your leadership in 2020, and I look forward to 2021. I especially hope to see you all in Lisbon. ■



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Co-Editors' Messages



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This message is feeding off the inspiration generated by the annual meeting, one that made me proud of the ISHRS's educational efforts. Kudos to Brad Wolf and the administrative team for pulling off a meeting that rivals if not eclipses those prior. Attending from the comfort of my home (ok, my bedroom to be fully honest) surrounded by a few of my dogs, I was struck by the flow of the Opening Session that was bar none the best I have ever seen in any scientific meeting, just about compensating for being denied the opportunity to sit next to my mentor Shelly Kabaker and spending time with colleague-friends at another great destination. Thank you to Dow Stough for providing a hawk's eye tribute to the father of our specialty, O'Tar Norwood. This was followed by presentations that allowed us to get into the minds of two of our most innovative colleagues, Jean Devroye and Roberto Trivellini, whose esoteric presentations were punctuated by clinical evaluation presentations by Gorana Kuka Epstein and Arturo Tykocinski. Acknowledgments to Paco Jimenez who, while denied the opportunity to be personally congratulated (and given hugs) for his work as president, gave sage advice to hair restoration surgeons to become fully engaged in the scientific aspect of treating hair loss.

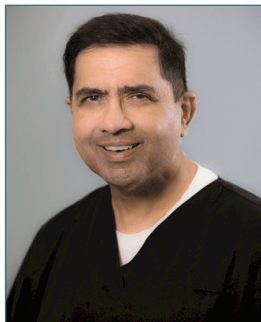
I fully agree with Paco's message; we are much more than just technicians, and can (and should) do more than just redistributing hair. His recommendation for collaborating with scientists doing research on hair biology and hair loss is a great pathway, one that has no doubt provided Paco, given his library of scientific contributions to the field, manifold quantities of professional fulfillment and helped advance the knowledge in our field. This is a pathway I know that some of our colleagues, including my prolifically published co-editor, Aditya Gupta, pursue with similar passion.

However, it is important to realize that there are many other pathways available that allow each one of us to fulfill his/her own potential and enhance the care we provide to our patients. Some of our notable members like Drs. Devroye and Trivellini, along with such respected colleagues as James Harris, are inventors with an entrepreneurial bend who focus on FUE technology, while other inventors focus on implanters or SMP devices. Speaking of entrepreneurs, there are some notable members who love the challenge of running a large practice, or serve as a speaker for a device or drug manufacturer, or have established a company that is developing proprietary technology for hair rejuvenation. For others, the passion lies in exploring the indications for cell-based therapies, while for Dr. Tykocinski it is on producing an Academy Award-deserving film. For certain members, the passion abides in putting on a teaching course or lecturing or authoring, while for some of our more notable mem-

bers like Ron Shapiro and Jae Hyun Park, it is the passion for the pursuit of the perfect hairline. And without some of our key members for whom satisfaction is achieved through leadership and legislative activities, our ISHRS would be a shadow of the successful society it is.

Focusing on our own practice and needs, we can sometimes forget how varied our field can be, and we can lose track of the countless ways one can find success—however one defines that—in the hair restoration field. The ISHRS was created years ago to meet the needs of a unique group of doctors who came from a diverse group of formal medical specialties who had one thing in common: a passion for learning and sharing, and having fun while doing that. The ISHRS must continue to serve the ever-expanding interests of its members, requiring a progressive and open-minded approach in order to stay relevant and exciting. I am confident that our new president, Paul McAndrews, who possesses that unique skill of listening and processing information to reach well-thought-out conclusions, can keep the course set by the leaders before him, while having an open ear to new ideas from our diverse members.

This issue is packed with outstanding articles and columns. Notable is Greg Williams's final Ethics column, which for the past three years has served as an excellent moral compass and invoker of thought. Ralf Paus's second episode on the Neuroendocrinology of the Human Hair Follicle is as interesting as ever. Appreciation goes out to Rachael Kay and Andres Finner for diving into the task of summarizing the 2020 World Congress. Finally, be sure to check out the actual Q and A's that Aditya and I selected out from the chat portion of the annual meeting, which are linked to the lecture "On Demand" feature for those who missed certain lectures or did not attend the meeting at all. ■



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What an incredible Virtual Congress! Congratulations to Bradley Wolf, Victoria Ceh, and the ISHRS staff who worked tirelessly to assemble our first virtual meeting, which was a huge success. We have all heard stories of virtual meetings falling flat or being plagued with technical issues, but the ISHRS 2020 Virtual World Congress was seamless. Not only was it well organized and conducted, the faculty assembled was remarkable, consisting of many well-known lecturers and experts. The diversity in lectures from scientists, physicians, researchers, and guest speakers made the educational experience exceptionally rich and enabled us to continue our mission to share ideas, techniques, and technologies with each other to advance the field of hair restoration.

The meeting highlights were captured by Rachael Kay and Andreas Finner, and are published in this issue if you are looking for a re-cap. This issue also presents original articles on managing eyebrow keloids, facial hair transplantation, and cannula assisted transdermal anesthesia. Our cover article, "Cannula Assisted Transdermal (CAT) Anesthesia: A Novel Approach to Donor and Recipient Area Anesthesia," describes a study testing CAT anesthesia as a method for anesthetizing both donor and recipient areas in an effort to improve the patient experience and reduce pain during hair transplant surgery. This is an important topic since patients vary so widely in their response to anesthesia. Better pain management will increase the likelihood of a positive patient experience.

Another outstanding article is Sam Lam's "Managing

Eyebrow Keloids and Performing Eyebrow Hair Transplant in a patient of African Descent." Managing keloid scars in the central face region is difficult, and Dr. Lam touches upon several key elements to consider when faced with managing eyebrow keloids. Sharing his insight will certainly enlighten others in their search for an appropriate approach to patients wanting to resolve this issue.

Greg Williams presents his last installment in the Medical and Professional Ethics column. This regular column has always provided thought-provoking discussions on relevant and timely ethical issues we as hair restoration surgeons encounter in our practices. With the end of this column, we will see the birth of a new column by Dr. Williams titled "Conversations with the ABHRS Diplomates," which will summarize interesting topics discussed on the new ABHRS WhatsApp group. So, keep your eyes peeled for this new and exciting column in the new year.

We welcome new ISHRS president, Paul McAndrews, and thank Paco Jimenez for his leadership as president in 2020, which was no easy task! Paco was a guiding light to us through the unknowns of the pandemic and helped us navigate shutdowns and how to safely re-open, as well as manage the many operations of the ISHRS. I would also like to thank my co-editor Jeff for his unwavering dedication to our mission as co-editors and the *Forum* and ISHRS staff for their guidance and support through our first year.

As we say good-bye to 2020, take a moment to reflect. Despite the challenges thrown at us from this pandemic, we have persevered. We have advanced our knowledge on hair restoration techniques. We have risen to the challenge and overcome issues with creativity and support from each other. We stand strong as a society as evidenced by the tremendous World Congress. Let's look ahead to 2021 with optimism, but know we can overcome even the most tumultuous times, together. ■



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Furthermore, field blocks are most commonly used in anesthetizing the donor and recipient areas. This involves infiltrating the inferior margin of the donor area and anterior to the recipient area. Several techniques to achieve a desired field block are used, including a multiple wheal technique or a continuous wheal technique. Often, physicians develop and adopt their own techniques of optimal infiltration based on their personal experiences and preferences.

In this study, we implemented a well-described technique in aesthetic medicine in an attempt to improve the patients' experience and pain tolerance during the administration of local anesthesia in hair transplant surgery into both the donor and recipient areas. While this technique is commonly used in some areas of aesthetic medicine, we do believe that its application in hair transplant surgery has never been reported on or adopted prior to this.

OBJECTIVE

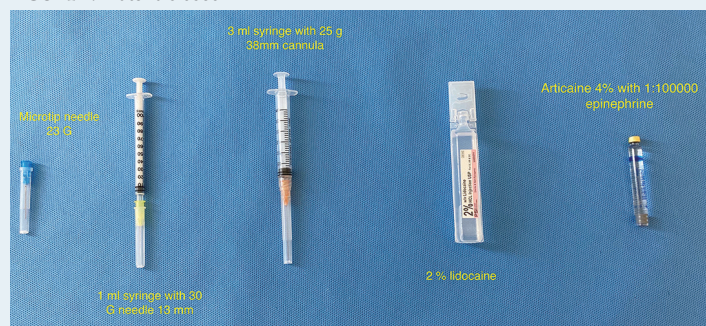
We set out to assess whether cannula assisted transdermal (CAT) anesthesia for the donor and recipient areas provides better pain scores compared to the conventional (control) method used in our practice. This will result in a safe and improved overall patient experience during surgery.

METHODS

The materials we used included the following (Figure 1):

- Dental syringe
- 30g dental syringe
- 4% articaine with 1:100000 epinephrine local anesthetic vials
- 1ml syringe
- 30g (13mm) needle
- 25g (38mm) transdermal cannula with 23g introducer needle
- 2% lidocaine with epinephrine

FIGURE 1. Materials used



We enrolled 20 consecutive hair transplant patients (male and female). Informed consent for both the procedure and the study was obtained. The donor and recipient areas were divided into two equal zones and randomized, giving a total of 40 donor test areas and 40 recipient test areas. A pre-measured safety zone between the two tested areas was kept to avoid any interference or overlap in anesthesia. Our conventional (control) method of articaine 4% in 1:100000 epinephrine infiltrated using a dental syringe and a 30g needle was used for one test area in both the recipient and the donor areas. Our control technique involved a continuous wheal technique with

slow infiltration. For the alternative test areas, a small wheal was created using 2% lidocaine with epinephrine and a 13mm 30g needle. A 23g introducer needle was then used to create an entry point for the 25g (38mm long) cannula. Next, 2% lidocaine with epinephrine was infiltrated transdermally using the placed cannula. Patients were blinded as to which technique was used in each area. The patients were asked to provide a pain score based on a numerical rating scale for each test area immediately after each injection.

RESULTS

We analyzed 40 donor test areas and 40 recipient test areas. Table 1 shows descriptive statistics of the gathered pain score data for the two types of local anesthesia injection techniques: needle and cannula injection. This data was used to determine if there was a significant difference in the pain score between the needle and cannula injections on the recipient and donor area of the scalp. We used the Wilcoxon Matched Pairs Signed Rank Test, also known as the Wilcoxon Signed Rank Test. This test is a non-parametric test that is a counterpart of the parametric Paired Sample t-test, and it was deemed appropriate for the dependent sample. Throughout this study, we considered 5% as the level of significance for the test. SPSS Statistics 23.0 software was used to carry out the analysis.

Descriptive Statistics for Pain Scores of the Needle and Cannula Injections

Table 1 shows the mean, standard deviation, and minimum and maximum pain scores of the 20 patients. The mean pain scores using needle and cannula injections in the donor area were 4.40 and 2.05, respectively. Also, the mean pain scores using needle and cannula injections in the recipient area were 5.05 and 2.30, respectively. In general, cannula injection in the recipient and donor areas was less painful compared to needle injection.

TABLE 1. Descriptive Statistics for Pain Scores of the Needle and Cannula Injections

Location	Injection Technique	Sample Size	Mean	Standard Deviation	Pain Score Min.	Pain Score Max.
Recipient	Needle	20	5.05	1.50	3	8
	Cannula	20	2.30	1.17	1	5
Donor	Needle	20	4.40	1.43	2	8
	Cannula	20	2.05	0.89	1	4

Significance Test

Table 2 shows the significance test for the median differences by type of local anesthesia injection technique in the recipient and donor areas. The pain scores using the cannula injection in the recipient area for all of the patients were lower than the pain scores using the needle injection, with mean rank (10.5) and sum of ranks (210). The pain scores using the cannula injection in the donor area for 19 patients were lower than the pain scores using the needle injection, with mean rank (10) and sum of ranks (190). Only 1 patient had equal pain scores using cannula and needle

injections in the donor area. Furthermore, the Wilcoxon signed ranked test at 5% level of significance showed that median of the pain score difference between cannula and needle injections in the recipient ($z=-3.956$, $p=0.00$) and donor areas ($z=-3.879$, $p=0.00$) is not equal to zero. Hence, there was a significant difference in the pain scores between cannula and needle injections in both areas.

TABLE 2. Significance Test for Median Differences by Type of Local Anesthesia Injection Technique

Location	Rank Difference	Count	Mean Rank	Sum of Ranks	Wilcoxon Signed Rank Test	p-value
Recipient (Cannula Injection – Needle Injection)	Negative Ranks*	20	10.5	210	-3.956	0.00
	Positive Ranks**	0	0	0		
	Equal Ranks***	0				
	Total	20				
Donor (Cannula Injection – Needle Injection)	Negative Ranks*	19	10	190	-3.879	0.00
	Positive Ranks**	0	0	0		
	Equal Ranks***	1				
	Total	20				

*Pain Score of Cannula Injection < Pain Score of Needle Injection
 **Pain Score of Cannula Injection > Pain Score of Needle Injection
 ***Pain Score of Cannula Injection = Pain Score of Needle Injection

DISCUSSION

Based on the results using the Wilcoxon signed rank test, we do have statistically significant evidence at 5% level of significance to show that the median difference of the pain scores between cannula and needle injections in both the recipient and donor areas is not equal to zero. Hence, there was a significant difference in the pain scores when using cannula and needle injections in both areas.

The effectiveness of the CAT anesthesia technique stems from the fact that it combines several factors that could alleviate the pain sensation while infiltrating. First, a very fine needle is used to infiltrate a small amount of anesthesia in the subcutaneous plane. The introducer needle and the blunt tipped cannula is then inserted transdermally and more anesthetic is slowly infiltrated. The slow and controlled infiltration that cannulas provide contributes to the reduced sensation of pain that a higher or faster rate of infiltration causes. It is worth mentioning that these cannulas come in several gauges and lengths for which the physician might have a preference. We personally found that the selected size and length provided us with ease of introducing into the dermal layer and also enabled us to infiltrate the full donor and recipient areas with only 2-4 advances. While we do realize that we did not use the same type of anesthetic agents in both the control and test areas, we believe that the main focus of the study was on the technique of delivering the anesthetic agent and a comparison of the pain levels between our conventional method and the new proposed technique of infiltration. We don't consider the difference in the type of anesthetic agents used in both areas as a major confounding variable. Nevertheless, we are looking at studying the technique with the same agents in both control and test areas.

The need for a larger patient cohort and assessments using several pain score modalities can add further validity to this technique in the future. Furthermore, a formal and scientific follow-up of post-operative swelling in the forehead/recipient area among both methods could outline any additional benefit in employing this less invasive technique.

CONCLUSION

Among our 20 tested subjects, we concluded that CAT anesthesia is a suitable and safe alternative method for anesthesia in both donor and recipient areas. There was a significant improvement in pain scores when compared to our conventional technique.

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Managing Eyebrow Keloids and Performing Eyebrow Hair Transplant in a Patient of African Descent

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ABSTRACT

Introduction: This case is of an African-American woman who had a chemical burn that was accidentally self-inflicted while attempting to remove a prior poor eyebrow tattoo. She developed keloids that required a series of injectable scar dissolvers followed by eyebrow transplant. Postoperatively, the keloid returned, requiring additional injections, and ultimately an excision of the residual scar.

Methods: This is a retrospective clinical case that is reviewed to discuss the clinical pathology of keloids as they relate to eyebrow hair transplants in patients of African descent.

Results: Eyebrow hair transplant led to reawakening of the keloid scar that ultimately required surgical excision of the residual keloid to attain an optimal outcome for the patient.

Conclusion: The hair surgeon should have a good understanding of keloid clinical pathology along with how to recognize, avoid, and manage the condition. In this unusual presentation, the patient would have been better served with an excision of her keloid prior to eyebrow hair transplant rather than after.

Keywords: African, eyebrow hair transplant, keloid, keloid management, chemical burn, eyebrow tattoo

INTRODUCTION

A 45-year-old African-American woman underwent

FIGURE 1. This photograph, taken by the patient, shows her tattoo, which she found aesthetically displeasing.

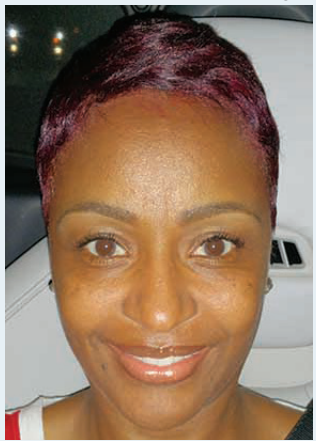


FIGURE 2. This photograph, taken by the patient, shows the scarring immediately after her use of a home-remedy chemical peel to remove the tattoo.

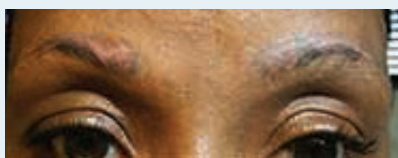
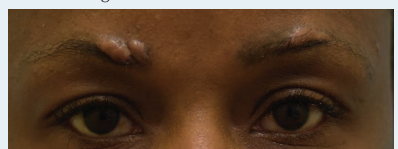


FIGURE 3. The patient presented pre-operatively with much worse keloids bilaterally than was shown in Figure 2.



to undergo multiple rounds of scar-dissolving therapy for her keloid scars prior to surgery. She knew that there was a chance for keloid recurrence and also possible graft compromise in areas of previous scarring and chemical damage. Alternatively, she could have undergone microblading or other non-invasive

an eyebrow tattoo to cover previously overplucked eyebrow hair loss (Figure 1). To remove the unaesthetic tattoo, she tried a home remedy chemical peel (purchased online) that left her with bilateral scars on her eyebrows that gradually developed into keloids. Although somewhat successful in removing the pigment from the tattoo, she still exhibited general hair loss, scarring, and eyebrows that appeared unnatural (Figure 2). In order to avoid the need to pencil in and hide her eyebrows, she sought treatment for possible eyebrow transplant and correction of her keloid scarring. On pre-operative physical examination, she showed keloid scars along the medial aspect of both eyebrows with the scar being worse on the right than left side (Figure 3).

The patient was offered surgical eyebrow hair transplant to cover her tattoo, scars, and hair loss. However, it was agreed that she needed

therapy that would have been performed in another facility, but she elected to proceed with surgery.

METHODS

The patient underwent five rounds of injections per side, each consisting of 5-fluorouracil (0.2ml) mixed with triamcinolone acetonide 40mg/ml (0.2ml), injected intralesionally every month until the scars entirely flattened prior to surgery (Figure 4). She then underwent a bilateral eyebrow hair transplant, using the linear donor strip harvesting method, and a total of 439 grafts were transplanted. She had 105 1-hair grafts placed around the perimeter of the left eyebrow and 89 around the right for a total of 194 grafts made with parallel 21-gauge recipient sites. For the center of the eyebrows, she underwent 121 grafts on the left and 124 grafts on the right for a total of 245 recipient sites to accommodate 2-hair grafts placed centrally in the eyebrows using a 20-gauge needle. She underwent a linear strip excision from her left temporal area, where hairs were finer in nature, with the incision measuring 4cm long by 1cm wide. She tolerated the procedure well. At one-day follow-up, photographs were taken, and she seemed elated with her surgical experience (Figure 5).

FIGURE 4. The patient after multiple rounds of scar dissolving therapy in preparation for her eyebrow hair transplant. She had an additional round of injection to further flatten the scar after this photograph was taken prior to her surgery.

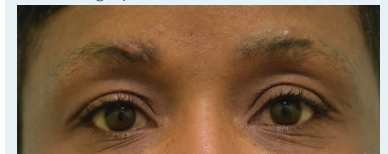
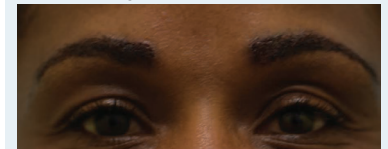


FIGURE 5. The patient 1 day following eyebrow transplant surgery.



RESULTS

The patient returned 6 months after the surgery with good eyebrow hair growth but a partial, albeit significant, return of keloids with minimal eyebrow hair growth within the keloid area (Figure 6). We injected with the same 5-fluorouracil/ triamcinolone acetonide 40mg/ml mix as noted above every month for 4 months until the scar

FIGURE 6. The patient returned 6 months after her eyebrow hair transplant with recurrence of keloid scarring. Otherwise, the rest of her eyebrow shows good survival of the transplanted hair even in the previously tattooed and chemically burned regions.

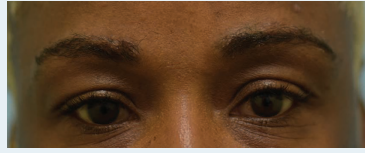


FIGURE 7. The patient is shown after several additional rounds of keloid scar dissolving therapy, but she was still dissatisfied with her result due to the gap in her eyebrow left by the treated keloid.



FIGURE 8. The patient is shown 6 months after surgical excision of residual gap; she is satisfied with her outcome. She is now 1 year out from surgery with no keloid recurrence.



had flattened. Although a favorable improvement was observed following this treatment, the patient was still dissatisfied with the eyebrow hair loss in the areas of residual scarring (Figure 7). At this time, we discussed whether to transplant additional grafts into the scars or to excise the remaining scar and close the incision. The concern was that additional recipient sites and grafting into the scar would traumatize the scar and lead to a return of the keloid scarring as before.

The patient underwent excision of the keloid using a No.15 Bard-Parker blade taking care to minimize transection of existing transplanted eyebrow hairs. The skin was closed with interrupted 7-0 polyglycolic acid (Vicryl, Ethicon, Sommerville, NJ) sutures. The patient has been followed now for 1 year without recurrence or need for keloid-scar injections (Figure 8). She is delighted with the aesthetic outcome and is still satisfied despite some residual scar being present.

DISCUSSION

This was a challenging case to manage because of the pre-existing keloid scar. I have extensive

experience managing keloid scars of the head-and-neck region including occipital keloids that are prevalent in the worldwide African community. This case is interesting because keloids rarely appear in the central face region. Typically, keloids occur in the upper forehead extending back to the posterior scalp. Also, they usually start at the lateral jawline and lateral preauricular region and extend to the ears and neck. Hypertrophic scars, on the other hand, can occur in the central face. However, in this case, the patient inflicted her own injury, which caused a keloid to arise.

In general, I treat keloids through the process of excision of the keloid with timed low-dose, fractionated radiation that must be initiated within 24 hours after excision for it to be successful. I felt this approach would be excessive for this situation, and I was worried about the effects of radiation on graft survival. Therefore, I elected to treat the keloid with several rounds of steroid/5-fluorouracil until the keloid became flattened over time.

Although injectable therapies as a standalone treatment for keloids do not work consistently in my opinion, I was hoping that given the small size of these keloids and the fact they existed in an anatomic region not typically prone to keloids,

she would respond well enough to forgo their excision prior to surgery. For keloid injections, I found the following treatment to be effective: triamcinolone 40mg/ml and 5-fluorouracil mixed at a 1:1 combination with approximately 0.2ml of each directly into the substance of the small keloid (2-4cm in length), taking care to avoid inadvertent injection into the subcutaneous plane that would risk dermal atrophy, with larger quantities for proportionally larger keloids. Usually, the interval of treatment is every 3 to 6 weeks until resolution. I counsel patients that the keloid may recur, and that at the earliest sign of recurrence, these injections need to be given again. Also recommended are pressure dressing over areas of keloid recurrence, such as ear clips for ear keloids or ACE bandages for areas that reside over bony prominences, preferably around the clock (24/7) until stable, then only at night with gradual progression to wear them off. However, in this case, again I did not perform my usual routine, as I treated this keloid as less severe and atypical in comparison to the typical keloids I confront.

Following the hair transplant surgery, the patient unfortunately experienced a recurrence of her keloid that required further intervention. I believe that the keloid was stimulated through the act of recipient-site creation and graft placement, as trauma is well known to incite exacerbation of a keloid. As mentioned previously, the patient underwent multiple rounds of additional injectable therapy with good but not complete resolution. The small gaps of poor hair growth left her dissatisfied, as she needed to use makeup to camouflage the missing hairs. At this point, I had a choice of whether to place more hair grafts or excise the residual scar. I decided on the latter approach because I was truly worried that additional hair grafting would reinvigorate the keloid scar yet again.

The excision was performed approximately 10 months after the initial hair transplant, with cautery avoided cautery for its potential for causing hair loss or reawaken the keloid. While closing the incision with 7-0 polyglycolic acid (Vicryl) suture may seem counter to common sense because a braided dissolvable suture may prevent good wound healing and may also appear to be less favorable for keloid scarring, I use this suture routinely for ear keloid excisions and just allow the suture to dissipate over a period of several weeks to a month or slightly longer with good results. However, this suture is too weak to close larger keloid excisions, such as jawline and occipital keloids, in which case I typically use interrupted, buried dermal 5-0 poliglecaprone 25 (Monocryl, Ethicon) and 3-0 polypropylene (Prolene, Ethicon). Fortunately, there has been no recurrence of the keloid scar and the patient is happy with the aesthetic outcome even though there is still a small residual gap. In principle, I consider the risk of keloid recurrence to be a possibility for 5 full years post-transplant but believe that after 1 year without recurrence this risk is significantly diminished.

In retrospect, I could have excised the keloid from the very beginning, waited several months, and then undertaken eyebrow hair transplant possibly thereafter. I believe that if the keloid tissue were entirely removed pre-operatively there might have been less of a chance for recurrence. When traditional keloids recur following surgical excision, they can actually be significantly worse. Since this keloid occurred in

a region atypical for keloids and arose due to a self-inflicted trauma, I treated it unlike the way I treat standard keloids and maybe would have still attempted surgery even if the keloid presentation had been more significant in nature.

As far as surgeries in patients of African descent, the concern obviously is whether a keloid will arise in the donor area. Keloids in the occipital region can occur both from linear strip harvesting as well as with follicular unit excision (FUE) methods, though it is far less likely with the latter. I used the linear strip harvesting method in this patient because I believed that she was not prone to keloid formation, as evidenced by the fact that she has pierced ears and wears earrings with no issues. I felt that the keloid arose in an unusual location caused by unusual circumstances. Fortunately, I was not incorrect in this assumption since her donor incision healed well and was taken from the temple region where the hair was better suited for eyebrow transplantation and less prone to keloid formation.

CONCLUSION

Eyebrow transplantation represents the highest art in hair restoration and can easily look unnatural due to improper design on the part of the surgeon and/or improper graft placement by the assistant staff. The assistant staff play a significant role in successful outcomes since placing these extremely fragile 1-hair grafts very closely together with changing directions at a very low angle with the proper hair curl direction in an atraumatic fashion is very challenging. With African hair that has an exaggerated hair curl, placing grafts correctly poses another level of difficulty,

Invited Commentary

Jeffrey Epstein, MD, FISHRS

On “heroic” eyebrow restoration

Sam Lam should be commended for putting together a comprehensive case presentation that touched upon several key elements, most importantly the options in the management of eyebrow keloids, through this patient’s treatment course that first involved chemical-dissolving followed by transplantation, that then required excision. Other elements included guidelines for performing eyebrow transplants in Black patients, and essentials in the management of keloids and the risk for them occurring in our patients.

In my eyebrow restoration practice, I have encountered several similar cases to the one Dr. Lam described. For my treatment approach, I have designated the moniker “heroic” eyebrow restoration. These are not cases of simple scarring, such as those that are the result of older permanent makeup techniques, but rather are cases of severe scarring where total or near-total eyebrow resection is required, calling for subsequent complete eyebrow restoration.

Figure 1 shows an Asian female whose attempt to remove a prior eyebrow tattoo with a 25% TCA peel purchased online resulted in bilateral eyebrow keloids. All of the keloids were excised using a similar technique to Dr. Lam except for the use of nonbraided sutures 4-0 PDS (p-dioxanone) deep and interrupted 6-0 Prolene (polypropylene) for skin closure that got removed after 6 days. Six months later, her eyebrows

were restored with a total of 620 grafts, the majority 2-hair grafts. There was no recurrence of the keloid without any steroid injected.

Figure 2 shows a non-Hispanic Caucasian female whose attempts at prior tattoo removal with laser resulted in severe widened discoloration. The scars were excised with closure using PDS and Prolene sutures, then 6 months later the eyebrows were transplanted with 650 grafts mostly containing 2 and 3 hairs.

It is important that the hair transplant surgeon recognize the indication for a more aggressive surgical approach when faced with severely scarred eyebrows. In fact, this aggressive surgical approach of complete excision is one I employ for severely scarred hairlines, but that is for another write-up. Another point these cases make is my reliance on nearly all 2-hair grafts for eyebrow restoration in Caucasian patients, with 3-hair grafts (if they are growing together with a slight curl) implanted into the central portion of the eyebrow so as to achieve adequate density. In Asian patients with typically straight, thick scalp donor hairs, I will rely on 1- and 2-hair grafts to ensure naturalness, and it is my experience that these are the hardest patients on whom to achieve a natural appearance. The only patient that can be as challenging is the Black patient with a “hard” curl to the donor hairs, where density must often be compromised for the sake of naturalness.

Finally, I have had just one case of keloids develop in a donor area, the FUT donor strip of a Lebanese Christian man 16 years ago. The keloid was chemically dissolved with intralesional triamcinolone. I would like to have colleagues share their experiences with keloids in hair restoration surgery. ■

FIGURE 1. At presentation (top), 3 months after near-total bilateral eyebrow excision (middle), and 8 months after eyebrow transplant (bottom)



FIGURE 2. At presentation (top), 4 months after near-total bilateral eyebrow excision (middle), and 10 months after eyebrow transplant (bottom)





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Facial Hair Transplantation with Follicular Unit Excision: Effective Technique in the Micrograft of Beard and Mustache

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ABSTRACT

Introduction: Facial hair transplantation has been increasingly requested by patients and used to improve appearance and highlight masculine features with natural results. Herein we describe our experience in facial hair transplantation, its pre-surgical assessment, the technique used, the subsequent follow-up, and possible complications.

Methods: A pre-operative evaluation was carried out to assess the recipient and donor areas. The follicular unit excision (FUE) technique was used to extract the follicular units (FUs) from the donor areas, which could be the occipital region and the beard itself. FUs of 1- and 2-hair follicles were implanted with the help of implanters. Possible complications included post-inflammatory hyperpigmentation, incorrect placement in the direction or angle of the FUs, or folliculitis in the implanted area.

Conclusion: Currently, hair transplantation to the facial area has very good results when performed by physicians with good training and experience in the technique.

Keywords: beard hair micrograft, beard transplantation, facial hair transplantation, follicular unit excision (FUE)

INTRODUCTION

With the experience and advances in hair transplantation techniques, it has been possible to successfully perform micrografting of follicular units (FUs) in the facial zone, a procedure that has increased in demand during the past 5 years. Based on the statistics of the International Society of Hair Restoration Surgery (ISHRS), facial implants (beard and mustache) increased 196% worldwide from 2012 (4,707) to 2014 (13,956), and 121% from 2014 to 2019 (30,957). While all components of a beard are important, the highest ranked features included strong goatee (15.8%) and strong cheek beards (15.8%).¹

Normally, around puberty androgens stimulate the hair of the beard for its growth. Along with a strong genetic basis, the hair follicles of the beard express terminal hairs under the dual actions of testosterone and the 5-alpha-reductase enzyme to produce the dihydrotestosterone metabolite (DHT).²

According to some studies, men who grow an unshaven beard are perceived as older, more masculine, and more dominant and aggressive, and display positive feminine attitudes by highlighting the appeal in contrast to those men whose face is shaven.^{3,4} However, when a man lacks the genetic and hormonal benefits to have masculine facial features and facial hair, or has feminine features in the lower third of the face, he may turn to hair transplantation on the beard to accentuate masculine facial features.

This article describes our experience in pre-operative evaluation and use of the follicular unit excision (FUE) transplant technique in the facial zone.

Preoperative Evaluation

Among the indications to perform hair transplantation in the facial zone are the following:

- Congenital hypotrichosis: partial congenital absence of hair due to an aplasia of the hair follicle in the beard (low follicular density or spaces in the beard)
- Congenital beard atrichia: when there is full hair loss as a result of aplasia of the hair follicle
- Cicatricial alopecia of diverse etiology: burns, injuries

due to car accidents, acne sequelae, correction of cleft lip, or any other surgery, etc.

- Masculinization of transgender patients
- Total or partial loss of the beard due to liposuction in said zone

The main cause for which patients turn to a beard transplantation is congenital beard hypotrichosis.

During the evaluation, a design is drawn that includes the areas to be grafted, and the surface and number of FUs required are determined. Anatomically, the facial region of the beard can be divided into different zones to determine where the FUs will be placed: 1) cutaneous section of the upper lip: mustache, 2) chin region, 3) genian area: beard of the cheek, and 4) descending section of the jaw: sideburns. In the chin region, we can distinguish a) the lateral pillars and b) the medial pillar (Figure 1). When the mustache connects to the chin region (medial pillar) through the lateral pillars, it is colloquially called "goatee."

The follicular density to be implanted can range from 20–60 FUs per square centimeter; the higher the density, the better the result, and the lower the density, the larger the beard should be to cover the spaces. The grafts implanted are 1- and 2-hair FUs. On average, the number of FUs implanted in the moustache are 300-500; in the lateral pillars, 200-400; in the medial pillar, 100-200; in the chin, 300-900; in the right and left genian areas, 1,200-2,400; and in the sideburns, 700-1,100. The quantity is determined factoring in the expectations of the patient, the size of the face, the design of the implantation, the square centimeters

FIGURE 1. Facial region of the beard and its implantation zones



to be implanted, the quantity of FUs to be implanted per centimeter, the thickness of the hair to be transplanted, the amount of preexisting hair in the recipient area, and, mainly, the quantity of FUs that can be harvested from the donor area. Sometimes, a second or a third procedure may be necessary to fulfill patient expectations.

The recipient area has to be in good condition. In the event of having an aggregated pathology like folliculitis, active acne, etc., a previous treatment is administered to correct the issue. Topical minoxidil-based products should be discontinued in the recipient area, and the patient should be in good health. The overall result of the growth of the grafts is seen after 10-14 months, considering the shedding of the grafts.

It is recommended that the patient be over 25 years of age given that from that age onward it is simpler to predict the evolution of androgenic alopecia (AGA). However, the physician should warn the patient about the risks when implanting FUs in the facial region and removing an unrenewable resource from the donor area, which subsequently may be used for the scalp. Said warning is mainly targeted to those men under the age of 25 and with some grade of AGA; ideally, they should not have AGA.

Donor Area

The main donor area is the safe area of the scalp given that it usually has the sufficient quantity of follicles to be transplanted. There are approximately 6,000 FUs potentially transplantable,⁵ which corresponds to 12,000-13,200 hairs. The hair of the occipital region is normally thick enough compared to the beard, since the hair is thinner in other areas of the body.

There are some characteristics that are similar between the hair of the scalp and beard. In the first case, 85% of the hairs are in the anagen phase with a duration of 2-6 years; 15% in telogen phase with a duration of 3-4 months and a follicle depth of 3-5mm. In the beard, 70% of the hairs are in anagen phase with a duration of 1 year, 30% in telogen phase with a duration of 10 weeks and a depth of 2-4mm,⁶ understanding that 35%–85% of the body hair is in telogen phase and its anagen phase is very short, only a few months.

There are some characteristics of the FUs and the hair shaft that are known to suggest a better prognosis, such as the color and thickness of the hair; the darker and thicker the hair, the better the appearance.

It is important to tell the patient that his hair will grow with the characteristics of the donor area; that is, if the hair is curly, the hair will grow curly in the facial region. However, there are some studies that support that the transplanted hair mimics the characteristics of the growth of the hair of the native recipient area.⁷ In our experience, the influence that the recipient area may have is minimal or unnoticeable given that the follicle of the occipital donor area is very similar to the beard.

The second donor area that can be used is the beard itself, generally of the submandibular region. It is ideal in terms of the physical characteristics of the follicle, but limited in the number of FUs to be extracted; it is chosen when only a few FUs are needed or if the occipital zone is not sufficient. The extraction is made with the patient in supine position and the neck extended to expose adequately the neck and the jaw.

METHODS

The patient is prepared by using an electric hair trimmer to trim the hair of the donor area to a length of 2-3mm, and the definitive design of the area to be grafted is made (Figure 2).

FIGURE 2. Design of the implantation: A) right ¾ view, and B) anterior view



Extraction of the FUs with the FUE Technique

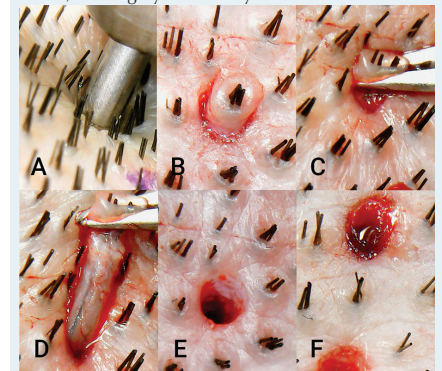
Preparation of the donor area. In the donor occipital area, antisepsis is done and a ring block local anesthetic is administered with 1% lidocaine and 1:100,000 epinephrine dilution. Afterwards, the area is infiltrated to promote vasoconstriction and decrease bleeding. When the FUs are extracted from the submandibular zone, it is important to maintain the needle superficially and ensure that it is not in a vessel by means of aspiration; to avoid direct infiltration, a cannula may also be used.

Extraction of FUs. We utilize the two-step method⁸: during the manual extraction, we used a punch of 0.8-1mm in diameter with an outside or middle margin cutting edge to perform the perifollicular cut aiming at releasing the FU. The penetration of the punch is variable depending on the length of the follicle; on average, it is between 2-5mm. In order to release the superior segment of the FU, it is necessary to separate it from the piloerector muscle and the sebaceous gland; once it is loose and separated from the surrounding dermis, the inferior segment can usually be easily extracted by traction. Once the FU is released, it is held by the epidermis with a curved forceps to fully extract it (Figure 3).

When the transection index is high, the perifollicular cut is made with the aid of motorized equipment. Using a blunt punch, the rotation is made clockwise; the rotation speed is determined based on variables like the thickness of the skin.

Preparation of the FUs. The FUs are placed in a physiological solution or platelet-rich plasma (PRP) as preservation medium, and are maintained at a temperature of 4°-8°C. Under a 40-60× stereomicroscope, external dissection is made (this refers to the division under the microscope of the grafts into groupings that contain fewer follicles than the original intact group⁹) leaving FUs containing 1 or 2 follicles.

FIGURE 3. Trichoscopy with 35× magnification of the extraction of FU: A) placement of the punch on the FU, B) perifollicular cut of the superior segment, C) the FU is held by its superior segment with forceps, D) extraction of the FU, E) orifice of the FU, and F) healing by secondary intention.



Implantation of FUs

Preparation of the recipient area. If the patient has an existing beard, it is necessary to trim it to 3-5mm to be able to see the spaces where the grafts will be implanted. An antiseptics of the area is done, and a field block local anesthetic is administered with 1% lidocaine and 1:100000 epinephrine dilution. Sometimes, a block of the auriculo-temporal, infraorbital, and mental nerves can be made. If the patient is not tolerant to pain, sedation can be administered, but this is not very frequent.

Implantation. Implantation is done using a 0.8mm stick-and-place implanter for 1-hair FUs and a 1mm implanter for 2-hair FUs. The 1-hair FUs are normally used to make the contour of the design; to give density, we use 1- and 2-hair FUs. When implanting the FUs, it is important to check the direction of the implantation: they should be as parallel as

FIGURE 4. Implantation of FUs with implanters. The implantation is made as parallel as possible to the skin following the direction of the existing hair.



possible to the skin following the direction and angle of the hair of the area: downwards in the sideburns, genian area, and chin (Figure 4), and in the case of the mustache, downwards in its central zone, downwards and outwards in the medial zone, and downwards in the lateral zones.

Subsequent Care and Follow-up

Subsequent care and follow-up are very important for the success of the transplantation. The patient should not touch the implants with excessive pressure during the first 10 days. The area should be washed the day after the procedure with hypoallergenic or baby shampoo by lathering some shampoo between the hands, carefully applying it without rubbing, and allowing the hair to rinse with water only. It is not recommendable to expose to intense sunlight. After the transplantation, follow-up appointments are at 10 days (Figure 5), 1 month, 3 months, and subsequently every 3 months up to 12 months.

FIGURE 5. A) Immediate post-operative showing erythema in the implantation zone, and B) 10 days after the transplantation showing partial growth of the implants.



Possible Complications

The patient should be aware that there can be post-inflammatory hyperpigmentation in the implantation zone, mainly in the Fitzpatrick IV-VI skin phototypes, hence a depigmentation treatment would need to be administered for a good aesthetic result.

Incorrect placement in the direction or angle of the FUs

during implantation is another complication that may occur, thus causing unaesthetic growth that may require removal if there are too many. In the mustache area, despite being very careful with the direction, mainly in the zone of the philtral ridges and the groove of the philtrum, there might be some hairs in the wrong direction.

Folliculitis seldom occurs in the implanted area. However, the region with the highest incidence is often beneath the lip, in the chin region.

During the extraction, hypopigmentation is common in the scar from where the FUs were extracted, especially in the dark phototypes. Therefore, the extraction in the case of the beard should be made in the submandibular area avoiding the facial region.

Clinical Practice

In our clinical practice, with their informed consent, we analyzed 57 patients transplanted in the facial region from June of 2016 to September of 2018, and we found several interesting variables (Table 1).

All the transplanted patients were men (average age of 34 years), the majority did not have any grade of alopecia, 28% had post-inflammatory hyperpigmentation with phototype IV and V, and the main type of hair was black colored and straight with an average diameter of 0.062mm.

The main donor area was the occipital region. In terms of the areas where the implantation was made, they were varied (Table 2). How-

ever, in most of the designs, the patients opted for placing or covering spaces in the chin region (lateral pillars, medial pillar, and chin mound) and connecting with the mustache to form the so-called "goatee."

DISCUSSION

Since it is a method that is being increasingly used, in the medical literature we found the experience of Bared,¹⁰ having in common many criteria with regard to pre-operative planning; however, one of the differences that we can underline is the way to implant the FUs. We do not make recipient areas by making slits or implanting the grafts with forceps; we use implanters for the placement. Bared also mentions that small protuberances may be formed beneath the lip and in the chin mound, in the site of the transplanted grafts, without knowing the cause thereof. In the experience of Civaş et al,¹¹ it is mentioned that they occur because the skin is stiffer and thicker, and when the channels are opened they do not fit the FUs, so

TABLE 1. Variables Quantified in 57 Patients with Facial Hair Transplantation

Variable		Result
Age	Minimal	21 years
	Mean	34 years
	Maximal	52 years
AGA	Not present	73,68%
	Grade II	12,28%
	Grade III	8,77%
	Grade IV	5,26%
Fitzpatrick skin phototype	II and III	59,66%
	IV	31,57%
	V	8,77%
Hair color	Black	64,91%
	Dark chestnut	29,82%
	Graying chestnut	3,50%
	Gray	1,75%
Follicle shaft	Straight	91,22%
	Wavy	8,77%
	Curly	0%
Follicle shaft diameter	Minimal	0,043 mm
	Mean	0,062 mm
	Maximal	0,072 mm
Donor area	Occipital	98,24%
	Submandibular	1,75%

TABLE 2. Hair Restoration Areas

Implantation zone	n (%)
Sideburns	30 (52,63)
Genian	44 (77,19)
Chin	45 (78,94)
Mustache	14 (24,56)

Abbreviation: n, number of patients.

more care should be taken in the thickness of the channels. In our practice, this does not occur because the implanters provide the proper depth and width for the FUs.

In the article by Civaş, we also observed many common criteria. However, we can mention some differences with his technique described; for example, for the anesthesia, we do not use bupivacaine or prilocaine nor do we do use tumescence in the recipient area. In 9 out of 10 patients treated, the extraction was motorized, and their first transplantation was made using the Harris three-step technique, whereas we use both the two-step manual and motorized technique. In the implantation, they make slits with blades and place the implants with forceps, same as Bared does.

CONCLUSION

It is very important to make a good pre-operative diagnosis, take an adequate medical history, evaluate all the variables of the donor and recipient areas, verify the realistic expectations of the patient, and pay careful attention to the placement of the grafts.

One of the aesthetic benefits of the beard is being able to highlight the masculine facial features such as the chin, and angle and inferior border of the jaw, while masking or attenuating features of the lower third of the face.

To perform hair transplantation in the facial area with the FUE technique requires an experienced physician as it entails more physical fatigue, and it has a long learning curve for both the physicians and the nursing staff who assists them in order to obtain natural and satisfactory results. (Figure 6).

FIGURE 6. Results before and after facial hair transplantation.



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Invited Commentary

Robert H. True, MD, FISHRS

I enjoyed reading the article on facial hair transplantation by Drs. García and Garces. They have presented a very well-organized approach. I would like to share a few comments.

To quote from the paper: "It is recommended that the patient be over 25 years of age, given that, from that age onward, it is simpler to predict the evolution of androgenic alopecia (AGA). However, the physician should warn the patient about the risks when implanting FUs in the facial region and removing an unrenovable resource from the donor area, which subsequently may be used for the scalp. Said warning is mainly targeted to those men under the age of 25 and with some grade of AGA; ideally, they should not have AGA."

In regard to this aspect of informed consent, I offer this comment: The evaluation of male patients for concurrent AGA or risk of AGA should not be limited to those under age 25. AGA may begin later in life. Family history of AGA can indicate future risk. All patients undergoing scalp to beard transplantation must be informed that this may have adverse impact on their ability to have AGA treated. This is particularly important when more than a few hundred grafts will be used.

In discussing complications, the authors did not mention the development of cobblestoning or bumps on the skin around grafts placed to the face. This has been described by several surgeons. This is thought to arise because of differences between the epithelial layer of the scalp and facial skin, and prevalent opinion is that this can be prevented by removing the epithelium from the scalp grafts before transplanting.

The number of grafts required for each beard area as stated by the authors is a very wide range with the upper numbers being very high. I would like to have the authors define the average number of grafts they transplant per each beard area and the density of grafts that is most commonly performed. ■

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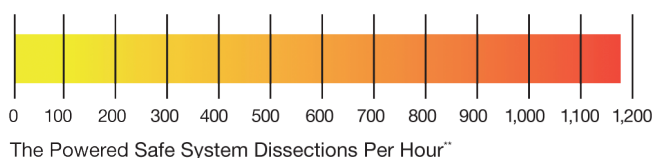
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Where have all the follicles gone, long time passing?

Paul T. Rose, MD, FISHRS | Coral Gables, Florida, USA | paultrose@yahoo.com; Michael Morgan, MD | Tampa, Florida, USA; Aron G. Nusbaum, MD | Coral Gables, Florida, USA

A basic tenet of hair transplantation is the concept that hairs taken from the safe donor zone continue to grow for the rest of the person's life. We acknowledge that with age there is some senescent hair loss due to the aging process.

When patients inquire as to whether the transplanted hair is "permanent," my experience in multiple clinics is that patients are told that "in general" the hair stays for the rest of one's life.

Having been performing hair restoration surgeries for over 30 years and seeing many patients return decades after a procedure as well as simply observing my colleagues' and my own hair transplant, it is apparent to the authors that this is not an irrefutable truth. We wonder, where have all the hair follicles gone?

Almost weekly, we see patients who have had transplants years ago with us or other colleagues and clearly, while the results may still look natural, there is a decrease in density; this is not often apparent to the patient. We would propose several reasons for why this might occur, and we would like to make a case for being more transparent in the informed consent process to account for this reduction in density that occurs:

1. **Scalp or skin disorder.** Some patients develop an inflammatory reaction in the recipient areas post hair restoration. Most commonly, it seems to be consistent with fibrosis and oftentimes including in the differential is lichen planopilaris (LPP). It should be noted that the inherent changes to the skin from hair restoration can make histological evaluation difficult to accurately assess. In cases where there is a clearer picture of LPP, it is often a problem trying to ascertain if the transplant procedure was an etiological cause of the inflammatory process or if it could it have been overlooked in the consultation period.
2. **Use of testosterone.** Many male patients are using a testosterone replacement; many of these men are in their 40s and older. The testosterone is likely raising levels of DHT and causing more hairs to be lost. Hairs at a later age in life that would ordinarily not be exposed to such levels of DHT are now exposed to the DHT and engender miniaturization.
3. **Alteration of the hair cycle.** It may be that transplanted hairs once moved to the recipient site have somehow aged more quickly. Perhaps the surgery itself caused the hair cycle to be altered so as to limit the normal number of cycle rotations that would normally occur if they were not transplanted. One might wonder if out-of-body time, storage medium, and/or mechanical trauma in placing might play a role in such a phenomenon.

4. **Underlying medical conditions and medications.**

As our patient's age, they are more likely to develop age-related and constitution-related medical issues. Cardiovascular, renal, endocrine, gastrointestinal, hematologic maladies, and the medications used to treat the conditions might have an adverse effect on hair growth and hair cycling.

5. **Peri-follicular stroma/matrix.** Considerable evidence has recently been marshalled to support the tenet that the epithelium and/or adnexal structures including the hair follicle receive not only nutrition and support from the surrounding dermis but also cell signals that are capable of modulating growth and senescence. It is possible that the disruption of this nexus or anatomic differences within the perifollicular mesenchyme may influence the hair cycle or growth. Reappraisal of this possible influence vis-à-vis degrees of harvested native dermis (traditional graft versus mini-graft) should be undertaken.

6. **Biologic aging of the host.** Histologically, it is apparent that with aging there is atrophy of the epidermis, dermis, and adipose tissue. This becomes especially evident with ultraviolet or ionizing radiation exposure. Does this age-related senescence within the supporting cast of the skin substrate also impact adnexal integrity or could there be an age-related decline in hair follicle density independent of the surrounding skin? We know that with time there is a decrease in hairs in the donor area and this could conceivably correlate with the decrease in hairs in grafts that are implanted

There may be other causes for this loss of hair, but it seems most important that we acknowledge the occurrence of such a course of events. We are obligated to advise patients that a portion of hair that is transplanted may be lost over time and that, while the hairs are harvested from the "safe zone," a guarantee that they will last for the patient's lifetime is unwarranted.

We would suggest that studies should be initiated to discern the cause(s) of loss of transplanted hair. Perhaps cases could be collected from multiple clinics and biopsies obtained to elucidate causal factors of this phenomenon.

We may not know where all the follicles have gone, but it is not always a long time passing. ■

HAIR SCIENCE MINI-SERIES

Neuroendocrinology of the Human Hair Follicle

Episode 2: Scalp Hair Follicles and the Hypothalamic-Pituitary-Adrenal Axis

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INTRODUCTION

Welcome to Episode 2 of the new HAIR SCIENCE mini-series! In Episode 1, we kicked off this series with a foray into the seemingly outlandish world of hair follicle (HF) neuroendocrinology and covered it in broad strokes by providing key background information, general concepts, and important overarching themes. While this may have exhausted your patience already (yes, once again, there will not be any nice illustrations so as to entice you to check up on the original research papers...), brace yourself: here, we will dive into some of the nitty-gritty details.

Probably the best HF neuroendocrinology topic to get started on in Episode 2 is the one that made the field suddenly so fascinating: the discovery that your scalp HFs have a fully functional peripheral equivalent of the central hypothalamic-pituitary-adrenal (HPA) axis, which is the key neuroendocrine system that governs the stress responses of mammalian organisms (Fink 2010, Lechan 2020):

In response to various perceived stressors, the hypothalamus generates and secretes corticotropin-releasing hormone (CRH). This up-regulates proopiomelanocortin (POMC) production in CRH receptor-positive cells in the pituitary gland, which enzymatically synthesize key neurohormones such as adrenocorticotrophic hormone (ACTH) from the POMC prohormone; ACTH travels via the blood to the adrenal gland, where this stimulates epithelial cells with cognate ACTH receptors (mainly melanocortin receptor 2 [MC-2R]) to synthesize the glucocorticoids, namely cortisol, which not only are essential for our survival, but also hormonally coordinate key systemic stress responses of the human body (Fink 2010, Lechan 2020). In addition, CRH and ACTH themselves unfold many other activities through the mammalian organism, ranging from immunomodulation (e.g., mast cell activation) to pigmentation control (e.g., skin hyperpigmentation and repigmentation of gray/white hair shafts) (Paus et al. 2006, Murphy and Travers 2017, Lechan 2020). When any key element in this central HPA axis is defective or produced in excess, this cannot only have major, potentially life-threatening consequences, but it also can result in striking skin phenotypes well-known to dermatologists, such as alopecia, telogen effluvium, and hypertrichosis (Paus 2016).

Even though it had already been known at the time that there were actually many other cells and tissues outside of this central HPA axis, including some cultured human skin cells, that also expressed/produced individual elements of this axis (Slominski et al. 1993, 1993a, 2000; Ito et al. 2004), it was not until 2005 that the first evidence was published that a human (mini-)organ actually mimics the central HPA axis in

full and utilizes the locally generated hormones to regulate its own function (Ito et al. 2005). More on that below.

Apart from being biologically fascinating and clinically relevant, as we shall see in the following, this discovery also created a dilemma that remains unresolved to-date: Psychologists and stress researchers are now frequently measuring cortisol levels in plucked hair shafts as an instructive indicator of systemic hormonal responses to psychoemotional stress and of monitoring long-term glucocorticoid serum levels (Meyer and Novak 2012). Yet, since the scalp HF itself also produces cortisol, which has now been independently confirmed by multiple studies, how can we distinguish the—chemically identical—cortisol produced in the adrenal gland from that of other so-called “non-classical” sites of cortisol synthesis, namely the HF? (Sergiel et al. 2020, Sharpley et al. 2011)

Moreover, it is often forgotten that hair-shaft-producing anagen HFs, especially our largest terminal HFs in scalp and beard skin, are very effective excretory organs that actively take up multiple, potentially noxious compounds from the blood so as to eliminate them from the organism by embedding them into a hair shaft, where they can no longer do harm and eventually get shed into the environment (Carre et al. 2020). This makes it by no means trivial to prove that cortisol found in the hair shaft was actually produced in the HF itself, rather than elsewhere in the body, and was then taken up via the HF’s dense vascular system. Finally, that natural sunlight tends to degrade hair-shaft-embedded glucocorticoids (Wester et al. 2016), and that these levels may be hair growth rate-dependent and may be reduced by frequent shampooing (Xiang et al. 2016) adds other elements of uncertainty. Thus, if you are contemplating offering your patients hair shaft analyses of “stress hormones” so as to assess their level of “chronic stress,” these are considerations and caveats you need to keep in mind.

But, in line with our mini-series motto (“back to the future”), let’s have a look at where this neuroendocrinological discovery tour started.

Scalp HFs express CRH and ACTH.

The easily dissected terminal scalp HFs in the anagen VI phase of the hair cycle (Oh et al. 2016) are not only best-liked by hair transplant surgeons, but also are the preferred, best-tractable study object in human preclinical hair research in general. Previously, we had found that mammalian skin transcribes and translates *in vivo* the gene for the pro-hormone from which several key pituitary neurohormones are enzymatically generated,

proopiomelanocortin (POMC) (Norman & Henry 2017); this extrapituitary POMC expression we had found in mouse skin was hair cycle-dependent, with β -endorphin, another important POMC cleavage product, being most prominently detectable in HF-associated sebaceous glands of mouse anagen HFs (Slominski et al. 1992).

Yet, when examining healthy human skin samples, initially, we found only immunoreactivity for ACTH, another key POMC product, but interestingly, only in the epithelium of human anagen scalp HFs (Slominski et al. 1993). Many years later, we therefore probed this hypothesis: If human anagen scalp HFs generate ACTH in such a stringently localized manner, this should be under the control of *locally generated* corticotropin-releasing hormone (CRH), that is, the “hypothalamic” neurohormone that controls POMC expression and synthesis as well as ACTH production by pro-hormone convertases (Fink et al. 2010, Melmed et al. 2016). However, our studies in mice had suggested that murine pelage HFs prominently express CRH-R1, but they do not themselves transcribe and synthesize CRH (Roloff et al. 1998). Not deterred by this finding, we suspected that—as so often in hair research!—mouse HFs might be a misleading guide for human HF biology.

That is exactly what we found (Ito et al. 2004). Our study in anagen scalp HFs from female patients revealed widespread, specific, CRH-like immunoreactivity (IR) in the ORS, dermal papilla (DP), and keratinocytes of the most proximal hair matrix. This was backed up by RT-PCR evidence, documenting that scalp HFs also transcribe the CRH gene. Double immunofluorescence of NKI/beteb and CRH showed human HF melanocytes also express CRH-like IR (Ito et al. 2004). CRH-R1 IR was seen essentially in the same intraepithelial HF compartments. Interestingly, double IF (NKI/beteb and CRH-R1) showed that only *amelanotic* melanocytes/melanoblasts in the periphery of the most proximal hair matrix (Tobin 2011, Paus 2011) were double-positive, as opposed to the melanogenically active melanocytes of the hair follicle pigmentary unit (HFPU) that were NKI/beteb-positive but CRH-R1-negative (Ito et al. 2004).

Interestingly, we found the most intense CRH-like IR accumulated in the HF's basement membrane zone, that is, where basal layer ORS hair matrix keratinocytes most closely interact with the inductive fibroblasts of the connective tissue sheath (CTS) or DP. This begs the intriguing question of which role CRH/CRH-R-mediated signaling plays in the interaction of HF epithelium and HF mesenchyme. A recent study claims that the DP itself expresses CRH and even has an HPA axis equivalent of its own (Lee et al. 2020), which only underscores the need to systematically interrogate the role of CRH in the HF mesenchyme and basement membrane.

This simple IF and qRT-PCR charting exercise firmly established human scalp HFs as yet another extrahypothalamic respectively extrapituitary site of CRH and CRH-R1 expression (Ito et al. 2004) and showed that, in contrast to mouse HFs (Roloff et al. 1998), human scalp HF do transcribe and synthesize CRH. That ligand and receptor were predominantly seen in the same intrafollicular compartments, and predominantly both within defined compartments of the HF epithelium, suggested predominantly para- and

autocrine signaling mechanisms. This is important to note, since neuroendocrinologists are used to seeing their favorite neurohormones neatly compartmentalized in distinct cell populations and tissues, where one neurohormone is produced in compartment A (e.g., the hypothalamus) and then acts on corresponding receptors in compartment B (e.g., the anterior pituitary gland) so as to regulate the production of other neurohormones (Lechan 2020). This strict compartmentalization does not seem to exist in the HF.

Contrary to previous claims (Zouboulis et al 2002), our study showed that the entire human pilosebaceous unit, at least in female scalp skin, is a *bona fide* target organ of CRH signaling, since it expresses CRH-R1, and it suggested that the pilosebaceous unit is also an extrahypothalamic site of CRH production (Ito et al. 2004).

Shortly before this work, melanocyte stem cells had been identified in the bulge of mouse HFs (Nishimura et al. 2002), and their key role in human HF greying had been postulated (Nishimura et al. 2005). However, in human scalp HFs, bulge HF melanocyte stem cells are located a very far distance from the HF pigmentary unit (HFPU) in the anagen hair matrix, where graying invariably starts—and where it is reversible for many years, probably until the greying process also affects bulge melanocyte stem cells, after which it becomes irreversible (Paus 2011, O'Sullivan et al. 2020). Also, there is no evidence that bulge melanocyte stem cells are needed to continuously replenish the human HFPU during the many years that it must remain uninterruptedly functional during single anagen phase (Tobin 2011).

Instead, the population of CRH-R1/NKIbeteb-double-positive amelanotic HF melanocyte progenitors we had detected would be much better placed as a candidate cell pool to provide replacement melanocytes for the (terminally?) differentiated, non-proliferating melanocytes of the human HFPU (Paus 2011). Moreover, it is conceivable that defects in this putative HFPU replenishment system, for example, declining stimulation of these melanocytic progenitors with CRH and likely other locally produced factors, could contribute to the initiation of the greying process, in addition to accumulating oxidative damage in the human HFPU (Wood et al. 2009). Thus, clinicians and translationally minded hair biologists alike may wish to turn their attention to these CRH-R1/NKIbeteb-double-positive amelanotic HF melanocytes (O'Sullivan et al. 2020), for example, in order to probe whether their stimulation with CRH can reverse hair greying while it is still reversible.

Scalp hair follicles display a functional equivalent of the central HPA stress response axis.

Our previous work (Slominski et al. 1993, Ito et al. 2004) had already placed the first two key players of the central HPA axis (CRH→ACTH→cortisol) (Melmed et al. 2016) on the human HF neuroendocrinology map. This made us curious how human scalp HFs would respond to CRH and ACTH stimulation, whether human HFs might also synthesize cortisol, and, most importantly, whether any of this activity is functionally linked in a manner that resembles what is seen in the central HPA (Fink et al. 2010, Jameson 2017).

Natsuho Ito and her husband Taisuke Ito managed to

answer these questions (Ito et al. 2005). They showed that human scalp HFs do respond to CRH stimulation by increased transcription of the proopiomelanocortin (POMC) gene, thus demonstrating simultaneous functionality of the previously detected intrafollicular CRH-R1 receptors *ex vivo*, since they also found that IR for ACTH and α -MSH, which must have been processed intrafollicularly from the POMC pro-hormone, was upregulated *ex vivo*. Moreover, CRH, α -MSH, and ACTH also modulated expression of their cognate receptors (CRH-R1, MC1-R, MC2-R), mostly but not always in the manner predicted from the central HPA axis counterpart. This showed that yet another functional element of the central HPA axis was recapitulated in isolated human scalp HFs in serum-free organ culture (Ito et al. 2005).

Most importantly, the strongest stimulus for cortisol production in the adrenal gland, ACTH, also up-regulated intrafollicular cortisol-IR. Given that we had to use a cortisol antibody for IF that presumably works only in RIA, among all our data, we probably had the hardest time convincing the peer reviewers of our study of the validity of concept. Ultimately, the findings that cortisol synthesis was localized primarily in the hair bulb epithelium, where cortisol-like IR increased after ACTH stimulation of organ-cultured HFs, and that CRH stimulation of HFs increased cortisol levels in the culture medium, thus demonstrating cortisol secretion by human HFs, seems to have convinced the referees. This was the first demonstration that an intact key component of human skin, the HF, can engage in extra-adrenal glucocorticoid synthesis, and that this intrafollicular activity is stimulated by the relevant, locally produced HPA axis neurohormones (CRH, ACTH) (Ito et al. 2005).

This study also demonstrated that CRH modulates important functional parameters of human HF biology *ex vivo*: it inhibits hair growth and stimulates intrafollicular melanogenesis (melanin production). Importantly, we also showed that the glucocorticoid receptor agonist hydrocortisone (which is almost identical with endogenous cortisol) down-regulates CRH expression in the HF epithelium, thus demonstrating the presence of an HPA axis-like negative regulatory feedback system. Taken together, this provided the first *ex vivo* evidence for the existence of a fully functional peripheral HPA axis equivalent in an intact component of human skin (Ito et al. 2005).

Of course, this study raises numerous questions, most of which still await conclusive answers, such as: For what exactly does the HF use this elaborate peripheral HPA axis equivalent system? Current hypotheses on this run along these lines. On the one hand, this could be a classical endocrine stress response system, given that it generates three prototypic and interlinked stress response-hormones (CRH, ACTH, cortisol) (Slominski et al. 2007, Fink 2010, Nestler et al. 2015, Jameson 2017) which the HF may utilize as a fast-response system to directly and immediately manage environmental stressors (Slominski et al. 2000+ 2007+2018, Paus et al. 1999). Since no other (mini-)organ of the human body is more exposed to potential environmental stressors, ranging from hostiles/predators that grab and pull the hair shafts to UV-induced HF damage (Lu et al. 2009, Gherardini et al. 2019) as

well as stressor/"danger" signals emanating from the rich HF microbiome (Polak-Witka et al. 2019, Lousada et al. 2020) or skin pathogens, teleologically, it appears perfectly sensible for the HF to utilize the neuroendocrine stress response systems that skin epithelium may anyway have developed first during evolution (see Episode 1).

Immunological dimensions of the intrafollicular HPA axis equivalent

On the other hand, as indicated by the hair-growth-inhibitory and pigmentation-stimulatory *ex vivo* effects of CRH (Ito et al. 2005), the HF's HPA axis equivalent system likely plays many additional, functionally important roles in HF biology, many of which may not even have been discovered yet, namely, in regulating the relative immune privilege of the anagen hair bulb (Paus et al. 2005 + 2018). In fact, α -MSH functions a major HF "immune privilege guardian": it can both protect human HFs from IFN γ -induced immune privilege collapse and can effectively restore HF immune privilege even after it has collapsed (Ito et al. 2004).

This suggests that at least one POMC product generated within the HPA axis system of the HF, that is, α -MSH, plays a major role in the maintenance and restoration of the immunoinhibitory "cocoon" that shields a healthy HF from HF autoimmunity leading to long-lasting or even scarring/permanent alopecia. Of course, intrafollicular synthesis of the potent immunoinhibitory steroid hormone cortisol may serve similar "immune privilege guardian" functions (Slominski et al. 2007, Paus et al. 2018). In the next study, we will discuss yet another striking function of intrafollicularly generated HPA axis neurohormones, namely CRH-induced stimulation of the intracutaneous, bone-marrow-independent maturation of functional mast cell from resident progenitor cells in the CTS of human scalp HFs (Ito et al. 2010). It can safely be assumed that we shall soon discover multiple additional functions of individual neurohormones that are continuously being synthesized in human HFs under the control of CRH.

Interestingly, stress-responsive inflammatory hair diseases like alopecia areata can be associated with a dysregulation of the intrafollicular HPA system (Katsarou-Katsari et al. 2001, Kim et al. 2006, Guo et al. 2010). This raises the question how important normal functioning of the intrafollicular HPA axis is for human hair health. The Ito et al. (2005) study is also translationally relevant in the context of dermatological therapy with topical glucocorticosteroids, which are routinely employed for the treatment of inflammatory scalp disorders (Dawber 1997, Sterry et al. 2006): both topical and systemic glucocorticoid therapy in dermatology may have to be greatly optimized in order to avoid a longer-lasting disruption and suppression of the intrafollicular HPA axis equivalent. The latter could have deleterious consequences for HF immune privilege, for example, if externally applied glucocorticoids long-term suppress intrafollicular CRH and POMC expression and ACTH production and thus, ultimately, HF α -MSH and cortisol synthesis (Ito et al. 2005).

Finally, since psychobiological stress studies now routinely measure the hair shaft content of cortisol and other stress mediators as read-out parameters for psychoemotional stress (Meyer & Novak 2012, Carlitz et al. 2014, Brand et al. 2016),

it is critically important for proper data interpretation to be able to distinguish which of these stress mediators actually were generated *intrafollicularly*, and which ones were taken up by the HF from the circulation. Unfortunately, this is not yet possible as HF and serum cortisol are chemically indistinguishable. Moreover, it is as yet quite unclear whether and how psychoemotional stressors impact the *intrafollicular* synthesis of key HPA axis stress mediators, such as CRH, ACTH, and cortisol (Fink et al. 2010, Lechan 2020). Yet, many researchers who assess hair shaft levels of “stress hormones” and simplistically interpret the values they obtain as indicative of corresponding changes in the serum levels of these mediators ignore that scalp HFs actually have their own HPA axis equivalent system (Ito et al. 2005) (see above).

CRH promotes SCF release from hair follicle keratinocytes, which stimulates mast cell maturation from resident progenitors.

CRH is the central neuroendocrine regulator of perceived stress responses and a potent neuroendocrine activator of mast cell functions and induces, for example, mast cell degranulation (Arck et al. 2006, Paus et al. 2006, Theoharides et al. 2017). Therefore, we wanted to know whether and how exogenous CRH (as a surrogate for endogenous, HF-derived CRH) impacts on the population of skin mast cells that resides, in unusually high density, in the HF mesenchyme, namely the CTS. This was also interesting, since we had previously shown that these perifollicular mast cells contribute to hair growth regulation *in vivo*, albeit in mice (Paus et al. 1994, Maurer et al. 1997). We had also found that the prototypic stress-associated neuropeptide, substance P (SP), not only inhibits human HF growth, but it also induces the degranulation of these perifollicular human CTS mast cells *ex vivo* (Peters et al. 2007).

In a nutshell, what we could show here is that, in organ-cultured human scalp HFs, CRH stimulation rapidly induces a significant increase in the number of perifollicular mast cells, yet without altering mast cell proliferation (Ito et al. 2010). Since this occurred in the complete absence of bone marrow and functional vasculature, this could only be explained by mast cell differentiation from pre-existing, *resident* mast cell progenitors in the CTS. Moreover, we demonstrated that CRH largely induces this effect by stimulating SCF secretion from HF keratinocytes *ex vivo*, which then promotes progenitor cell differentiation. CRH also induces prominent degranulation of perifollicular mast cells, likely via CRH-Rs expressed on perifollicular mast cells (Ito et al. 2010).

This confirms that CRH is indeed a very important regulator of human skin mast cell functions *in situ* (Theoharides 2017) and suggests that CRH can both target and activate CRH-R+ perifollicular mast cells directly, and can increase their population by promoting the differentiation of resident mast cell progenitors in the CTS by stimulating SCF release from CRH-R1+ HF keratinocytes (Ito et al. 2010). This generated the first evidence in the literature that extramedullary mastopoiesis is possible in human skin from resident progenitors. (Most recently, we found that human skin can also generate another key

innate immunocyte population, macrophages, from resident progenitor cells *ex vivo* under conditions of SP-induced neurogenic skin inflammation [Gherardini et al. 2020].) This work also attests to the potency of neurohormones synthesized within the HF epithelium—and of the complexity of the functional effects we need to expect.

Interestingly, contrary to their reputation as allergy- and inflammation-promoting cells, under physiological conditions, perifollicular human mast cells actually display a profoundly immunoinhibitory phenotype; this gets transformed into a strongly pro-inflammatory one in alopecia areata lesions (Bertolini et al. 2014). Therefore, one important open question is whether and how intrafollicularly generated HPA axis neurohormones (CRH, ACTH, cortisol) regulate the degranulation, secretory activities, and phenotype switch of perifollicular mast cells in the human CTS, and the generation of differentiated mast cells from resident perifollicular mast cell progenitors in healthy and diseased human skin, for example, in inflammatory hair loss disorders such as alopecia areata.

While the Ito et al. (2010) study does not prove yet that it is indeed *intrafollicular* CRH that exerts the observed effects on perifollicular mast cells *ex vivo*, it supports the concept that one of the neuroimmunological effects of HF-derived CRH may be to shape and activate its immediate mast cell-dependent immune environment, thus “managing” these innate immunocytes, which not only are hair growth-regulatory (Paus et al. 1994, Maurer et al. 1997), but also may help to preserve the HF’s immune privilege under physiological circumstances (Paus et al. 2005, Bertolini et al. 2014).

CONCLUDING COMMENTS

It is gratifying to note that many individual findings of our 2004 and 2005 papers (Ito et al. 2004, 2005) have been independently confirmed. They have been expanded by subsequent reports showing, for example, that patients with alopecia areata show reduced expression of the main receptor for ACTH (MC-2R) (Kim et al. 2006), increased CRH and ACTH expression in lesional HFs (Guo et al. 2010), and the finding that phototherapy in alopecia areata patients can increase both ACTH and CRH production in HFs (Cuellar-Barboza et al. 2020). Also, there is a renaissance of interest in studying how perceived stress and/or its neuroendocrine mediators impact on the hair follicle in both mice (Wang et al. 2018a) and humans (Peters et al. 2017).

But if this mini-series episode has piqued your curiosity, and you’d now like to embark on your own discovery tour of stress- and HPA axis-related human hair research, you may wish to avoid some common pitfalls. A recent study, which claims that the DP of human HFs exhibits its own HPA axis equivalent, illustrates these exemplarily (Lee et al. 2020). If one, as in the latter study, only looks at isolated and cultured DP cells, but not at tissue sections of the HF itself, one cannot really draw any reliable conclusions on what the results mean for HF biology. Moreover, manipulating human DP cells in routine cell culture rarely ever provides much insight that is directly applicable to the HF as such—not the least because these specialized fibroblasts only retain their

inductive features and DP-like gene expression profile in 3D cultures (Topouzi et al. 2017) (which were not used in Lee et al. 2020) and because their physiological activities are very much dependent on a continuously maintained, intimate communication with hair matrix keratinocytes (**). Instead, under standard 2D culture conditions, DP cells rapidly begin to behave more like dermal fibroblasts, even though they can show fascinating expression patterns (which, unfortunately, do not really tell us anything reliable about human hair biology).

Also, under physiological conditions, such as within the HF, DP cells never go into apoptosis and probably proliferate only once very briefly, if at all. Instead, they mainly migrate in and out of the DP (trafficking activity can be easily assessed by counting the number of nuclei in the stalk of the DP on tissue sections, with a high number of nuclei indicating enhanced cell emigration from the DP [Kloepper et al. 2010, Hawkshaw et al. 2015]). Thus, measuring the impact, for example, of HPA axis hormones on DP proliferation/apoptosis responses of DP cells in 2D culture (Lee et al. 2020), rather than on their migration/trafficking, doesn't really provide instructive insights into hair biology. Finally, to support a credible HPA axis equivalent claim, one also needs to demonstrate the presence of negative feedback regulation (e.g., down-regulation of intrafollicular CRH expression by cortisol [Ito et al. 2005]), which is missing in the Lee et al. 2020 study.

Yet, many of these—often ignored—pitfalls in human hair research, which also need to be kept in mind when exploring HF neuroendocrinology, can easily be avoided, if one sticks primarily to using the human scalp HF organ culture model pioneered by Michael Philpott and colleagues (1990) and its subsequent refinements and applications (Langan et al. 2015). Our next episode will explore how this model can be utilized to also investigate another key neuroendocrine signaling system, the hypothalamic-pituitary-thyroid (HPT) axis.

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Regenerative Medicine and Hair Loss

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To Exosome or Not to Exosome

When searching “exosomes for hair loss” on Google, terms such as “brand new therapy,” “effective treatment,” “quicker onset,” “more robust hair growth,” and “hair loss rejuvenation breakthrough” first appear. It does sound very promising in a world where there is yet no definitive and permanent medical solution for hair loss, and every patient would definitely rush to book an appointment to save their hair once and forever.

Research into exosomes for hair restoration is a new development, dating to the spring of 2019 when physicians started investigating its efficacy for hair loss.

What does basic science say?

There are very few published research studies on this topic even though the original description of exosomes is over 30 years old. Exosomes are extracellular vesicles of the smallest size, which act as cell-to-cell transporters and messengers by carrying signaling molecules including transcription factors, cytokines, and RNA.¹ Exosomes have been demonstrated to be important modulators of paracrine signaling, and particularly dermal papilla (DP) cell-derived exosomes could be of major importance for hair follicle regeneration.² Studies have shown that exosomes play a critical role in cell-to-cell communication, and these powerful messengers are popularly called “avatars” of the cell.

The mechanism of action of DP-derived exosomes is still unknown, but it is thought that they increase proliferation of DP cells, hair matrix cells, and outer root sheath cells.² An exosome animal study in mice using intradermal injection of mesenchymal stem cell-derived extracellular vesicles concluded that there is an increase in progression from telogen to anagen phase, and prolonged anagen and delayed catagen phase.² Kwack et al. published another study in 2019 investigating whether DP-derived exosomes, especially those from three-dimensional (3D)-cultured DP cells, affect hair growth, cycling, and regeneration.³ Exosomes derived from 3D DP (3D DP-Exos) promoted the proliferation of DP cells and outer root sheath (ORS) cells and increased the expression of growth factors (IGF-1, KGF, and HGF) in DP cells. These preclinical studies show favorable outcomes, but more are needed to have implications for the development of therapeutic strategies for hair loss.

What does clinical data say?

There are currently no clinical studies applying extracellular vesicle or exosome therapy for hair growth. We are currently witnessing pioneering work by some of our esteemed ISHRS colleagues who are injecting their first group of patients and presenting some preliminary data and results.

There are several companies that supply exosome allografts isolated from living human bone marrow-derived mesenchymal stem cells (MSCs). One of them, Direct Biologics, is purifying by using proprietary cGMP processing, that then provides more than 1,000 regulatory proteins (anti-inflammatory cytokines, angiogenic growth factors, matrix regenerative signals, tumor suppressor signals) that are involved in processes such as angiogenesis, chemotaxis, cell proliferation, differentiation, wound healing, and tissue regeneration. Per early clinical reports, a single treatment with exosomes is sufficient, where they are diluted with saline and injected 0.1cc per cm². The company claims results as soon as four-weeks post treatment. Some of the before and after results of a single treatment with exosomes are shown below (Figures 1, 2, and 3). There is also a company that provides exosomes derived from human adipose stem cells, more precisely from adipose stem cell conditioned media (ASC-CM). The source of the exosomes should determine their effect, but we do not have to date how this affects hair regrowth.

FIGURE 1. Photos courtesy of Dr. Jerry Cooley. Patient before (left) and 1 year after (right) a single treatment with exosome injections. Dr. Cooley uses ExoFlo from Direct Biologics. Below patient was injected with 5cc of ExoFlo diluted in 5cc of preservative-free saline.



FIGURE 2. Photos courtesy of Dr. Dan McGrath. Patient before (left) and 8 weeks after (right) a single treatment with exosome injections. Dr. McGrath uses ExoFlo from Direct Biologics. Below patient was injected with 5cc of ExoFlo diluted in 5cc of preservative-free saline.



FIGURE 3. Photos courtesy of Dr. Robin Unger. A patient before (left) and 8 weeks after (right) a single treatment with exosome injections. Dr. Unger uses ExoFlo from Direct Biologics. Below patient was injected with 5cc of ExoFlo diluted in 5cc of preservative-free saline.



What does the FDA say?

In December 2019, the Food and Drug Administration (FDA) reported multiple serious adverse events experienced by patients in Nebraska treated with exosomes. The FDA has identified Las Vegas-based EUCYT Laboratories as the company whose exosome products, named XO-somes, derived from umbilical cord sickened patients in this state. When the FDA conducted inspections at EUCYT's manufacturing plant last November, it found violations including deficient donor eligibility practices, unvalidated manufacturing processes, deficient environmental monitoring, and inadequate aseptic practices, and it issued a lengthy warning letter.⁵ The FDA website states that there are currently no FDA-approved exosome products. It is common understanding that taking anything from a cultured source is more than "minimal manipulation" in the FDA's eyes, and is therefore placing this product in the illegal drug category.

The products taken from donors are required to be sterilized. Gamma irradiation destroys the DNA in all cells, not just the bacteria. If it's sterilized, it's going to be dead or about to die. As well, there is potential for mutation if any cells did survive.

If a product has live cells, the FDA has determined it is to be classified as a drug and needs to go through the same process as any pharmaceutical, which includes an FDA clinical trial (usually around a 5-year process) and involves getting an Investigational New Drug Application (IND). Any product that is live that is not registered this way is considered an illegal drug. However, none of these products are actually live, so they are not a drug, which makes it hard for the FDA to shut these companies down as the FDA only regulates drugs and devices.

On the other hand, Direct Biologics is one of the only labs in the country that has a current good manufacturing practice (CGMP) from the FDA. Adherence to the CGMP regulation ensures the identity, strength, quality, and purity of drug products by requiring that manufacturers of medications adequately control manufacturing operations.

What do the skeptics say?

There has been a lot of controversy about the use of exosomes, and without a doubt the single most important issue is actually understanding the biological significance of these structures. There are several important things to contemplate.

The exosomes coming from the "donor cell" contain many different biological constituents that include a large

number of varying proteins, mRNA, miRNA, and even double-stranded DNA. Exosomes can directly enter a cell with very little preventive mechanisms in place. Growth factors attach to receptors on the outside of cells, and if the factors are mutated or denatured, they simply cannot attach, and the message on the inside of the cell won't amplify. They also may not enter the cell, due to the lipid bilayer that protects the cell through its hydrophobic properties. However, exosomes are also made of lipid bilayers that allow them to enter the cell through endocytosis or direct fusion. This means the contents may be dumped directly inside the cell, or the exosome can travel into the cell and then make its way into the nucleus. If the exosomes are carrying mutations or "bad instructions," they can create a genetic mutation, which will then be tumorigenic and can replicate at will.

Exosomes do provide means of intracellular communication, but they can also spread "bad" communication. They have been shown to contain numerous disease-associated cargos, for example, neurodegenerative peptides in Alzheimer's disease and numerous neurodegenerative diseases (tau peptide).⁴

What does the author say?

As a big fan of regenerative medicine, this therapy captured my attention from the start. I need to further educate myself in basic biology to get a better understanding of the mechanism of action. I have not jumped into providing this therapy yet as I share some ethic and safety concerns based on early reports about potential risks. I think the basic biology and the applications of exosomes are in their infancy, and we know very little about their role in treating hair loss. I support my colleagues in their early work with exosomes, which is always challenging to execute. Several presentations at the ISHRS Virtual 2020 World Congress were persuasive, however, I always aim for more clinical research with relevant quantifying studies to justify any product's use and to ensure safety and prove efficacy, as well as to avoid creating confusion in the field and encourage further skepticism.

What do you say—to exosome or not to exosome?

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Medical and Professional Ethics

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Spotlight on Medical Ethics

This will be my last column as I have stepped down as the chair of the ISHRS Ethics Committee and passed on the baton. It has been

a privilege over the past 3 years to write the 18 articles that constitute this series, and it has allowed me to self-reflect on my own practice.

Former US Supreme Court Justice Potter Stewart stated: "Ethics is knowing the difference between what you have a right to do and what is right to do." In this sense, medical ethics is a process of self-discovery and the ongoing development of a personal understanding of what is right and wrong. Sometimes, we don't inherently know what is the right thing to think or do, but we learn from research, education, and discussion with others. Often, in medicine, there are guidance documents from our professional associations to help us decide what is the right course of action. The World Medical Association, established in 1947, states on its website that "a central objective of the World Medical Association (WMA) has been to establish and promote the highest possible standards of ethical behaviour and care by physicians. In pursuit of this goal, the WMA has adopted global policy statements on a range of ethical issues related to medical professionalism, patient care, research on human subjects and public health. The WMA Council and its standing committees regularly review and update existing policies and continually develop new policy on emerging ethical issues."¹

One of the outputs of the WMA is the Medical Ethics Manual, which was last updated in 2015 and is essential reading for anybody interested in this subject.² In this manual, ethics is defined as "the study of morality—careful and systematic reflection on and analysis of moral decisions and behaviour, whether past, present or future. Morality is the value dimension of human decision-making and behaviour.... According to these definitions, ethics is primarily a matter of knowing whereas morality is a matter of doing."²

The manual goes on to state: "In recent times medical ethics has been greatly influenced by developments in human rights. In a pluralistic and multicultural world, with many different moral traditions, the major international human rights agreements can provide a foundation for medical ethics that is acceptable across national and cultural boundaries."² This is important for an international society such as the ISHRS.

The aim of the WMA manual is to help physicians to better navigate through the many ethical challenges we face in our daily practice and find effective ways to put the patient first. I commend Dr. Brad Wolf for having an entire general session at the recent Virtual 28th World Congress dedicated to "The Patient," and I hope that future scientific chairs will continue to ensure there is a focus on patient-



Reflective Question

- Have I learned anything from the Medical and Professional Ethics series?

centered care. Much of our scientific meetings' content is dedicated to better, faster, and more efficient ways of doing our hair transplant surgeries, and whilst of course this is beneficial to our patients, there are other, and perhaps more important, issues that we must focus on. Dr. Dow Stough's lecture at the Congress on the Progressive Loss (PL) Risk Scale was one such issue. Is it ethical to perform a hair transplant in a young man with progressive hair loss and a family history of advanced hair loss? Whenever I see an end stage advanced Norwood VII patient in a crowd, I think to myself: "What if I had done a hair transplant on him when he was a young man...?"

There seems to be an increasing trend to try and offer patients as many follicular unit grafts as possible in one procedure or over multiple sessions. I have seen hair transplant clinics advertise "maximum number of grafts" or, worse yet, "unlimited number of grafts." Perhaps a better philosophy is to do as few grafts as possible to achieve a result that looks good objectively. It is important in many cases to ensure that the donor zone is not exhausted and that enough donor hair is left to deal with future needs. A balance needs to be achieved between a patient's current desire to have as thick a transplant as possible and the ethical hair transplant surgeon's assessment of the patient's future hair transplant surgery requirements.

Principlism is an applied ethics approach to the examination of moral dilemmas that is based upon the application of certain ethical principles.³ Tom Beauchamp and James Childress in their book *Principles of Biomedical Ethics* (1979) state that the following four prima facie principles lie at the core of moral reasoning in health care: respect for autonomy, beneficence, non-maleficence, and justice. These principles were discussed by Raanan Gillon in his article in the BMJ in 1994 and remain relevant today.⁴

But how do these principles apply to hair transplant surgery?

Autonomy: Patients have a right to control what happens to their bodies. This means making sure they are properly informed about the hair restoration process so they can refuse or accept the treatments being offered. My spotlights on honesty with patients and on framing, nudging, and informed consent addressed some of these issues.

Beneficence: All hair transplant doctors should strive to improve a patient's health and hair loss condition. This does not mean that all patients seeking hair transplant surgery should be offered it. Quite the opposite: it is important not to take advantage of patients and to decline to perform surgery

in those for whom it is not in their best interest. My spotlights on the vulnerable patient, guarantees and assurances, and puffery referenced some concerns in this area.

Non-maleficence: Most doctors will identify with the concept of “*primum non nocere*,” or “first, do no harm.” In hair transplant surgery, we know that there are consequences to having elective surgery for appearance-related reasons that must be balanced against the potential psychological benefits. For instance, scars result from harvesting donor hair. The quality of these scars varies and, with FUE, the amount of scarring increases proportionately to the number of follicular unit grafts harvested. We know that patients can be harmed from FUE overharvesting, but finding the balance between optimal recipient site hair density and adequate residual donor site hair coverage takes skill and experience. Hair loss is progressive, so a great hair transplant result today might look terrible in the future in a patient who does not want to use medication to stabilise their hair loss, who cannot tolerate them, or in whom they do not work. My spotlights on ethical marketing, social media, and whistleblowing highlighted matters around misleading messaging that can lead to harming patients.

Justice: This is perhaps the least applicable principle in hair restoration since it generally applies to the distribution of scarce resources and who gets what equally and fairly.

The ISHRS Operation Restore tries to address inequality by offering reconstructive hair restoration procedures to those who cannot afford it. I offer free surgery to selected burn survivors, and I encourage others to offer pro-bono surgery to deserving patients. However, justice also applies to respect for people’s rights (rights based justice) and respect for morally acceptable laws (legal justice). In my first column, I introduced the ISHRS Ethics Committee and its role. I said it is not the job of the Ethics Committee or of the ISHRS to police matters that deal with medical licensing or clinical care—this is the remit of the member’s regulatory or licensing body. However, ISHRS members are expected to adhere to the attestations they have signed, which includes a commitment to abide by the ISHRS’s policies and tenets. Prominent amongst these is the Code of Ethics. In that article, which was written 3 years ago, I wrote: “I hope you enjoy this new regular *Forum* column in which a variety of ethical topics will be discussed.” Hopefully you have!

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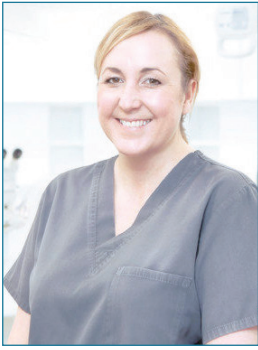





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Meeting Review

Rachael Kay, MBChB | Manchester, UK | rach.kay80@gmail.com

Review of the 28th World Congress of the ISHRS Virtual • October 17-25, 2020

This year has provided unprecedented challenges for all of us, including the necessity to reorganise the World Congress into an online format. The new virtual nature of the platform allowed accessibility to an extraordinarily diverse group of scientists, physicians, researchers, and guest speakers. This enabled a programme rich in educational content to be delivered in creative and innovative ways, all within the safety of our own homes.

The more familiar lectures were complemented by in-depth focussed sessions (workshops). Traditional poster sessions were replaced with CSI—Cases, Studies, and Innovations—that along with the lectures remain available to view for the next three months in either PowerPoint or poster format.

Overcoming the significant logistical and technical challenges this year has allowed the simultaneous connection of 650 surgeons from 64 countries. The exchange of ideas, techniques, and technologies with the common aim of improving patient outcomes and experiences was possible.

Implementing virtual social events and the addition of Fireside Chats helped to go some way to re-create the notion of collegiality and peer support, which we can hopefully resume in person next year!

Highlights from the 28th Virtual World Congress

Andreas M. Finner, MD, FISHRS | Berlin, Germany

DAY 1/OCTOBER 17, 2020

The first day went smoothly, featuring some very interesting talks and discussions. Despite some small issues, most users seemed very pleased with the virtual platform.

The Congress was opened by program chair [Bradley Wolf](#), who had important advice for us: Know your inspiration and always do what's best for the patient. Our society's president, [Francisco Jimenez](#), added: Know the hair follicle and find good collaborations with researchers and colleagues. Next, [Dow Stough](#) paid tribute to one of our pioneers, O'Tar Norwood, along with commemorating videos from several colleagues.



(L to R, top to bottom): Drs. Jean Devroye, Robert True, Maxim Chumak, and Samuel Lam prepare for the opening session.

General Session 1: New and Exciting: 21st Century Surgery

- [Jean Devroye](#) described the joy and process of inventing surgical innovations.
- [Gorana Kuka Epstein](#) showed that the short-term healing process after FUE was slightly better with the WAW than

with the MAMBA device. But she recommends to choose the device that the surgeon feels more comfortable with. The long-term healing has not been examined yet.

- [Roberto Trivellini](#) described a new long hair and short hair punch, which now has an octagonal part to reduce friction and generate vibration along with the mamba mode.
- [Arthur Tykocinski](#) gave tips on how to use a trumpet serrated punch on a multiphasic device.
- [Maxim Chumak](#) introduced the implantation of grafts with the ARTAS robot after being loaded into cartridges. The placing is somehow similar to sharp implanters, but there are still some obstacles to overcome such as popping and proper hair shaft orientation.
- [Antonio Ruston](#) presented "super coverage" after one session for those selected cases who have the appropriate coverage value in the donor area.
- [Samuel Lam](#) spoke about the role of FUT in an FUE world. He emphasized that surgeons should master both techniques to increase the yield and also treat women and other suitable patients with FUT.

General Session 2: Hair Follicle Regeneration

- The Norwood Lecture, given by [Angela Christiano](#), was entitled "Micropatterning of Hair Follicles, 3-D Bioprinting and In-Vitro Hair Follicle Formation." The goal of her exciting research is to replicate follicle induction and thus create hair farms. To determine the hair density, patterning and size, her group is printing tiny three-dimensional molds that create channel-like wells when pulled out of the surrounding dermis. After injecting both dermal papilla and epithelial cells, newly created follicles even grow in a natural tilt.



Featured Guest Speaker Dr. Angela Christiano presented in General Session 2: "Hair Follicle Regeneration" along with (L to R, top to bottom) Drs. Moonkyu Kim, Jerry Cooley, Maksim Plikus, Ratchathorn Panchaprateep, Robin Unger and Gorana Kuka Epstein.

DAY 2/OCTOBER 18, 2020

Day 2 was filled with very interesting practical and research presentations.



A live panel discussion enhances the popular Donor & Recipient session. (L to R, top to bottom): Drs. David Josephitis, Georgios Zontos, Otavio Boaventura, Robert True, Ali Abbasi

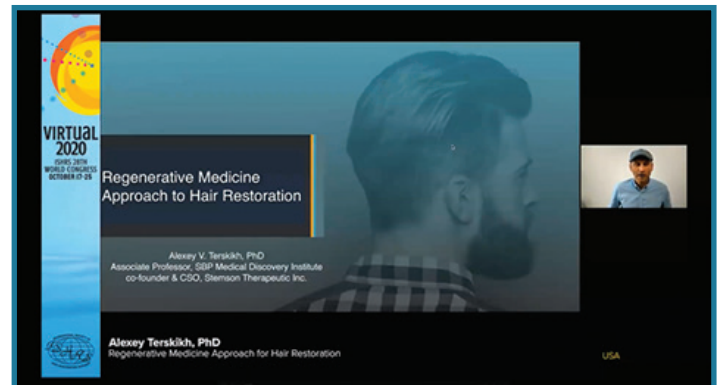
General Session 3:

- **Georgios Zontos** measured the superficial wound size on the skin surface and calculated that coronal incisions cause less recipient area injury and allow for higher densities and lower angles than sagittal incisions, as long as the depth is less than 4mm.
- **Gholamali Abassi** presented his study showing that a tumescent solution with 40mg triamcinolone acetate, 1cc of 1:1000 epinephrine and 100ml saline lead to edema in only 2.6% of patients.
- **Otavio Boaventura** performed a depth control analysis in 30 FUE patients. The average was 2.38mm, but the depth was higher in the occipital and upper occipital areas than in the inferior and temporal zones.
- **Bob True** suggested new strategies for placing FUE grafts if the safe zone is left during excision. The possibility of some non-permanent grafts, which may be saved by medical therapy, should be discussed with the patient. Those grafts harvested from intermediate zones above and below the safe zone should routinely be separated. They could be mixed with the others, intentionally placed widely and randomly distributed, or those from the upper zone are put into non-critical areas such as the center of the crown, those from the lower zone into the hairline and temples, especially in young men.
- **Jennifer Martinick** showed that transected hairs after

- **Jiro Kishimoto** presented a study showing significant results after injection of expanded dermal sheath cup cells (DSC). This may become an autologous cell-based therapy for pattern hair loss.
- **Jerry Cooley** had good results in 100 patients using bone marrow-derived mesenchymal stem cell exosomes for androgenetic alopecia.
- **Gorana Kuka Epstein** showed that a combination of fat and PRP worked better than either alone.
- **Ratchathorn Panchaprateep** found that the effectiveness of PRP combined with microneedling is higher compared to microneedling alone in a split-scalp study.

FUT will have some growth if they are not removed from the graft. But careful graft handling is crucial.

- **Kongkiat Laorwong** described the use of a double-loop closure in large FUT excisions (Pulley closure), with alternating far-near and near-far stitches starting on the lower wound edge, to hold the tension and approximate the wound edges.
- A poll during the session showed that a majority (52%) of participants perform both FUE and FUT.
- **Greg Williams** postulated that the laxity paradox of wide scars in lax skin may be due to a downregulation of thrombospondin, which may lead to a new therapy.
- **Bob Haber**, broadcasting from a virtual studio, showed how to remove a strip with minimal donor scarring. Adjusting the strip width to donor laxity, meticulous excision preferably by using the spreader and lower trichophytic closure are key techniques.



Featured Guest Speaker Dr. Alexey Tersikh shares his work in his presentation, "Regenerative Medicine Approach to Hair Restoration."

General Session 4: Hair Follicle Regeneration II and Implanters

- **Aleksey Tersikh** explained that neural crest-derived stem cells can generate facial and frontal hair. He showed that mouse epithelial cells and the newly programmed and generated human induced pluripotent stem cell-derived dermal papilla cells, when put into a biodegradable micro-scaffold and transplanted into mouse skin, could induce high numbers of new hair follicles. The following discussion mentioned that the cost for this technology using autologous iPSC-DP cells is still high, and it still has to be shown whether they

fully resemble the stem cells of safe occipital hair. For the moment, hair organoids are used in the lab to test the influence of different molecules on hair growth.

- **Young Sil Kim** introduced the concept of a membrane-free stem cell–derived protein complex, made from donor adipose tissue. A serum for external use, in a double-blind study, made the hair grow stronger and darker.
- **Salome Vadachkoria** observed a hair growth activation with polylactic co caprolactone based subdermal implants starting after 8 months in a small study. The mechanism of action may be a replenishment with stem cell activating lactate, which is reduced in androgenetic alopecia.
- An active panel discussion took place including the presenters and moderators along with researchers **Carlos Clavel**, **Claire Higgins**, **Ander Izeta**, and **Francisco Jimenez**.

DAY 3/OCTOBER 19, 2020

Day 3 of the Congress featured three very interesting Focused Sessions.



A panel of experts discuss the importance of hairline design. (L to R, top to bottom): Drs. Mauro Speranzini, Jeffrey Epstein, Piero Tesauo, Russell Knudsen, William Rassman, Jae-Hyun Park

101: Hairline

- **Jeffrey Epstein** explained the male hairline design. It should not be too rounded and be positioned into the horizontal plane and include micro- and macro-irregularities. He prefers single and some 2-hair FUs in Asian hair. At an acute angle, mostly singles are put into the hairline; larger grafts go into the forelock.
- **Jae-Hyun Park** demonstrated the female hairline design, which is round and irregular. He draws it in with the patient sitting, marking the midline to avoid asymmetry, and takes many photos. He explained his detailed “5-area-and-5-point-concept.” The common goal is to make the hairline less concave while avoiding to make it straight. The location of the points makes the face appear slimmer or larger, higher or wider. He creates the top face contour the same or slightly slimmer than the lower half of the face. In women, most hairs grow to the sides and very flat, with the change of direction part often located slightly on the left side.
- **Russell Knudsen** talked about the transgender hairline design. Most cases are male to female, preferably after facial surgery. He recommends careful planning and sometimes a stepwise approach according to stage of transition and goal of feminization. He uses

- **Moonkyu Kim** described the development of a KNU multi-implanter that can be loaded with 10 grafts.
- **Bill Rassman** (replacing Pascal Boudjema) presented further automation for graft handling and placement, called Hairvolution. A suction device can take grafts from a very big cartridge and load any implanter or an automatic implanter. A robot to incorporate all these steps is currently being developed.
- **Jae-Hyun Park** demonstrated the sharp rainbow implanter, which should be held with three fingers. He recommends placing from posterior to anterior and left to right, emphasizing the correct handling and ergonomics.
- **Leila Bloch** described a high-capacity implanter for 3 FUs, with a spacing of 2.7mm and staggered needles, to reduce the placing time.
- The session ended with a lively Q&A session.

the upper forehead crease for orientation. Female to male patients may have to be treated medically with minoxidil and 5-alpha-reductase inhibitors when taking testosterone.

- The panel discussion moderated by **Bill Rassman** mentioned that a hairline lowering may also help in females but may not be enough in females with a bitemporal recession. A hairline lowering in men is risky if AGA is present and progressive.
- **Piero Tesauo** discussed the live versus the computer simulation of a hairline. It is essential to communicate clearly to know your patient’s will, be honest, empathic, curious about the patient’s background, and consistent. Furthermore, “hairline” rhymes with “timeline.” It is often better to be less aggressive but plant more dense. In the live simulation, he draws the hairline and uses a little Toppik concealer, then takes photos and discusses everything with the patient looking into the mirror. The computer simulation with software such as Photoshop allows for a side-by-side comparison but may be more pleasant to the eye than the realistic result. In any case, it is important to simulate a plausible outcome to not risk an unhappy patient.
- **Mauro Speranzini** emphasized that the hairline is often the most important outcome criterion. He described the different patterns for men and women. Often, the patient asks for an inappropriate juvenile or female hairline pattern. Black market clinics often create female round or M-shaped hairlines in males. Do not give in! It helps to let them go online to look at celebrities in their 40s, 50s, and 60s. The central midpoint is placed at the transition from vertical to horizontal hairline. He pointed out that it is crucial to be conservative in young patients.
- The panel discussion emphasized that it is crucial to warn males of a feminine or children’s hairline, but it may help to put some singles in front of the actual hairline to create the illusion of a more forward design.



Dr. Henrique Radwanski leads the discussion "Eyebrows, Beard, and Body Hair Transplantation." (L to R, top to bottom): Drs. Henrique Radwanski, Marco Barusco, Kapil Dua, Carlos Eduardo Leão

102: Eyebrows, Beard and Body Hair

- **Sara Wasserbauer** pointed out that brows are not twins, but siblings. There is no perfect symmetry; natural brows are not perfect either. She uses almost only single hair grafts. For planning, she uses magnification to compare the donor and original hair. She designs the brow shape following special rules and by looking at old photos. There is a javelin flow of hairs towards the lateral side and a herringbone direction inwards. She is mostly using a 20G bent needle to make the sites very shallow, and is pulling medially while making sites and standing above the patient. To leave the graft hairs long, she prefers FUT. Patients may need brow gel later and often require some touch-up grafts. A previous tattoo or microblading may have left some scars and impaired growth.
- **Rogério Régis** demonstrated the FUT long hair technique in eyebrow restoration. He likes to choose the best singles (for the edges) and some double grafts (for the center). He is using a sharp implanter and puts a transparent film dressing on the eyebrows during the first 3 days.
- **Gorana Kuka Epstein** presented FUE for eyebrow transplantation. She likes that she can pick the size and width of each FU, also from the nape of the neck. She prefers singles and some parallel non-splayed double-hair grafts.
- **Kapil Dua** described the different beard zones to be treated. He mostly uses an infra-orbital and mental nerve block, then a field block moving downward from the temples. For small areas, he performs FUE from the lower beard itself, otherwise FUT or FUE from the scalp. He prefers coronal slits and an acute angle, putting only singles into the upper cheek. The moustache hair grows outwards and downwards. Implantation is more difficult compared to the scalp. Cobblestoning is a complication mostly occurring on the chin, which can be avoided by trimming of the epithelium and can be treated with dermabrasion or ablative laser.
- **Carlos Leao** demonstrated FUT for beard reconstruction because it yields long hair and is faster as he prefers general anaesthesia. He then explained his beard design planning. He puts moistened gauze into the

cheeks to facilitate the surgery and is using the stick-and-place technique at an acute 20% angle.

- **José Muricy** showed that the beard is a good donor area in patients with insufficient scalp donor hair. He also presented more than 300 FUE patients with body and beard harvesting. He uses 5% minoxidil on the donor area pre-operatively, and he prefers local anaesthesia with ropivacaine and sedation. Beard hair grafts mostly consist of very thick singles and are therefore used for the intermediate and crown regions and mixed with hairs from body and scalp grafts.
- **Pradeep Sethi** described the indications and techniques for body hair transplantation. In his opinion, beard is the best body hair source and leaves the least visible post-op scarring. However, occasionally, keloids and pigment changes can occur. Beard and body hairs are usually mixed with scalp hair. Their use in the hairline and central crown should be avoided. Different cycling and growth characteristics lead to a less predictable outcome than in scalp hair.
- **Henrique Radwanski** emphasized that hair transplantation into scar tissue is possible if there is enough donor hair. It is important to plan ahead how many sessions will be necessary and whether the recipient area needs a preparation such as fat grafting. Premade sites pose a lower risk of graft popping.
- The speakers participated in several discussion periods with questions posed by the audience and moderated by **Marco Barusco**. An active Fireside Chat followed the session.

103: Basics of FUE: Types of Machines and Punches and When to Use Them

- **Bruno Ferreira** presented FUE basics and best practice. It is important to ensure good patient candidacy, to measure the coverage value, stay in the safe zone, and avoid transection by adjusting the technique or instruments to preserve the donor area. Grafts should be handled carefully, always kept hydrated, and not stay out of the body for too long.
- **Conradin von Albertini** gave an overview of FUE devices. He emphasized the overall larger donor wound surface in FUE and the importance to avoid graft transection. Modern instruments can help to reduce donor skin injury while still being gentle to the grafts.
- **Emorane Lupunzula** gave practical tips on how to use the manual punch. It allows for good tactile control but may lead to some surgeon fatigue in high graft numbers.
- **Bruno Ferreira** showed his technique of motorized punch excision, followed by microscopic graft quality control and sharp implanter use.
- **David Josephitis** demonstrated the WAW hybrid device, usually starting with 0.9mm punches and then adjusting the size and length after some trial excisions. He often moves upwards on the donor area and sorts the grafts by size and time of excision, placing them with dull implanters.
- **Conradin v. Albertini** described his multiphasic Trivellini device technique. His usual steps are push,

rotation 80% for 300ms and oscillation 70% power, 120 degrees for 300ms. His favourite punches are 0.9 and 0.95mm.

- **David Josephitis** presented a comprehensive comparison of devices, which may have their special indications in different hair and skin types and parts of the donor area. Patient examples helped to illustrate the differences.

DAY 4/OCTOBER 20, 2020

Day 4 featured three very instructive Focused Sessions.

201: How to Avoid, Repair and Hide Bad Scars

- **Alex Ginzburg** explained that key factors to avoid bad scars in FUT are respecting scalp laxity, good donor area choice, strip width, the tension of closure, avoiding bipolar hemostasis, and a trichophytic closure on the inferior edge. For closure, he recommends clamps and a double layer suture. Scar problems in FUE occur in low density donor areas, due to keloids or after too dense excisions. Punches should not be too big. Do not harvest adjacent FU, he warned.
- **Bob Haber** said that for scar optimization, a careful donor assessment, harvesting, and closure are important. He demonstrated his spreading device and stapling. In FUE, the punch size and harvest pattern are important factors.
- **Marcelo Pitchon** recommended to avoid tension and transection on the borders and any pinching of the skin with forceps. He demonstrated his technique, recommending for the incision to move the scalpel forward to see the hair direction. He then uses skin hooks to incise parallel to the follicles. He also demonstrated a shallow horizontal subcision just below the bulbs. He showed his mobility check excising a small strip section first. He prefers a minimal tension closure, which he achieves by a very loose closure with absorbable sutures.
- **Antonio Ruston** warned to be careful with young body-builders. He routinely recommends 4 weeks of scalp massage pre-op. Otherwise, he uses diluted hyaluronidase on the operating day and a short massage. He performs a two-layer closure with superficial staples. FUE carries the risk over-harvesting. He therefore maps



Dr. Akaki Tsilosani prepares to lead the Focused Session "How to Avoid, Repair, and Hide Bad Scars."

- the whole donor area before, calculating the coverage value, and follows a zigzag pattern of FU excisions.
- **Akaki Tsilosani** recommends to obtain straight wound edges in FUT, to use skin hooks for better visibility, to perform a tension-free closure, and to aim for minimal transection on the wound edges and a close approximation. He uses the Haber spreader especially in females. He prefers a 4.0 monocril retention suture and 3.0 nylon, performing a trichophytic closure. In FUE, a 0.9mm punch size would be optimal and limiting the first session to max 2,500-3,000 grafts.

- **Emorane Lupunzula** gave an overview of the history and ongoing evolution of FUE.
- The final panel discussion emphasized that it is helpful to master different FUE techniques and instruments, learn from colleagues, and keep trying and practicing.

- The panel discussion mentioned that different punches have different diameter measurement parameters. Marcelo Pitchon only does trichophytic closure when he thinks it is the last session. It is important to advise patients about avoiding scalp stretch for several weeks. The panelists don't do undermining anymore, most of them wait around 2 weeks before they remove the stitches.

How to Repair Bad Scars

- **Alex Ginzburg** demonstrated how to repair bad scars. Often, the scar will have the same width after a second excision. He therefore prefers a running W-plasty with small triangular excisions of the wound edges. He is first using subcutaneous stitches, followed by a superficial 5.0 nylon running suture.
- **Bob Haber** explained that a scar revision may be difficult because of intrinsic problems with the patient's skin. In full scar excisions, he tries to do it the opposite way it was done before. A partial re-excision may be the way to go depending on laxity, or grafting into the scar. His general advice was to set the expectations low in scar repair.
- **Antonio Ruston** recommended to first reduce the scar if it is wider than 3mm, for example, with large punches and then stitching together the saw-tooth edges, then adding SMP or FUE after 6 months.
- **Akaki Tsilosani** listed the options of scar camouflage: a tension-free trichophytic closure, W-plasty, grafting into the scar with FUE grafts with a shallow angle, SMP, or hair prosthesis.
- **Alex Ginzburg** went over some options to hide bad scars: longer hair, concealers, or doing SMP—which is an art—into linear or pinpoint scars.
- **Bob Haber** demonstrated the camouflage with make-up such as DermMatch. SMP has to be done very superficially, putting small pigment spots into the papillary dermis using special needles. He warned to avoid painting. It is better to do irregular spots, and feather them to blend into adjacent areas.
- **Antonio Ruston** showed how SMP requires a long learning curve.
- **Akaki Tsilosani** demonstrated FUE from body hair to hide overharvested FUE scarring.

202: Delectable Injectables: PRP, Exosomes, and Stem Cells Scientific Updates

- **Jiro Kishimoto** showed that expanded dermal sheath cup cells migrate into the dermal papilla region and differentiate into DP cells. The increased number of DP then secrete signaling molecules to stimulate hair growth.



A lively discussion on injectables and what that means for the field of hair restoration surgery. (L to R, top to bottom): Drs. Gorana Kuka Epstein, Piero Tesauero, Shadi Zari, Ramon Llull, Mario Marzola

- **Carina Nicu** explained that dermal white adipose tissue has promoting effects on hair follicle growth and pigmentation, for example, via paracrine excretion of HGF, by downregulating SFRP1 in the DP to activate the Wnt/ β -catenin pathway, and by upregulating keratinogenesis genes.
- **Peter Everts** discussed a possible 2020 standard for PRP. It should contain more than 1.5 million platelets per microlitre and be mostly free of red blood cells and neutrophils, while lymphocytes and monocytes may be beneficial in tissue repair and regeneration. The role of platelet activation is not clear yet.
- **Shadi Zari** spoke about the role of exosomes in the management of AGA. They contain functional DNA, RNA, and proteins that can stimulate the mesenchymal-epithelial cross talk leading to hair restoration, and they protect these particles from degradation. They can be produced and stored in large quantities. Their effect was first noticed when using stem cell conditioned media, followed by studies in mice which also showed an effect of DP-cell-derived exosomes on hair growth. To date, there is only one human study in 20 patients. There has been an FDA warning because there have been cases of infections. He is using a Korean and Saudi approved exosome therapy made by artificial reconstruction from purified stem cell conditioned media, which contains no cell remnants.
- **Piero Tesauero** described the role of macro- and nanofat grafting in scalp and facial scars. He likes to use an all-in-one system called Seffihair®. Pre-treated areas can often be transplanted with a higher density. However, many questions still remain regarding the mechanism, dosage, etc.
- **Ramon Llull** talked about healing parenchyma with mesenchyma. There are two isolation methods for adipose stromal fraction cells, which include fibroblasts, endothelial cells and mononuclear cells. One option is an enzymatic dissociation to get isolated cells which require enzymes and may include senescent cells. The other option is mechanical disaggregation of a 20cc lipoaspirate that yields cell aggregates such as Nanofat® that are enzyme free, highly concentrated, maintain

their structural properties and essential function, and are subject to less regulatory issues. The aggregated cells can keep their mesenchymal properties, such as causing local ischemia, and thus stimulate angiogenesis at the dermal papilla and thereby support anagen induction of hair follicles.

- **Gorana Kuka Epstein** described the increasing evidence that fat grafting is useful to treat different alopecias, often in combination with PRP or hair transplantation. She warned to be cautious especially in the frontal scalp area as embolism can occur. The risk is higher with microfat using a cannula compared to nanofat using a needle. All these treatments are temporarily effective. She also warns of false advertising and missing regulatory approval in some countries.
- During the active panel discussion led by **Mario Marzola**, Gorana said she prefers a combination with PRP to maintain the effect. She re-treats when the fat is fully absorbed, usually after 6-12 months. It is advisable to wait at least 3, or better 6, months for the angiogenesis and anagen onset before doing a hair transplant.

203: Advanced and Challenging Surgical Cases

- **Christian Bisanga** talked about megasessions that involve more than 3,000 FUs but require a well-trained staff (500-600 FU per assistant). Patient evaluation is crucial to determine candidacy and choose the appropriate technique or a combination. It is a mistake to do megasessions in young patients where the safe donor and extent of baldness zone is still unclear. He described criteria when large FUE and FUT procedures are possible and their potential complications.
- **Márcio Crisóstomo** talked about megasessions combining FUE and FUT and even body or beard harvesting. He does them in one session or on two consecutive days, to obtain more grafts without pushing each technique to its limits.
- **Anil Garg** spoke about body hair transplantation (30% of grafts) in combination with scalp harvesting (70% of grafts). The right positioning of the patient is crucial. He likes to use local anaesthetic creams followed by injecting local anaesthesia. Skin stretching is helpful during beard FUE; a 2mm depth is usually enough. He often does simultaneous excision and insertion into premade slits, sometimes with the help of a dilator needle for fine chest hair.
- **Jae-Hyun Park** talked about Asian hair. The skull shape in Asians is usually wider. The hairs are black and in East Asians often have a high contrast to the white skin. The scarring tendency is higher, the skin is more rigid and fibrotic. The hairs are relatively thick and long. Body hair is scant. Therefore, the donor hair reserve is smaller. In FUE, the punch size is higher and less hair can be harvested.
- **Patrick Mwamba** spoke about African hair. Fronto-temporal recession is common in women and may be due to alopecia areata, frontal fibrosing alopecia, lichen planopilaris, traction alopecia, or scarring from chemical relaxers. Trichoscopy and a biopsy are helpful. Central

centrifugal cicatricial alopecia can mimic androgenetic alopecia. Acne keloidalis nuchae is a relative contraindication for hair surgery, especially when punches are too big. Ingrown hairs, folliculitis and pigment changes are common complications.

- **Humayun Mohmand** talked about hair restoration in burn cases. The vasculature, fat, and nerves are often impaired in third-degree burns. Skin grafts or expanders may be required before hair surgery. Sequential grafting with lower densities may be necessary.
- **Antonio Ruston** described repair work using FUE, SMP, and the coverage value. He showed how to improve the hairline, the temporal peaks, and strip or FUE scars. Medical treatment may be added. Too low hairlines can often be treated with laser therapy. Mixing FUE grafts with SMP can add coverage.

DAY 5/OCTOBER 21, 2020

Rachael L. Kay, MBChB

Day 5 featured three excellent Focused Sessions, each followed by engaging Fireside Chats.

301: Ditch the Clippers' Preview Long Hair and No Shave FUE

This session was designed to describe the fundamentals of these techniques and how to introduce them into practice.

- **Marcelo Pitchon** and **Ricardo Gomes de Lemos** introduced the session, with an emotional video from Dr. Pitchon displaying the immediate results of long hair FUE procedures to both the patients and their families.
- **Akaki Tsilosani** discussed long hair FUE, which utilises longer hair between 3-8cm rather than the conventional shaven 2mm length. He described a historic reluctance to adopt this concept in the field that has gradually diminished. One of the main advantages of the process being the immediate reveal of the aesthetic results to the patient. It can help patients understand and appreciate the hairline design. It is important to note that the initial visualisation is at 100%, when in reality only 80-90% of transplanted follicles will grow. Also, the presence of small crusts on the scalp can give the illusion of greater density. The patient is educated about both of these elements and for these reasons the final outcome may not be as pleasing as this initial reveal on the day of surgery. Personal Growth Index can be calculated by estimating the difference between the hair density as a percentage at transplantation compared to that of 1 year later. Options for extraction include punches with a slit in the lumen or Trivellini's long hair punch. Cases are limited to 1,500 grafts due to the complexity of the process. Long hair FUT is the preferred source rather than FUE.
- **Luis Roberto Trivellini** again reflects the advantages for both patient and surgeon being able to see immediate results. It may be that fewer grafts are needed than was originally planned thus conserving the donor area. Reflections were made on the early evolution of the process back since 2011 and how these contributed to the current long hair FUE technique and instruments.

- **Asim Shahmalak** presented the challenges of eyelash reconstruction. Active trichotillomania or alopecia areata are relative contraindications. 50-80 eyelashes per side can give cosmetic improvement. The harvesting is done by FUT or long hair FUE. He is using a French eye needle for insertion. Long-term maintenance including trimming, perming, and mascara is required. Acid burn victims are especially thankful.
- **Emorane Lupanzula** talked about temporal peaks and advanced hair loss reconstruction. Careful positioning and the use of irregularly placed singles and doubles is key. In general, good donor area management is crucial in advanced or advancing cases.
- The panel discussion stressed the importance of medical therapy to avoid alopecia progression, especially when hairs were harvested outside of the safe donor zone.

The new long hair punch has a diameter of 0.95mm, and there are 4 micro openings along the edge of the lumen allowing the longer hair to slide in and avoid transection. There is appropriate software on the new mamba machine specifically aimed at long hair FUE. A useful tip is to only anaesthetise half of the head at a time given the extractions take twice as long. Hairs superior to those being extracted should be gently repositioned vertically to avoid excessive traction on the skin. When starting out, it is advisable for the assistant to extract each hair once it has been excised. Stick-and-place is the preferred option for placing. The receptacle developed for the grafts contains saline to ensure graft hydration and also has a suction element that allows removal of some of the surface blood avoiding tangling of the longer hairs. It is not thought there is a marked difference between survival of long hair FUE grafts versus conventional FUE grafts in Dr. Trivellini's clinic, although it has not formally been studied yet.

- **Laura Caicedo Albarello** highlighted further advantages of long hair FUE, including greater control of the angle of insertion and visualising the curl of the hair. Impressive cases were demonstrated using long hair transplantation for beard and eyebrow. During beard-to-beard transplantation, simultaneous anaesthesia of recipient and donor further improved efficiency. Implanting can begin simultaneously with continued extraction. Slightly longer beard hair allows for correct curl alignment and accurate coverage assessment. For eyebrow transplants, local anaesthetic and Klein solution were used; the mamba with long hair parameters is the preferred equipment to extract long hair FUE grafts. The grafts are trimmed prior to insertion in the brow but are left long enough to assess the hair direction and curl. It is essential to have adequately trained staff for this procedure. Brows may include between 150-400 grafts each side. Two-hair grafts are only utilised if they lie in a parallel orientation to avoid unwanted splay.
- **Marie Schambach** explained her study comparing shaved v long hair FUE methods and results. In particular, it looked at the hair/FU coefficient, total FUs extracted per area, total and partial transection, number of FUs placed

in an area, and excision time and placing time. Parameters used for extracting the long hairs included oscillation 240 degrees, 60% force 400m/s, pedal initiated, using a long hair punch. For the shaved hair rotation for 200m/s, 60 % force, followed by an asynchronous roto-oscillation for 200m/s whilst using a 0.9mm flared punch. It was concluded that in preview long hair FUE there may be a slight reduction in graft quality with higher partial and total transection rates. It also takes twice the time to excise and extract the grafts (time and practice might improve this). However, in preview long hair FUE, you can better manage the donor because coverage can be better managed during placing. Incorrect curvatures can be adjusted. Extraction in a particular zone can be lengthened or shortened depending on the remaining coverage in that section. It is important to ask the patient how long they intend to keep their hair. Other applications for preview long hair FUE include beard, eyebrow, eyelash, and triangular alopecia.

- **Jae-Hyun Park** shared his thoughts that preview long hair FUE is considered the most advanced technique in the field of hair transplantation. The absence of donor shaving is appealing particularly to female patients; even with the expected shedding, appearances are thought to be more natural. Dr. Park has developed open window punch with oscillation arc at 270 degrees; the window can be single double/single/triple. He also shared some pearls in terms of positioning the patient: preferably, the patient is sat upright, on a chair with adjustable height, and the patient's neck may need to be flexed to obtain hairs lower than the occipital protuberance.
- **Marcelo Pitchon** feels long hair preview optimises and preserves donor area whether done by FUE/FUT; he also utilises stick-and-place. The panel discussed the importance of warning patients of subsequent loss of transplanted hair as with conventional FUE, and although concern was raised about psychological shock to patients when hair falls at a later stage, it was not thought to be an issue in current practice.

302: Implanters—Dull, Sharp and Multiple Needle, and How to Incorporate Them into Your Practice

Directed by **Marie Schambach** with discussion periods moderated by **Otavio Boaventura**.

- **Leoncio Moncada Lion** | Uses a hollow needle to protect the graft, the plunger retracts as graft is inserted into the skin. It should be loaded by holding the graft above the bulge. It is comprised of 8 parts. It is straightforward to change the needle when required. Easy to use and allows high-density packing. Start with the implanter perpendicular to the skin and then angle forward to the desired position.
- **Jae-Hyun Park Rainbow Sharp** | Seven unique features; each colour of the rainbow, ranges between 0.6-1.2mm diameter. Easy to see the colour (and therefore know the implanter size) with colour at both the handle and the tip of the implanter. The presence of the black line at the distal tip allows the surgeon to see which direction the bevel is in allowing easy placement. There is a protruded

area on the body of the implanter on the same side as the bevel, enabling the surgeon to easily identify the orientation of the bevel. Each is available in wide or narrow channels depending on the individual grafts. Up to 1,600 grafts per hour can be placed when used effectively.

- **Mauro Speranzini Rainbow Blunt** | Dull needle implanter, ideal for surgeons who prefer to premake the incision sites allowing technicians to then place the grafts, reducing surgeon fatigue. 0.5-0.9mm incisions can be made for single-, two-, and three-hair grafts, respectively, using these implanters. Dr. Speranzini feels the reduced size of the incision is advantageous, as well as the protective effect of having the graft in the implanter with potentially less trauma to the bulge area. The epidermis is grasped to load into the lumen of the implanter. For sagittal incisions, the bevel must face to the left then rotate 90 degrees anteriorly.
- **Parsa Mohebi Mohebi** | The Mohebi inserter was designed to protect the fragility of FUE grafts. Similar to the Keep but with a more rounded bevel. It has a blunt tip, an opening at the top, with depth control; it is autoclavable and available in different sizes. Grafts are scooped into to the bevel of the inserter from the fingertip of the technician. Grafts can be placed with one hand, more than one technician can place at the same time, and it has a short learning curve.
- **Antonio Ruston KEEP** | Grafts are loaded with a rotational movement over the graft from the fingertips of the technicians. Must penetrate only the tip of the KEEP implanter into the skin, into a premade incision, using forceps to slide the graft into the incision. Loading the graft into the implanter has minimal trauma. 0.6-1.0mm sizes available. Two placers enable placement of approximately 1,200 grafts per hour. When calculating depth control, the grafts are measured and then reduced by 1mm to enable protrusion of the epidermis above the skin surface. Discussion confirmed those using the KEEP and the dull implanter have similar size incisions premade. KEEP works well for sagittal incisions. Dr. Ruston feels that there is no role for forceps when placing FUE grafts.
- **Jean Devroye WAW Inserter** | There are three sizes available. Many grafts are pre-loaded into the implanter, with the curve facing downwards. The grafts are then placed using gentle encouragement down the lumen with forceps into the premade incision. The implanters are stored in solution to avoid dehydration. Although the device can store 7 grafts, it is recommended to use it for 3-5 grafts only as preferred by the technicians for ergonomic regions. The aim is to improve efficiency and reduced trauma or J-shaped grafts.
- **Luis Roberto Trivellini T fast** | The main aim is once again to reduce surgery time with all of the benefits that brings along with it. There are two sharp needles in parallel, one slightly longer than the other, to facilitate simultaneous insertion of the grafts. Then a single needle implanter is used to fill in spaces between. This is a disposable device that will cost approximately \$10(US).
- **Moonkyu Kim INRUT** | Developed to improve speed and

efficiency. Enables 10 grafts to be placed from one loader in succession. Ten separate needles are contained within a rotating central cartridge device where the 10 grafts are loaded. There is a 4-step approach to delivering the graft. It can reduce surgery time, risk of needle-stick injury, and graft out-of-body time. However, time is needed to adapt to the differing ergonomics of using the wider cartridge pen device, which contains the 10 needles.

- **William Rassman** *Reel Multi* | This is a prototype of a device designed to be used with only one doctor and one assistant.

303: Designing Your Own Research Project—Tips on Writing Clinical Trials, Protocols and Abstracts

Marco Barusco and **Dow Stough** co-moderated the session.

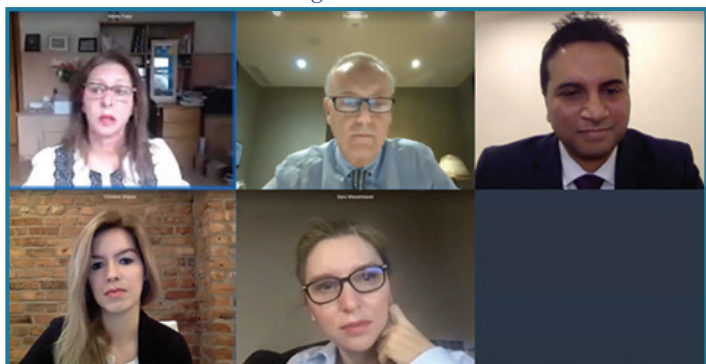
- **Marco Barusco** delivered a concise introduction to the terminology of study designs. Details of observational, experimental, and literature reviews were discussed along with the pyramid of evidence that has randomised controlled trials at the highest point indicating the strongest evidence base. Detailed information was shared on the principles of varying types of scientific studies, complemented by terms used in calculating results, such as mean, standard deviation, and confidence interval and P value. Perhaps most importantly a poor study will only produce poor results.
- **Dow Stough** emphasised the necessity to understand the fundamentals of clinical trials and which elements of the studies are required and validated in each country. Sponsorship, investigators, ethical review board, informed consent, confidentiality, ICH guidelines, good clinical practices (GCPs), and protocol composition were detailed.

- **Jerry Cooley** discussed transforming an idea into a research project. Think about these concepts: What is your question? How will you answer it? And what are the potential obstacles? The different elements of a study were reviewed including control arms, randomization, blinding, statistical and clinical significance, confounding variables, and the power of a study.
- **Greg Williams** spoke on how to compose a research grant proposal, having been granted 6 since 2016. Familiarising oneself with the funding source and their remit and reading guidance documents are essential. The ISHRS grant guidance comprises 8 concepts that must be addressed in the application and supported with an evidence base where appropriate: aims, importance, preliminary studies, experimental design, literature cited, ethics approval, background, budget. Noted the importance of professional presentation and allowing yourself time to complete the project.
- **Aditya Gupta** discussed ethical considerations of research projects, such as research sponsors that might influence reporting, noting that conflicts of interest should be disclosed. Reporting negative results and correct and transparent reporting of results is essential. Details of some pitfalls were discussed and how to avoid them, including involving a statistician.
- **Carlos Puig** shared tips on how to get your research protocol funded by the ISHRS. He explained the composition of the ISHRS Grants and Awards committees and the grant review process, and the specific criteria of the committee.

DAY 8/OCTOBER 24, 2020

Andreas Finner, MD, FISHRS

General Session 5, “Non-surgical Treatment and Scarring Alopecia,” was moderated by **Paul Cotterill** and **Nilofer Farjo**. CSI poster winners were announced and were encouraged to submit a manuscript of their poster to the FORUM ePUB at ishrs-htforum.org.



Drs. Paul Cotterill and Nilofer Farjo moderate a discussion about the medical treatment of hair loss. (L to R, top to bottom): Drs. Nilofer Farjo, Paul Cotterill, Vikram Jayaprakash, Christine Shaver, Sara Wasserbauer

- **Vikram Jayaprakash** talked about finasteride dosing in the face of exogenous testosterone supplementation. He explained the important functions of testosterone and that there is a constant reduction after the age of 35. The optimal testosterone replacement can be

titrated. In an analysis of 26 men (52-83 yo) on testosterone cream 100 mg/ml, 16 required higher doses of finasteride than the usual 1mg, three times a week, which he usually prescribes. There were no side effects of finasteride. Some patients required additional aromatase inhibitors due to raised estrogen levels. In conclusion, supplementing testosterone will often lead to a rise in DHT levels at the follicular unit and require higher doses of finasteride.

- **Antonio Ruston** raised the question whether an improvement seen in some advertisements is actually a finasteride effect or a real result. He emphasized the role of combining finasteride and hair transplantation, especially in younger patients. Many internet results may mostly be due to a finasteride effect and be presented as fake results from surgery only. He showed amazing results of using finasteride only in the recipient as well as the donor area. My takeaway message was that starting medical therapy 6-12 months before the surgery is not only more honest but may also motivate patients to continue after the procedure.
- **Sara Wasserbauer** gave a comprehensive overview of the role of photobiomodulation to treat hair loss. It is an adjunctive therapy. Results may vary depending on the underlying pathology, the wavelength and dose, the treatments interval (usually 1-3 days), the pigmentation

of hair and skin, the hair length, the use of a laser vs. LED, the distance to the scalp, and many other factors.

- **Christine Shaver** talked about the use of finasteride for transgender patients (M to F) undergoing HT. Although they may be on chemical or physical castration, their testosterone will and should not go to zero. So there is some risk for alopecia progression. The adrenal glands are another source of testosterone. She recommends to consider adding finasteride, but to avoid it if there is any evidence of depression or sexual dysfunction. You may also want to add minoxidil but there is a small risk of increased facial or body hair. In fact, a potential breast growth may be beneficial. Ultimately, these stabilized patients may need less surgery in the crown area, so more can be done in the frontal scalp.
- The panel discussion agreed that lower doses of finasteride may be advisable initially. It helps to convince patients with before-and-after-medication photographs. Sara reminded us of the bucket of hair analogue: The bucket has a leak, with medical therapy you can make that leak as small as possible. Sara always has the transgender patients wait a year to see the finasteride effect.
- **Mark Waldman** talked about the consultative scalp evaluation. He reviewed the clinical clues and trichoscopic signs to recognize primary cicatricial alopecias. He recommended a biopsy from the active edge to confirm the diagnosis and warned us not to transplant when active inflammation is present.
- **Aron Nusbaum** talked about the incidence of LPP in hair transplant consultations. Dermoscopy has been a game changer to evaluate the donor and recipient areas. Missing an inflammatory scarring alopecia may lead to insufficient growth or even re-activation. He discovered 31 LPP cases in 988 hair transplant consultations (3.1%) over 12 months. In 26 patients, it was co-localized with AGA. He concluded that many patients with poor growth due to inflammation may already have had undiscovered LPP prior to surgery.
- **Ratchathorn Panchaprateep** talked about how to select a good frontal fibrosing alopecia (FFA) candidate for hair transplantation. FFA does not only occur in postmenopausal women. A band-like alopecia is typical, often including the sideburns, the eyebrows in 70% of women, and sometimes even the eyelashes. She presented a case series of 5 patients who still had more than 60% of hair growth after 5-7 years. For better results, the condition should be inactive for at least 2 years, confirmed with a biopsy in the donor and recipient areas. Although the scalp appears normal in some areas, there may be slight inflammation, too. Patients with an affected occipital hairline are not good candidates. Medical therapy should be continued after surgery. The clinical pattern is helpful to predict progression, with the linear pattern being the most benign. Patients should be warned of recurrence, which may also destroy the transplanted hair.
- **Ahmed Youssef** presented a non-controlled study on hair transplantation in secondary cicatricial alopecia. By using a fractional carbon dioxide laser and PRP pre-operatively, he achieved good survival rates at higher densities,

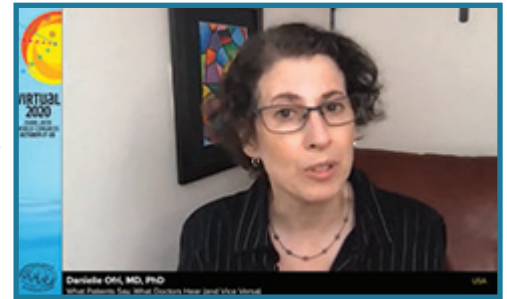
probably due to tissue remodeling and revascularization. Histology showed newly formed collagen.

- The panel discussion, which also included **Ali Abbasi** and **Jeffrey Donovan**, focused on medical therapy in primary cicatricial alopecias. For a clear diagnosis, trichoscopy is very important. One biopsy alone may not be enough to evaluate disease activity and should include the donor area. Loss of eyebrow is often the earliest sign of FFA.

General Session 6, “The Patient,” was moderated by **Russell Knudsen** and **Greg Williams**.

- The STOUGH LECTURE was given by guest speaker **Danielle**

Ofri and was titled “What patients say. What doctors hear (and vice versa).” She talked about the oft-forgotten bedside manners of the



Featured Guest Speaker Dr. Danielle Ofri speaks to the audience about the importance of doctor-patient communication.

doctor. Good communication is key. One example she mentioned is a video discussion of post-op pain management, which saved 50% of opioids. There is a placebo effect even when it is openly explained by the doctor. It is very important to let the patients talk uninterrupted and to perform full frontal listening. This helps to establish trust and to avoid a medical diagnostic error. Even in procedural specialties, openly discussing the pros and cons is very important. She showed how conversation is a simple but effective tool that we should use effectively. So, let's show patients that we are actually listening to them.

- **Dow Stough** introduced a new “Progressive Loss (PL) Risk Scale” with 5 classes. It helps to quantify and communicate the risk of a procedure to patients and colleagues. We must keep in mind that success depends on factors we cannot fully control, and that we are mostly dealing with progressive hair loss, which is impossible to estimate beyond the next 10 years. Factors that determine the risk group are age, donor area size, density, hair caliber, and more. The larger the area to be treated, the higher the risk. The true value of the PL Risk Scale is to convey to the patient their lifetime risk. Dow reminded us of our constant obligation: First, do no harm.
- During the panel discussion, **Russell Knudsen** added that patients need to understand that they commit to go on a lifetime journey when doing a hair transplant. It usually is not a one-stop treatment. **Dow Stough** emphasized that we cannot predict the progression of the hair loss, which is determined by genes, aging, lifestyle, and longevity. He admitted that the PL Risk Scale is a subjective scale and depends on the surgeon's experience, but it is urgently needed in our field. He

often rejects patients or redirects them to medical therapy, or recommends a partial reconstruction or to postpone the procedure.

- **Bruce Reith** talked about the impact of hair transplantation on depression. In a retrospective study in 187 pre- and 127 post-surgery patients, using a questionnaire, the BDI-II depression score was significantly lower after surgery. He concluded that hair surgery can prevent or reverse symptoms of depression that are caused by severe hair loss.

DAY 9/OCTOBER 25, 2020

Andreas Finner, MD, FISHRS

General Session 7, "Tissue Regeneration and Best Miscellaneous Abstracts," was moderated by **Samuel Lam** and **Bessam Farjo**.



Featured Guest Speaker Dr. Maksim Plikus discusses his lecture on tissue regeneration with a panel of experts. (L to R, top to bottom): Drs. Maksim Plikus, Ander Izeta, Claire Higgins, Bessam Farjo, Sam Lam, Carlos Clavel, Francisco Jimenez, Luis Garza

- **Maksim Plikus** lecture was entitled, "Groups of Hair Follicles Regenerating as a Spreading Wave." In mice and rabbits, he observed an activating coupling between hair follicles to facilitate the telogen to anagen transition. Thus, hairs regenerate in waves. Anagen follicles can send molecular Wnt signals within 50-100 micrometers around them, and thus "talk" their neighbor hairs into anagen. In mice, a ventral to dorsal hair cycle advancement could be observed. The pacemaker function of ventral and chin follicles could also be shown when transplanting them to dorsal skin. These follicles drive bilateral symmetry. Some areas of skin were however refractory and stayed in telogen, for example, on the ear. This phenomenon may have been caused by skin adipocyte and cartilage BMP signaling, an antagonist to Wnt signaling. These wave patterns of hair growth and synchronization seem less common in humans but could be an explanation for transient neonatal alopecia and even the wave-like regrowth often seen in alopecia areata. Future research may be directed to re-activate this follicle cross-talk in hair loss patients.
- **Francisco Jimenez** talked about the transplantation of anagen hair follicles to remodel human scars. In his study on 4 patients, he transplanted hair follicles into scars from previous FUT surgery. Four biopsies were

- **Jennifer Krejci** talked about difficult patients. She said it is all about setting realistic expectation. We should sit down and listen to the patient. She showed three videos role-playing typical scenarios of a difficult patient-doctor communication: a young patient who had a hard time understanding the limitations and long-term implications of a hair transplant; a female patient with diffuse thinning, who is scared of getting bald and thinks a hair transplant is the way to go; and a patient who was harmed by a black market clinic. She was able to fix the hairline and frontal tuft and to win the trust of the patient.

taken before and at 2, 4, and 6 months. Hair follicle grafts increased dermal cell density and vascularization. They led to a decrease in the collagen amount and fiber thickness, and an increase in epidermal thickness. This could explain the better aesthetic appearance and texture of skin.

- The following panel discussion also included **Carlos Clavel**, **Claire Higgins**, **Ander Izeta**, and **Luis Garza**. Wnt antagonists also are found in areas of androgenetic alopecia but it is unknown whether transplanted hairs can also stimulate neighboring hairs. The role of adipose tissue and innervation deserves further research. It may always be beneficial to transplant some follicles into a scar and not just do SMP.
- **Anastasios Vekris** talked about an algorithm of facial hair restoration in a Caucasian male population. To gather data, he measured the surface, density, and FU composition in 58 males in 9 different spots on the face. He counted surprisingly high numbers of facial terminal hairs, totaling 9,840 hairs on average, mostly consisting of single and some double FUs.
- **Samuel Lam** demonstrated how to use Botulinum Toxin to alleviate acute and chronic nerve pain after hair surgery. He puts 2.5-3.5 units directly into the painful spots and observes a very fast relief.
- **Sharon Keene** shared an easy but effective method for an FUE-only clinic to offer elliptical linear excisions. The idea is to punch-harvest all units from a small ellipse and then excise it, leaving a linear scar without widespread donor area thinning. This may increase the donor hair yield without having to teach extra staff members how to do microscopic dissection, which she still prefers for the highest graft quality.
- **Mbaraka Ljohiy** talked about a new era of hair transplant consultation using artificial intelligence. He tested it in 45 hair transplant clinics on 197 "customers" and with 45 "sales representatives." He concluded that AI may help the doctor to assess the patient pre-operatively and suggest a treatment plan based on prior procedures.
- **Felix Popescu** talked about graft placement in reconstructive surgery. It is important to evaluate the skin thickness, stability, and hypoperfusion. He emphasized the importance of correct angulation, direction, and distribution. Often, a stepwise restoration is necessary.
- **Jim Harris** talked about air sampling for bio-aerosolization. He measured the particles in 10 patients com-

paring simulated and actual FUE surgery, using a blunt punch under an acrylic dome. The difference was not significant. Studies for other punch types are being conducted.

- [Jeffrey Epstein](#) talked about the ISHRS COVID-19 impact study #2. It showed that most participant members had a significantly lower income between March and August but many are optimistic for the future.



Congress's Best Topics Panel. (L to R, top to bottom): Drs. Robert Haber, Dow Stough, Greg Williams, David Josephitis, Robin Unger, Marcelo Pitchon

General Session 8, "Open Dialogue—Congress Best Topics."

- The first panelists, [Robin Unger](#), [Bob Haber](#), [Dow Stough](#), [David Josephitis](#), [Marcelo Pitchon](#), and [Greg Williams](#), discussed their experience with the COVID-19 pandemic. It is imperial to protect patients and staff. A rapid antigen test may be helpful but there are still many uncertainties. Marcelo talked about preview long hair transplantation and how it even increases the responsibility of the surgeon to achieve good graft survival. Robin does not do PRP in patients who are immunocompromised, infectious, or have an autoimmune disorder; she thinks that exosomes from reliable sources are a good alternative.
- The second panelists, [Nilofer Farjo](#), [Ken Washenik](#), [Bob Haber](#), [Paul Rose](#), [Dow Stough](#), and [Sharon Keene](#), talked about regulatory issues regarding cellular therapies. As long as nothing is added to the original tissue, it is less problematic, but the local regulations have to be followed. Ken described the different sources of exosomes, such as placenta, bone marrow, and, in the future, maybe dermal papilla cells. It is imperial to not make unsubstantial claims such as "stem cell therapy." Paul warned of unpredictable ingredients and effects of exosomes, signals, and stem cells. In FUE, Nilofer prefers a dull punch in soft skin and a sharp punch in hard skin. She adjusts the parameters to the individual situation and different harvesting areas. Paul added that it is also important to become proficient in one particular system. Ken mentioned that they are not doing facial surgery at the moment because the patient cannot wear a mask.
- The third panelists, [Marie Schambach](#), [Sara Wasserbauer](#), [Bill Rassmann](#), [Mauro Speranzini](#), [Bob Haber](#), and [Dow Stow](#), discussed FUE devices, implanters, and SMP. Marie predicts a trend towards multi-graft implanters and ultimately automatization. Bill said that

the first step may be the automatic loading of conventional implanters from a cartridge, followed by an automatic implanter, which may even take the grafts right from the donor area. This would require fewer staff members and reduce the out-of-body time. However, curly hair will remain difficult. Mauro mentioned the fatigue factor for the doctor, which especially exists with sharp implanters. He advised us to not go for the smallest punch diameter if that leads to higher transection rates in a particular patient. Marie summarized that the choice of the implanter depends on the preference of the surgeon. Sara recommended to let the staff decide which implanter they prefer. The most important issues to teach all members are graft quality control and hairline design. Bill argued that we all should have the option to offer SMP to our patients. The panelists agreed that it should be done in a gradual way.

The **Awards Ceremony** was done as a Zoom meeting.

- [Francisco Jimenez](#) thanked program chair [Brad Wolf](#) and the members of the scientific committee, the technical team, and [Victoria Ceh](#) and the ISHRS staff for their outstanding work to make this virtual congress happen and become a great success. He also thanked the Annual Giving Fund donors and Operation Restore volunteer physicians.
- [Arthur Tykocinski](#) thanked outgoing president [Francisco Jimenez](#), who received the **President's Award** and bar pin.
- [Brad Wolf](#), chair of the 28th World Congress, received a plaque for his excellent work. Brad thanked the ISHRS team, the scientific committee, the virtual sub-committee, [Sara Wasserbauer](#) for being the workshop chair, and all those who contributed to this congress.
- [Moonkyu Kim](#) received the **Platinum Follicle Award** for his outstanding achievements in hair restoration research.
- [Robert Leonard](#) received the **Golden Follicle Award** for his outstanding and significant clinical contributions in hair restoration. Both gave very moving speeches emphasizing that every success depends on a great team.

This 2020 Virtual Congress ended with a lot of applause and smiles on all the screens. ■

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Thank you to the members of the 2020 World Congress Planning Committee for their commitment to creating an informative and engaging ISHRS Virtual World Congress!

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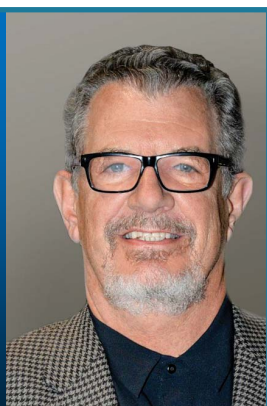
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3rd row (L to R): Robin Unger, Kapil Dua, Paul McAndrews, Nilofer Farjo, Francisco Jimenez
Bottom row (L to R): Bradley Wolf, Sharon Keene, Ken Washenik, Marcelo Pitchone

Global Council of Hair Restoration Surgery Society Members



Top row (L to R): Shady El-Maghraby, Janice Ayarzagotia (Project Manager), David Perez-Meza, Marco Barusco, Ricardo Mejia
2nd row (L to R): Marie Schambach, Piero Tesaro, Malgorzata Kolenda, Francisco Jimenez, Luis Roberto Trivellini
3rd row (L to R): Konstantinos Anastassakis, Victoria Ceh (Executive Director), Russell Knudsen, Paul McAndrews, Vincenzo Gambino
4th row (L to R): M. Humayun Mohmand, Kapil Dua, Anil Garg, Bessam Farjo, Nilofer Farjo, Francisco Le Voci
5th row (L to R): Peter Canalia, Andreas Finner, Greg Williams, Enrique Orozco, Mughese Amin
6th row (L to R): Karin Leonhardt, Rattapon Thuangtong, Conradin von Albertini, Luis Nader, Moonkyu Kim
Bottom row (L to R): Rachael Kay, Waris Anwar, Mayank Singh, Christopher D'Souza, Zulfiqar Tunio

2020 Research Grant Recipients

Congratulations to the 2020 Research Grant recipients!



James A. Harris, MD, FISHRS



Paul T. Rose, MD, JD, FISHRS



Karen Copeland, PhD

2020 Research Grants



James Harris, MD
 Research team: Paul Rose, MD, JD, FISHRS, Karen Copeland, PhD

Investigation of the Bioaerosolization of Blood and Skin Tissues During FUE



Marie Andrée Schambach, MD, FISHRS



**Research Team
Francisco Jimenez, MD, FISHRS**

2020 Research Grants



Marie Andrée Schambach, MD, FISHRS
 Research team: Francisco Jimenez, MD, FISHRS

Axillary Follicular Unit Excision (FUE) as a Possible Treatment for Hyperhidrosis: A Pilot Study



Greg Williams, MBBS, FISHRS



**Research Team
Magda Plotczyk, PhD**

2020 Research Grants



Greg Williams, MBBS, FISHRS
 Research team: Magda Plotczyk, PhD

Investigating the Role of Thrombospondins in the Formation of Stretched Scars

The “Notorious 9” ISHRS Members Toast to Having Attended All 28 World Congresses



Top row (L to R): Mario Marzola, Ivan Cohen, John Gillespie
 Middle row (L to R): Paul Cotterill, Russell Knudsen, Edwin Epstein
 Bottom row (L to R): Robert Leonard, Robert Haber, Bessam Farjo

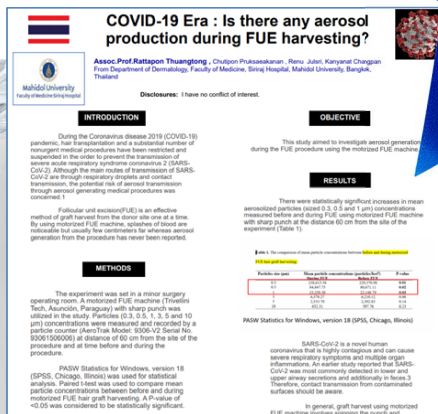
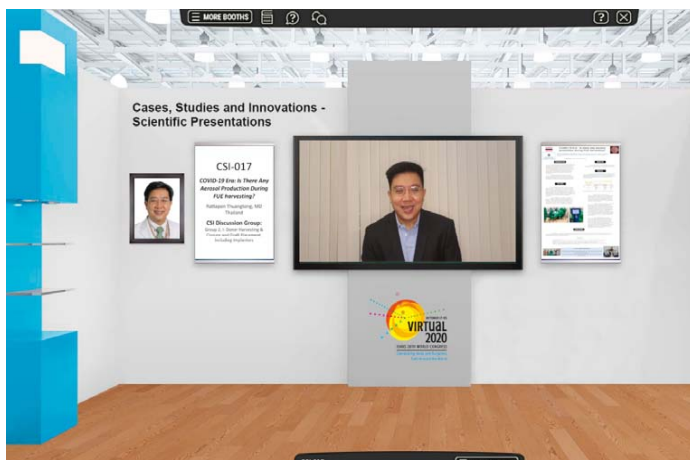
2020 CSI Awards

Congratulations to the 2020 CSI Awardees!

1st Place

Rattapon Thuangtong, MD | Thailand

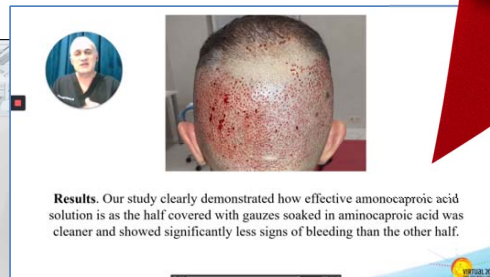
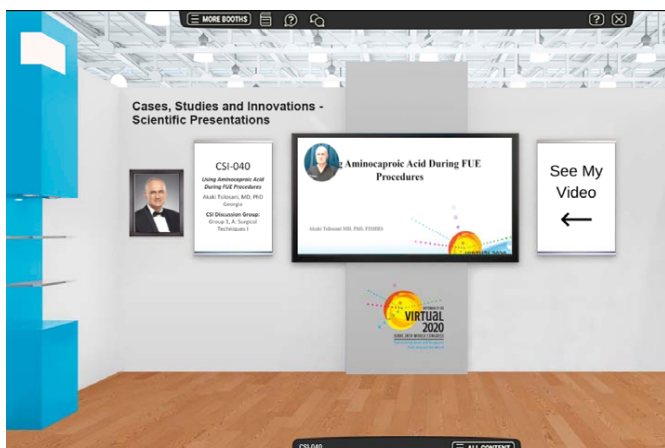
CSI-017: COVID-19 Era: Is There Any Aerosol Production During FUE harvesting?



2nd Place

Akaki Tsilosani, MD, PhD, FISHRS | Georgia

CSI-040: Using Aminocaproic Acid During FUE Procedures Surgical Techniques



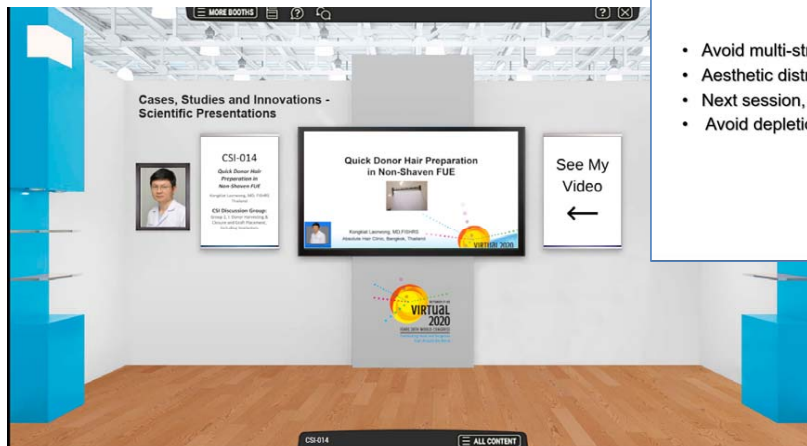
2020 CSI Awards

Congratulations to the 2020 CSI Awardees!

Best Practical Tip

Kongkiat Laorwong, MD, FISHRS | Thailand

CSI-014: Quick Donor Hair Preparation in Non-Shaven FUE



Home Message

- Avoid multi-strips or window shave
- Aesthetic distribution for the size of procedure
- Next session, harvest in other area,
- Avoid depletion in previous area



Honorable Mention

Francisco Jimenez, MD, FISHRS | Spain

CSI-032: Follicular Unit Grafts Contain More Catagen Than Telogen Follicles: An Unexpected Finding That Challenges Previous Dogma



Follicular unit grafts contain more catagen than telogen follicles: an unexpected finding that challenges previous dogma

Francisco Jimenez, MD, FISHRS | Spain

Medicine and Health Sciences, University of Valencia, Valencia, Spain

Disclosures: There are no financial conflicts of interest to disclose.

INTRODUCTION

The hair follicle (HF) has the unique capacity to undergo periods of growth (anagen), regression (catagen), and rest (telogen) and re-enter anagen to repeat the cycle. The HF cycle is a dynamic process that is regulated by a complex interplay of genetic and environmental factors. The HF cycle is a dynamic process that is regulated by a complex interplay of genetic and environmental factors. The HF cycle is a dynamic process that is regulated by a complex interplay of genetic and environmental factors.

OBJECTIVES

Based on our observations we hypothesize that the percentage of catagen hairs has been underestimated and that catagen follicles are in fact more numerous than telogen follicles.

RESULTS

The results of the study are presented in a table showing the percentage of catagen and telogen follicles in the HF cycle. The results show that the percentage of catagen follicles is significantly higher than the percentage of telogen follicles.

CONCLUSIONS

The results of the study challenge the previous dogma that telogen follicles are more numerous than catagen follicles. The results show that catagen follicles are in fact more numerous than telogen follicles.

REFERENCES

1. Jimenez F, et al. (2020) Follicular unit grafts contain more catagen than telogen follicles: an unexpected finding that challenges previous dogma. *Journal of Hair Research and Society*, 10(1), 1-10.

ACKNOWLEDGMENTS

The authors thank the staff of the Hair Research Society for their assistance and support during the study.

CONTACT INFORMATION

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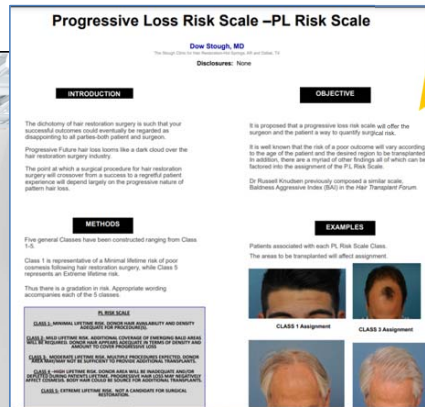
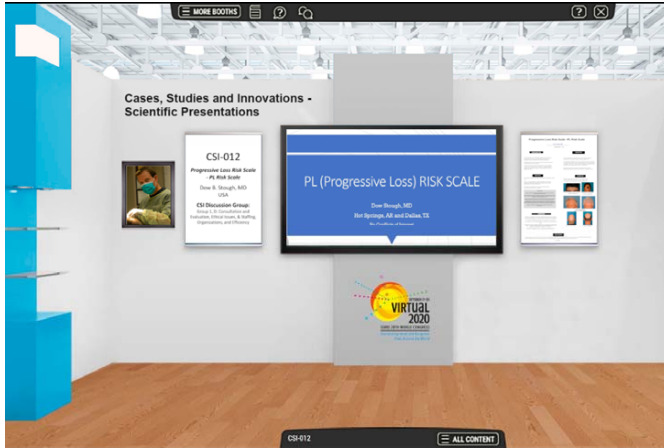
2020 CSI Awards

Congratulations to the 2020 CSI Awardees!

Honorable Mention

Dow B. Stough, MD | USA

CSI-012: Progressive Loss Risk Scale - PL Risk Scale



2020 Follicle Awards



Moonkyu Kim, MD, PhD, FISHRS
2020 Platinum Follicle Award Winner

For outstanding achievement in basic scientific or clinically-related research in hair pathophysiology or anatomy as it relates to hair restoration

Dr. Kim and his Platinum Follicle award with his mentor Dr. Jung Chul Kim, who was the first winner of this award in 1994.



Robert T. Leonard, Jr., DO, FISHRS
2020 Golden Follicle Award Winner

For outstanding and significant clinical contributions related to hair restoration surgery

Dr. Leonard celebrating his award with family and friends at home.

2020 Service Awards

Thank you for your service to the ISHRS and for serving on its board and committees!




Outgoing Vice President

Paul J. McAndrews, MD, FISHRS





Outgoing Secretary

Nilofer P. Farjo, MBChB, FISHRS





Outgoing Board Member

Robert H. True, MD, MPH, FISHRS




Outgoing Past President Board Position

Paul T. Rose, MD, JD, FISHRS




Outgoing Past President Board Position

Sharon A. Keene, MD, FISHRS





Outgoing FUE Advancement Committee Chair

James A. Harris, MD, FISHRS





Outgoing Ethics Committee Chair

Gregory Williams, MBBS, FISHRS

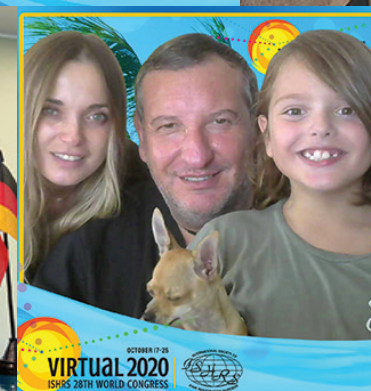




Outgoing Communications & Public Education Committee Chair

Sharon A. Keene, MD, FISHRS





Q&A from the ISHRS Virtual Congress

Below is a sample of the thought-provoking questions and answers sparked from presentations at the ISHRS Virtual Congress. Q&As are posted for each session from the ISHRS Congress, which will be available on demand until January 25, 2021, through the virtual platform. These questions and answers provide detailed insight into the intricacies and challenges of hair restoration across many different niches. This kind of shared information from colleagues is invaluable and is what our society is built upon. Enjoy these select questions and head to the Virtual Congress for more!

DISCLAIMER: The below is based on material presented at the World Congress, and has been made available under sponsorship of the International Society of Hair Restoration Surgery (ISHRS) for educational purposes only. This material is not intended to represent the only, nor necessarily the best, method or procedure appropriate for the medical situations discussed, but rather is intended to present an approach, view, statement or opinion of the faculty that may be of interest to others. As an educational organization, the ISHRS does not specifically approve, promote, or accept the opinions, ideas, procedures, medications, or devices presented in any paper, poster, discussion, forum, or panel at the World Congress. Registrants waive any claim against ISHRS arising out of information presented in this Congress.

Focused Session 103/October 19, 2020

"Basics of FUE: Types of Machines and Punches and When to Use Them"

Question: Do any of you use a different FUE device if you don't get good extractions when you start out (i.e., do you switch devices)?

Asked by: Nilofer Farjo

Answered by: Bruno Ferreira

Answer: I sometimes try switching to the manual, but I believe it's more a matter of adjusting the technique. I offered a couple solutions in my presentation: change the punch size or cutting edge type, change the parameters of your machine, or change tumescence amount. I also find that moving to a different zone can help. You can always return to the original area with a more thorough understanding of the best way to approach extraction.

Focused Session 101/October 19, 2020

"The Art of Hairline Design: Male, Female, and Transgendered"

Question: Dr. Park, aside from being capable of doing FUE in women, what is the advantage? The disadvantage is thinning the donor area and taking hairs from less permanent areas.

Asked by: Robin Unger

Answered by: Jae-Hyun Park

Answer: When talking about FUE in women, we have to divide the patients into two separate categories, the one with FPHL or alopecia, and the other one who wants to do female hairline correction surgery (i.e., without androgenetic hair loss). In FPHL patients, some also have severe thinning in donor area. In some of them whom we can see very severe thinning especially on the temporoparietal side but who have relatively healthy and thick hairs dominantly in the mid-occipital zones, I prefer FUE. In such cases, the biggest advantage is we can selectively target multi-FUs and thicker hairs for more fullness result. (Of course, less post-operative pain and no linear donor strip scar.) In female hairline correction surgery cases without hair loss, it depends on donor scalp laxity, patient's preference, budget, possibility to partially shave the donor, etc. (whether to do strip or FUE). Advantage of FUE must be less post-operative pain and no linear donor scar, especially advantageous when the patient likes to have hair in two braids.

Question: How do people on this chat feel about a sharp temporal corner? Acceptable? Never correct? Should be blunt?

Asked by: Sara Wasserbauer

Answered by: Mauro Speranzini

Answer: Good question! Very often patients complain about sharp temporal corner. I tell them that with the pen drawing it looks artificial and ugly. I explain that the drawing is just a reference, and I will place single grafts forward in order to make micro irregularities. Because they trust me, and because they have seen my results, they usually accept what I suggest. In cases where I see the patient is still concerned about that, I make it just a little blunt (which will not make any difference in the final result).

Focused Session 201/October 20, 2020

"Make It Disappear! Surgical Scar Optimization and SMP for Any Hair Transplantation Technique"

Question: What is the survival range of grafts in scars due to fibrotic tissue?

Asked by: Wendy Parada

Answered by: Alex Ginzburg

Answer: The survival range is between 60% to 95%.

Answered by: Robert Haber

Answer: I expect 75% to 80% survival of grafts placed into scars.

Answered by: Akaki Tsilosani

Answer: Despite the fact that blood supply in the scar tissue is compromised comparing intact tissue, survival rate does not make a difference from the intact tissue. According to my research conducted in 2003, there was a 92% survival rate in scar tissue via strip or FUE technique.

Question: When placing FUE grafts into a donor scar, how do your post-op instructions differ to prevent trauma to and loss of the grafts? Do you request that patients sleep prone?

Asked by: Karl Hekimian

Answered by: Alex Ginzburg

Answer: The instructions are the same as a normal FUE transplant but only one day delayed; for example, if the patient typically washes his hair after 24 hours, if the operation was into scar, then he can wash his hair after 48 hours.

Answered by: Robert Haber

Answer: As most patients also have grafts placed into the front recipient zone, I recommend sleeping on their side or in a recliner.

Answered by: Akaki Tsilosani

Answer: There are no special instructions needed. However, for the first night after a surgical procedure, the patient should lie down in a front position in order to avoid dislocation of the grafts.

Focused Session 202/October 20, 2020
“Delectable Injectables: PRP, Exosomes, and Stem Cells Scientific Updates”

Question: Where did the exosomes you used originate? Does the source of exosomes determine their effect?

Asked by: Sharon Keene

Answered by: Shadi Zari

Answer: The exosomes I used originated from human adipose stem cells, and, yes, the source of exosomes determines their effect. These exosomes are produced by a patented isolation technology called ExoSCRT™ (in compliance with GMP standards) from the adipose derived stem cell conditioned media (ASC-CM). Exosomes are produced through 2 steps of filtration of stem cell conditioned media, which isolate only 0.1~0.5% of the whole conditioned media to make highly purified exosomes. Exosomes are pure substances gained through filtration, which filters out impurities like cell debris, wastes, antibiotics, and medium components.

Question: Why microneedle when the majority of stem cells are in the bulge area, outer root sheath, and bulb areas?

Asked by: Paul Rose

Answered by: Shadi Zari

Answer: Yes, it should target the bulge & bulb area where stem cells exist. However, microneedling is more appealing to some patients as it eliminates the pain of injection allowing the physician to perform the procedure without the need of local anesthesia. In addition, microneedling allows the distribution/spread of the product into a larger surface area on the scalp. Finally, the patient also gets the combined benefit of microneedling itself, as it has been demonstrated to increase hair growth via the release of PDGF, EGF, and the activation of the hair bulge, all of which are triggered by the wound-healing response.

Focused Session 301/October 21, 2020
“Ditch the Clippers: Preview Long-hair and No-Shave FUE”

Question: Where did the exosomes you used originate? Does the source of exosomes determine their effect?

Asked by: Sharon Keene

Answered by: Shadi Zari

Answer: The exosomes I used originated from human adipose stem cells, and, yes, the source of exosomes determines their effect. These exosomes are produced by a patented isolation technology called ExoSCRT™ (in compliance with GMP standards) from the adipose derived stem cell conditioned media (ASC-CM). Exosomes are produced through 2 steps of filtration of stem cell conditioned media, which isolate only 0.1~0.5% of the whole conditioned media to make highly purified exosomes. Exosomes are

pure substances gained through filtration, which filters out impurities like cell debris, wastes, antibiotics, and medium components.

Question: As crusts can increase the results immediately post-surgery, I usually tell patients that the final result will be maybe 20% less than that in the day after. How do you manage this situation?

Asked by: Sebastian Yriart *Answered by:* Marie Schambach *Answer:* I give written information about this issue, and when patients sign the consent form, I make sure they understand this situation. So, one of the steps I take is that I not only take pictures at the immediate post-op but also at 10 days when crusts have healed and hair shafts have not started to fall. Now, there are some grafts whose hair shaft was inevitably cut and is short. Usually, these compensate for the long hair shafts that may not grow. Also, I ALWAYS tell my patients I will need to perform some type of small correction after a year (which I do for free); this is in case there are some small areas that have less density for some reason. I seldom need to do them, but still it reassures the patient that the final result may not be as similar as the immediate result.

General Session 1/October 17, 2020
“New and Exciting: 21st Century Surgery”

Question: Can the robot create a hairline? It appeared that there was an area not done by the robot in the video. Also curious about whether the robot can distinguish graft size after the cartridge is loaded.

Asked by: Sharon Keene

Answered by: Maxim Chumak

Answered: With the robot, you can create a hairline. There are some limitations though. Depends on patient bony anatomy as some angles may not be very accessible. Additionally, in my experience, the robot can achieve approximately 30 grafts per square centimeter density. I prefer to create at least 40 grafts/cm² density in the dense zone of the hairline. For that reason, I prefer to use sharp manual implanters to create a hairline followed by robotic implantation in the mid-scalp area.

Question: Any tips with Trivellini on very very soft skin?

Asked by: Nilofer Farjo

Answered by: Luis Roberto Trivellini

Answer: Nilofer, I don't notice that I have difficulty when I find a soft skin, because of the way I do the excision (without advancing the punch while moving), I think it favors me. The region where I find the softest skin in all patients is in the lower part of the neck and it is where the excision is easier for me. I do not put tension on the surface of the skin and try that the follicles of the unit stay without tension in the depth, but what you can try to have a harder skin is to make very superficial tumescence, something similar to what Jean does, that will make the skin have greater stability on the surface. Tumescence has two different effects depending on where we perform it. When we do tumescence, we are decreasing the density of the tissue since we are adding

a volume and expanding the tissue. Density is equal to the mass that is in a volume; therefore, we can decrease the density in two ways: 1) by removing mass, whose highest expression is given by the follicles of the unit, and we cannot do that, and 2) by increasing the volume of the tissue, and this is what we do when injecting the tumescent solution. Now, this happens in this way in the deep dermis and in the adipose tissue, so for that reason, when doing liposuction, we perform tumescent infiltration in all cases to reduce the cohesion between the adiposity and facilitate extraction

with suction. This is the justification for which I do not do tumescence because, when using suction, the units detach much easier and I run the risk of suctioning them. However, the tumescence in the superficial dermis meets a totally different terrain: the tissue is very cohesive and does not give rise to a volumetric expansion, so it does nothing but increase the pressure, making the medium more cohesive. Therefore, the mass of follicles trapped in this cohesive tissue tends to remain immobile. I hope this helps. ■

“

Testimonials

My first congress was in Bangkok and currently, this is my second one. Why did I like the congress? It provides me the latest knowledge in Hair Restoration. I was looking forward for a trip in Panama but due to unforeseen COVID situation affecting worldwide, a virtue conference is better than no conference. For those who are starting out in HRS, this platform will be the best guide with the experienced mentors that are always ready to help you!

– Kerwin Oh Shen Way, MD | Malaysia

This year's version of the world congress has been incredible, because I have been able to participate in all the talks, and I have also been able to repeat the ones that have been most interesting for me and be able to get more out of them from the hands of the Referents in the world of Hair Restoration. If you are a doctor who is starting in the world of hair restoration, this is definitely one of the meetings you should attend because it gives you the opportunity to see this rewarding occupation in a global way, it inspires you, you learn, you update yourself from the best which is the most important to give the best to our patients!

– Alejandro Henao Giraldo, MD | Spain



COWGIRL HAIR LOSS WORKSHOP

So she can tip her hat with confidence

POSTPONED

March 18-21 2021

March 2022

AN ISHRS REGIONAL WORKSHOP | HOUSTON, TEXAS

COWGIRLHAIRLOSS.COM

And the Winners are... ISHRS World Congress Games

During our 2020 World Congress, the ISHRS had two fun games in play. For the Exhibitor Extravaganza Passport Game, attendees used the game card to guide them to the participating exhibitors' virtual booths, seeking the answer to their game question. All completed and correct game cards were entered into a drawing to win. For the ISHRS Collegiality Game, the game card listed several questions and actions that led attendees to different parts of the Virtual Conference Center, scavenger hunt style. Each question was assigned a point value based on its level of difficulty. All submitted game cards were scored and prizes were awarded based on accrued point values. All submissions were also entered into a Grand Prize drawing.

We gratefully acknowledge the participating companies for donating the fabulous prizes: **212 Medikal**, **A to Z Surgical**, **Curallux**, **Devroye Instruments**, **Ellis Instruments**, **Finishing Touches Portfolio**, **Magna Medical**, **Nutrafol**, **Robbins Instruments, Inc.**, **SmartGraft by Vision Medical, Inc.**, **Tejco Vision**, **Zavimed Hair Restoration Supplies**.



The winners for the EXHIBITOR EXTRAVAGANZA PASSPORT game:

- Andrea S. Carvajal, MD, Venezuela; 2 Gold Model Forceps & 15 Gold FUE punches (\$435 USD value) from **212Medikal**
- Gregory Williams, MBBS, FISHRS, UK; Leavitt Bonn Placing Forcep (\$390 USD value) from **A to Z Surgical**
- Alejandro Fuentes Fuentes, MD, Mexico; Package of Capillus OfficePro, CapillusRx Laser Therapy Cap & Cap+ Volumizing Keratin Brush (\$11,000 USD value) from **Curallux**
- Sara M. Wasserbauer, MD, USA; 2 Serrated Hybrid Tornado Punches & 2 WAW Sharp Implanters from **Devroye Instruments**
- Carlos Daniel Bruces, MD, Venezuela; Cut-to-Size Blades and Handle (\$300 USD value) from **Ellis Instruments, Inc.**
- Sebastian Yriart, MD, Argentina; Scalp Micropigmentation Online Training (\$1,865 USD value) from **Finishing Touches Portfolio**
- Erika Camarena, MD, Dominican Republic; Magna Medical Gift Card (\$500 USD value) from **Magna Medical**
- Alejandro Cardenas, MD, Mexico; Nutraceuticals Core Pack (Women's, Men's, Women's Balance), Stress Adaptogen, Hairbiotic (\$300 USD value) from **Nutrafol**
- Rafael Francischetto Ultramar, MD, Brazil; Virtual Catalog Voucher (\$400 USD value) from **Robbins Instruments, Inc.**
- Matt Lewis, MD, MPH, USA; LOCKRx Hair Support Package (\$359 USD value) from **SmartGraft by Vision Medical, Inc.**
- Karen Cardenas Durban, MD, Mexico; Scalp Micropigmentation Device & Accessory Kit (\$800 USD value) from **Tejco Vision**
- Alejandro Henao Giraldo, MD, Spain; Webshop Voucher (EUR 300 value) from **Zavimed Hair Restoration Supplies**

The winners for the ISHRS COLLEGIALLY game:

Grand Prize Winners

- Rafael Francischetto Ultramar, MD, Brazil; Magna Medical Gift Card (\$500.00) from **Magna Medical**
- Tomasz Brzoskwinia, MD, Poland; Cut-to-Size Blades and Handle (\$300 USD value) from **Ellis Instruments, Inc.**
- Carlos Daniel Bruces Molina, MD, USA; 50 percent discount to 2021 Lisbon meeting registration from the **ISHRS**

Gold Tier Winners

ISHRS Prizes: \$100 USD off 2021 Lisbon World Congress registration, 1 ISHRS surgical cap, 1 ISHRS web cam cover, 1 ISHRS button

- | | |
|--|---|
| • Suzan Akanay-Diesel, MD, Germany | • Jennifer Krejci, MD, USA |
| • Alejandro Cardenas Lopez, MD, Mexico | • Ricardo Mejia, MD, USA |
| • Andrea Carvajal, MD, USA | • Kerwin Oh Shen Way, MBBS, Malaysia |
| • Carlos Daniel Bruces Molina, MD, USA | • Bruce Reith, MD, PhD, Germany |
| • Nilofer Farjo, MBChB, FISHRS, United Kingdom | • Marie Schambach, MD, FISHRS, Guatemala |
| • Bessam Farjo, MBChB, FISHRS, United Kingdom | • Tunde Tarjanyi, MD, Republic of Ireland |
| • Rafael Francischetto Ultramar, MD, Brazil | • Salome Vadachkoria, MD, Georgia |
| • Alejandro Fuentes Fuentes, MD, Mexico | • Sara Wasserbauer, MD, FISHRS, USA |
| • Robert Haber, MD, FISHRS, USA | • Greg Williams, MBBS, FISHRS, United Kingdom |
| • Alejandro Henao Giraldo, MD, Spain | |

Silver Tier Winners

ISHRS Prizes: \$50 USD off 2021 Lisbon World Congress registration, 1 ISHRS surgical cap, 1 ISHRS web cam cover, 1 ISHRS button

- Tomasz Brzoskwinia, MD, Poland

Congratulations to and thank you to all who participated!

Classified Ads

Seeking Hair Transplant Physician and Technicians

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

Please email your résumé to jobs@andersonhsc.com.

Seeking Experienced Hair Restoration Surgeon to Join Highly Regarded Private Hair Practice

Located in one of the southeast's most desirable large cities. If interested, please contact pgorin@aol.com.

For Sale: ARTAS® Robotic System with Chair

2015 ARTAS Robotic System for sale. System includes patient chair and was only used a few times. The system was originally purchased in 2015 for \$250,000 and is in excellent condition. Asking price of \$50,000 or best offer.

Email info@parsamohebi.com for more details or to make an offer.

Sandy Springs, Georgia, USA—Space for Lease

Excellent opportunity for a hair transplant surgeon of any specialty!

A 1,256 square foot consultation space, beautifully decorated, 4 consult rooms, office space, back office space for 4 patient advocates or staff. A 1,810 square foot surgical suite, lease all or part to do procedures. 3 operating rooms, one office, common space to maintain equipment and instruments. Supply area. Spacious, beautiful waiting room with main hall entrance. Private entrance for staff and physicians. Total of 3,066 square feet. This is negotiable. Hair transplant equipment available to use. Excellent referral source from a 40 year established dermatology practice next to the facility. Located in Sandy Springs, Georgia, close to St. Josephs, Scottish Rite and Northside Hospital. Available immediately.

Please contact Sharon Williams, 404-256-4457, ext. 211 or sharondaa@mindspring.com

Calendar of Hair Restoration Surgery Events

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

DATES	EVENT/VENUE	SPONSORING ORGANIZATION(S)	CONTACT INFORMATION
JUN 4-6, 2021	Italian Society for Hair Science and Restoration International Conference <i>Florence, Chianti</i>	Italian Society for Hair Science and Restoration	segreteria@SITRI.IT
* JUL 23-24, 2021	12th Annual Hair Transplant 360 Cadaver Workshop & FUE Hands-On Workshop <i>St. Louis, Missouri, USA</i>	Saint Louis University School of Medicine, Practical Anatomy & Surgical Education In collaboration with the International Society of Hair Restoration Surgery http://pa.slu.edu	pa@slu.edu
* OCT 21-23, 2021	29th World Congress of the ISHRS <i>Lisbon, Portugal</i>	International Society of Hair Restoration Surgery www.ishrs.org	www.29thannual.org
* MAR, 2022	ISHRS Regional Workshop: Cowgirl Hair Loss Workshop—Art & Perfection, Female Hair Loss <i>Houston, Texas, USA</i>	International Society of Hair Restoration Surgery Hosted by Carlos J. Puig, DO, FISHRS http://www.cowgirlhairloss.com/	cpuig@hairdoctexas.com

* Meetings that qualify for the ISHRS member educational maintenance requirement

2021 CME Webinars

We will soon be releasing the schedule with topics for the 2021 ISHRS webinars which will be sanctioned for CME credits!



Plans are already underway to create an unforgettable congress in 2021. Save the date for October 21-23, 2021! We have many ideas. We are naming the congress: Lisbon Hybrid. We are planning an in-person meeting, but also with an online option. This is called a “hybrid meeting.”

We anticipate travel will open up by next October so many will be able to attend in person. However, it is likely the case that some may not be able or willing to travel as it depends on the pandemic progression, vaccinations, etc. Therefore, an online/virtual option will be available. At this time, we imagine two tickets: in-person+virtual and virtual only. We plan to live stream and record sessions. We plan to have them available for on-demand viewing similar to this year. We will keep this year’s popular online CSI format to replace the traditional poster format. We are working through other details as we formulate the outline and appoint the committee. Please watch for more updates as this new and exciting plan unfolds!

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

29TH WORLD CONGRESS

October 21-23, 2021
Lisbon | Portugal

30TH WORLD CONGRESS

October 26-29, 2022
Panama City | Panama

31ST WORLD CONGRESS

Dates to Be Determined, 2023
New Delhi | India

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

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

2020–21 Board of Governors

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Global Council of Hair Restoration Surgery Societies

Membership proudly includes:

American Board of Hair Restoration Surgery
 American Society of Hair Restoration Surgery
 Arab Association of Hair Transplantation
 Argentine Society of Hair Recovery
 Asian Association of Hair Restoration Surgeons
 Association of Hair Restoration Surgeons-India
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 Brazilian Society of Hair Restoration Surgery
 British Association of Hair Restoration Surgery
 China Association of Hair Restoration Surgery
 French Society of Hair Restoration Surgery
 German Society of Hair Restoration
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 Japanese Society of Clinical Hair Restoration
 Korean Society of Hair Restoration Surgery
 Paraguayan Society of Hair Restoration Surgery
 Polish Society of Hair Restoration Surgery
 Swiss Society for Hair Restoration Surgery
 Thai Society of Hair Restoration Surgeons



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

- Articles should be written with the intent of sharing scientific information with the purpose of advancing the art and science of hair restoration and improving patient outcomes.
- If results are presented, the medical regimen or surgical techniques that were used to obtain the results should be disclosed in detail. If intra-operative or immediate post-operative photos are presented, please submit photos that show results (at least 6 months after surgery) of the procedure being presented.
- Articles submitted with the sole purpose of promotion or marketing will not be accepted.
- Authors should acknowledge all funding sources that supported their work as well as any relevant corporate affiliation.
- Trademarked names should not be used to refer to devices or techniques, when possible.
- Although we encourage submission of articles that may only contain the author's opinion for the purpose of stimulating thought, the editors may present such articles to colleagues with experience in the area in question for the purpose of obtaining further 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 blind fashion to make recommendations about its acceptance, further revision, or rejection.
- Once the manuscript is accepted, it will be published as soon as possible, depending on space availability.
- All manuscripts should be submitted to forumeditors@ishrs.org.
- An Author Authorization and Release form must be individually completed by every author listed on the byline and the Word document (not a fax) submitted at the time of article submission. The form can be obtained in the Members Only section of the ISHRS website at www.ishrs.org. This release is meant to be signed electronically directly in the Word document. Simply open on your computer, fill in the highlighted fields, and return the Word document with your submission.
- All figures and tables should be sized down to no greater than 6 inches in width and sent as separate attachments to your email.
- For the complete list of instructions and downloadable checklist, go to: https://ishrs.org/wp-content/uploads/2020/06/ISHRS_Forum_ArticleSubmission_checklist_Fillable.pdf.

Submission deadlines:

February 5, for March/April 2021 issue

April 5 for May/June 2021 issue

June 5 for July/August 2021 issue

Classified Advertising Guidelines for Submission

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

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Fight the FIGHT Campaign Update

Fight ***The*** ***FIGHT***

SLOW UN-PAUSE OF THE CAMPAIGN

When the pandemic hit, we paused the Fight the FIGHT campaign. We are now slowly starting it up again, reviewing the campaign assets and determining an appropriate roll-out schedule for 2021. Currently, we are focusing on the good work of ethical physicians with the Pledge campaign. The public perception of physicians is at an all-time high due to the heroic performance of physicians on the frontlines of caring for those with COVID-19.

TAKE THE PLEDGE

If you have not yet recorded a pledge video, please do so. We have a resource page to help you. Download at <https://fightthefight.ishrs.org/pledge/>

You can see example videos from your colleagues. We thank the members who submitted pledge videos during the World Congress. We have highlighted them on the Fight the FIGHT Pledge page.

MULTI-LINGUAL FIGHT THE FIGHT MICROSITES

We are finishing the build of the various microsites. We have all the content for the Fight the FIGHT campaign in five languages. Each is its own microsite. You can easily navigate between the different languages by clicking on the flags on the top left when you are browsing.

English: <https://fightthefight.ishrs.org/>
Arabic: <https://ftfarabic.ishrs.org/>
Italian: <https://combattifight.ishrs.org/>
Portuguese: <https://combataosfight.ishrs.org/>
Spanish: <https://luchafight.ishrs.org/>

Please take a moment to view the valuable content and share in your email newsletters to your patients, social media audiences, and to your colleagues. We have case studies, FAQ pages, warnings, press releases, position statement and much more.

If you have a case study or would like to write an article about the black market, please send an email to: fightthefight@ishrs.org.

MULTI-STRATEGY AND MELDING OF TWO COMMITTEES

We are in the process of appointing committee members. Thank you to those who submitted an application to volunteer for a committee. We will be reaching out to you soon. We are combining two committees as part of restructuring the strategy to combat the unlicensed practice of medicine in an effort to elevate patient safety, and educate patients, our physician peers, medical boards, and legislators.



HAIR TRANSPLANT FORUM INTERNATIONAL

International Society of Hair Restoration Surgery

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October 21-23, 2021



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PREPARE YOUR ABSTRACTS!
SAVE THE DATE