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96-hour study of FU graft “out-of-body” survival comparing saline to Hypothermosol/ATP solution

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Introduction

The original intention for this study was to repeat Dr. Bobby Limmer’s 1992 study that looked at graft survival over a period of time after harvesting,¹ but, in addition, to add two more days to the study time frame. Dr. Jerry Cooley persuaded me to add parallel study boxes with grafts stored in Hypothermosol solution with ATP added, to go along with the grafts stored in chilled normal saline (as per Limmer’s study). Grafts were placed in the two study boxes at the following time points: 2 hours, 4 hours, 6 hours, 8 hours, 24 hours, 48 hours, 72 hours, and 96 hours out of body. A hair count of all boxes was performed at 11.2 months.

Materials and Methods

A 49-year-old Norwood VI male, who had a few scattered residual hairs on the top of his head, was chosen for the study. He had a heart attack at age 33 with a subsequent bypass procedure He is currently well, a non-smoker, and not on hair loss medication. Sixteen separate 1.1cmx1.1cm study boxes were marked off (Figure 1). A total of 28 “native” hairs were present in these boxes and were later subtracted when doing the final count. In each box, ten 1-hair FU grafts and twenty 2-hair FU grafts were placed in 0.8mm and 1.0mm slit sites, respectively, by our most experienced technician, who has 18 years of experience (Figure 2). The corners of each box were tattooed and a 1.2mm-wide “moat” of bald skin was left around each box. All grafts were stored at 40°F (4.4°C) until placement into the patient’s scalp. Extremely miniaturized hairs (vellus) were not included in the hair counts. Photos were taken of each box at 5, 8, and 11.2 months.



Figure 1. 16 Study boxes marked off.

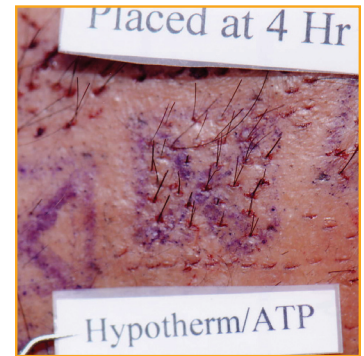


Figure 2. Close-up of study box with grafts planted.

Results

The final hair counts took more than 4 hours to complete with both “full terminal” hairs and “slightly thin” hairs included. Wispy vellus hairs were not counted. Figure 3 shows the final percentage of growing hairs present at 11.2 months in the 16 study boxes. The results in three of the boxes were unexpected: the saline-stored graft boxes planted at the 2- and 4-hour time points yielded very low hair growth (74% and 64%, respectively) and the 8-hour box with grafts stored in Hypothermosol/ATP revealed a 122% survival. All other counts were somewhat as expected and made sense in light of the amount of time out of body and the storage medium used.

	Saline	Hyp./ATP
2 Hr.	74%	90%
4 Hr.	64%	90%
6 Hr.	90%	92%
8 Hr.	90%	122%
24 Hr.	74%	82%
48 Hr.	68%	84%
72 Hr.	20%	76%
96 Hr.	12%	40%

Figure 3. Final percentage of growing hairs.



Figure 4. Comparison of graft survival over 96 hours.

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The graft survival in the Hypothermosol/ATP boxes was overwhelmingly superior to that in the saline boxes, except for at the 6-hour time point, where it was essentially the same (Figure 4). The most dramatic difference was at 72 hours, where a meager growth of 20% for the saline grafts contrasted with 76% for the Hypothermosol/ATP.

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President's Message

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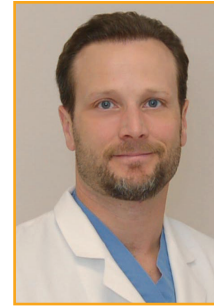
Although it may seem like we just met in Boston, it is already time to begin making your plans for the next Big One. This year our Annual Scientific Meeting will take place in Anchorage, Alaska, September 14-18. Some might consider this an out of the way location, that attendance will be down, and perhaps even that this might be a good year to skip. Not true!

We have already received higher than expected numbers of abstracts and we expect attendance to be excellent. Many of us have always thought we should one day visit Alaska, and what better plan than to combine a vacation there with attendance at the world's biggest and best hair restoration surgery conference?!

If you are serious about hair restoration, can you really afford to miss out on the Big One? New ideas, new techniques, and pertinent reviews promise to keep all of us at the top of our game. The opportunity to socialize and network with your peers is another motivating factor. I have found that I often learn as much chatting with my colleagues as I do attending the lectures. Together, the lectures and networking found at our annual meeting create a stabilizing force that keeps my professional career on track. I hope you feel the same.

September should be a nice time to be in Alaska. With the abundance of wildlife and scenic vistas, it will be a memorable trip. Why not plan a cruise before or after the conference to make it a truly unforgettable experience? We are working to provide members guidance in planning their trips so let us know if you need more information about tourism in the area. There is certainly a lot to choose from so everyone should find something to their liking.

I look forward to seeing you in Anchorage! ♦



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Co-editors' Messages

Nilofer P. Farjo, MBChB Manchester, United Kingdom editors@ISHRS.org



The *Forum* has now been going for more than 20 years with the leaders in our field at its helm. So it is a great honor to be asked to co-edit the publication but also a big responsibility to live up to the great job done so far. I would like to extend my congratulations and thanks to our recently retired editors, Bernie and Paco, for doing such a fantastic job. Like all the past editors, they will be a hard act to follow. Bill and I hope that all members will help us

to make the next three years as successful as previous ones, and with that in mind we have asked many of the columnists to stay on in their current positions. We have added a few new faces that include those who have either volunteered to get involved or those we have asked to join because they have made significant contributions to past issues. Some of the section headings have changed in order to broaden their scope.

When we started thinking of ideas for the upcoming issues, we looked at feedback from the recent practice survey and there were some suggestions that we become a peer reviewed journal or at least add some peer reviewed articles. While looking through past issues to get inspiration for my message, I was reminded that this is not a new concept. Dr. Richard Shiell made the following statement regarding the *Forum* back in 2001:

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(Hair Transplant Forum Int'l. 2001; 11(1):14)

He certainly made the point that it is a "forum," a place to share ideas and debate issues. There are peer reviewed journals in abundance—and most of us subscribe to several—so our ISHRS newsletter allows for a different type of exchange that is topical and allows for the quick exchange of information. This does not mean, however, that we publish anything without consideration or review because the articles do have to be suitable for the general education of our members and cannot be self-promoting nor libelous. Unfortunately, there have been times when opinions expressed in the *Forum* have been quoted as fact or have been used to promote a product or service. Non-medical people have also used the *Forum* for their own promotional purposes.

With these aims in mind, I encourage those of you who haven't participated in the past to get involved whether it's with new ideas, a surgical tip, a full article, or a criticism. Please make yourselves known to us and send in your ideas as this is your journal. ♦

William H. Reed, MD La Jolla, California, USA editors@ISHRS.org



What an honor and opportunity to be asked to co-edit *Hair Transplant Forum International!* It is a somewhat intimidating request because it has been this journal and its former editors who have taught me much of the art and science of hair transplantation. Nevertheless, I look forward to tackling the challenge.

In considering how to proceed, then, a fundamental question is: "What do we want the *Forum* to do for us?" I propose it assist its parent organization, the ISHRS, in pursuing the goal of its mission statement: to promote education and fellowship. The *Forum* has and should continue to achieve this by being a platform for expression of issues that affect us personally as well as professionally.

We are quite unique in that we come from a wide variety of medical and cultural backgrounds and the refinement of our art has irrefutably grown from this diversity. Patients come to us seeking an "expert's opinion" with a common complaint: hair loss. The *Forum* and the ISHRS exist to create the highest level of expertise for our members, a homogeneity of excellence from our rich diversity. We will try to identify and publish in areas that may not be uniformly strong within our diversity with the goal of making each of us confident that we are the expert opinion that the patient seeks and that the patient need seek no further. Such areas would include the investigation of female hair loss and other non-androgenetic alopecias, the frontiers of alternative

therapies for hair loss, and innovative aspects and refinements of the surgical technique.

We will not always be publishing peer-review quality studies; there are other journals for that purpose. However, we will try with editorial comments to commend the studies' strengths and render caution about their shortcomings. Many are the times that the progress in our field has come from ideas based upon small studies or anecdotal observations. The *Forum* should be the venue for these ideas to be shared.

Drs. Dow Stough and O'Tar Norwood and the close group of founding fathers of the ISHRS founded our Society as much for fellowship as for the sharing of ideas and the refining of our specialty. (This value carries on today in the extravagant parties at the meetings.) So, collegial fellowship goes hand-in-hand with the education and exchange of ideas that the *Forum* will continue to foster. I hope that each of us will want to share ideas and thereby continue the unique tradition of how our specialty has evolved from its medical and cultural diversity. I hope each of us will contribute and can do so with the assurance that the topic will be discussed respectfully. Criticism will be constructive and, hopefully, might help the contributor further evolve the contribution by the collaborative effort.

It is a pleasure to be co-editor with Nilofer Farjo. I know we will all work together in the spirit of education and fellowship. Please contact us with your ideas on how to make the *Forum* serve our members as well as how to further the evolution of our unusual and diverse specialty. ♦

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- If results are presented, the medical regimen or surgical techniques that were used to obtain the results should be disclosed in detail.
- Articles submitted with the sole purpose of promotion or marketing will not be accepted.
- Authors should acknowledge all funding sources that supported their work as well as any relevant corporate affiliation.
- Trademarked names should not be used to refer to devices or techniques, when possible.
- Although we encourage submission of articles that may only contain the author's opinion for the purpose of stimulating thought, the editors may present such articles to colleagues who are experts in the particular area in question, for the purpose of obtaining rebuttal opinions to be published alongside the original article. Occasionally, a manuscript might be sent to an external reviewer, who will judge the manuscript in a blinded fashion to make recommendations about its acceptance, further revision, or rejection.
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FU graft out-of-body survival

[from front page](#)

Almost more striking than the numerical differences in survival between the two groups was the across-the-board qualitative differences in the grafts (Figures 5 through 8). I divided all hairs that were counted into two categories: 1) full, terminal hairs, and 2) thin hairs. As noted earlier, the almost-invisible, fine, vellus hairs were not counted at all. These “thin” hairs were of various diameters, ranging from just beyond vellus and up to those that were just slightly thinner than a terminal hair. I noted that the saline boxes at time points beyond 24 hours featured a greater number of “thin” hairs, whereas the corresponding Hypothermasol/ATP boxes still produced a high percentage of terminal hairs.

The saline study boxes for the 2- to 24-hour time points grew 203 hairs, of which 177, or 87%, were terminal. In contrast, the Hypothermasol/ATP grafts for those earlier time points grew



Figure 5. Left: Saline grafts at 24 hours; Right: Hypothermasol/ATP grafts at 24 hours.

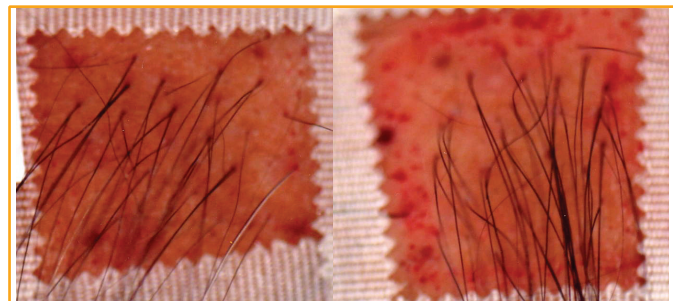


Figure 6. Left: Saline grafts at 48 hours; Right: Hypothermasol/ATP grafts at 48 hours.



Figure 7. Left: Saline grafts at 72 hours; Right: Hypothermasol/ATP grafts at 72 hours.



Figure 8. Left: Saline grafts at 96 hours; Right: Hypothermasol/ATP grafts at 96 hours.

243 hairs, of which 235, or 96.7%, were terminal. If we look at the grafts that were planted at the three longest time points (48, 72, and 96 hours), 32 (55%) of the 58 hairs that grew out in the saline boxes were terminal, while in the Hypothermasol/ATP boxes for those later time points, 79 (73%) of the 108 hairs that grew out were full, terminal hairs.

Figure 9 shows a “Hair Mass Score” graph in which each terminal hair that grew was assigned 1 point and each “slightly thin” hair was arbitrarily assigned 0.5 points. The graph reveals that, except for the 6-hour time point, the grafts stored in Hypothermasol/ATP had significantly more hair mass than the saline grafts, especially at the further time points.

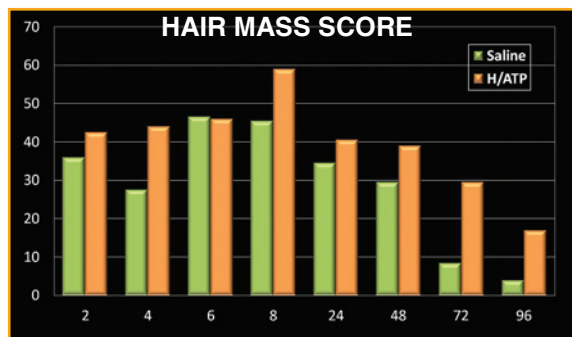


Figure 9. Hair mass score across 96 hours.

Conclusion

Reviewing my results against the earlier results obtained by Dr. Limmer, Figure 10 compares the results at the six various time points the studies shared. As noted earlier, I cannot account for the low growth rates at 2 and 4 hours, but the other four shared time points gave remarkably similar results between the two studies. It certainly appears, as before, that the 8-hour point is probably the maximum for keeping grafts out of the body, and before one begins to suffer some loss of graft survival.

In addition, the combination of ATP added to the Hypothermasol storage solution definitely helped increase graft survival and graft quality (diameter and length) at the 48-, 72-, and 96-hour time points, as compared to using the old standby of chilled normal saline. It was somewhat superior at the earlier time points also, but not quite as dramatically or statistically so.

Photos and hair counts will be repeated at the 18-month time point before a final closure of this study. Bear in mind that these grafts were placed in study boxes that were in the midst of a large transplant session of 2,165 FU grafts (4,547 hairs), so as to better simulate the “real-world” results that most of our grafts go through every day in our practices.

	Limmer	Beehner
2 hours	95%	74%
4 hours	90%	64%
6 hours	86%	90%
8 hours	88%	90%
24 hours	79%	74%
48 hours	54%	68%
72 hours	---	20%
96 hours	---	12%

Figure 10. Limmer and Beehner studies comparison: grafts stored in saline.

Reference

1. Limmer, R. Micrograft survival. In: D. Stough and R. Haber, eds. *Hair Replacement, Medical and Surgical*. St. Louis: Mosby; 1996:147-149. ♦