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New Storage Buffers for Micrografts Enhance Graft Survival and Clinical Outcome in Hair Restoration Surgery

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Introduction

Preparation and storage of human hair follicle grafts during micrograft transplantation procedures in hair restoration surgery are crucial steps in maintaining follicle cell growth and hair shaft elongation. High viability of follicle graft cells during transplantation is essential for survival of the transplant and therefore determines the clinical outcome of the procedure. There are different factors influencing the viability of the graft. Mechanical irritation of the follicles during preparation is one factor. Furthermore, it has been shown that during storage of micrografts in commonly used buffers the viability decreased, which limits the duration of the transplantation sessions. This might be due to the absence of nutritional factors, changes in environmental pH and osmolarity, depletion of energy stores for the anaerobic pathway in the follicle cells, or other not yet defined mechanisms. However, the commonly used conditions for graft storage in hair restoration surgery are not satisfactory today; this influences the outcome in micrograft transplantation procedures.

In the past, studies have been performed to optimize the storage buffers for micrografts. These studies focused on temperature conditions, salt composition, or the effect of nutrients supplied to the storage buffers.[1–4] Although some effect of storage temperature, nutrients, or salt composition has been demonstrated, no clear improvement of storage conditions was found in *in vitro* assay systems.

All the performed studies focused on prevention of follicle cell necrosis (which might be induced by the absence of nutrients for the aerobic or anaerobic pathways), mechanical damage of the follicle cells during preparation, or necrotic cell death due to the production of oxygen radicals or other toxic metabolites during the storage period.

Another pathway of cell death, apoptosis, has so far not been investigated as a possible cause of follicle cell death during storage. Apoptosis is an active form of cell death, in which fragmentation of DNA and cell death is induced by specific signals entering the cell. Many stimuli have been identified that can induce apoptosis, including death signals by soluble molecules like tumor necrosis factor, loss of survival factors (absence of insulin or other hormones), radicals released after tissue injury (oxygen radicals, nitric oxide (NO), and metabolites of the arachidonic acid (AA) pathway, respectively), or loss of cell-cell interactions.[5,6] All these mechanisms result in the activation of an

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Regular Features

Feature Articles

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The ISHRS Golden Follicle Award sculpture, as seen on the cover of this issue, was designed by Francisco Abril, MD. Dr. Abril offers for sale, copies of a small bronze hair follicle sculpture (10" high). For more information, please contact: Clinica Dr. Francisco Abril, PO dela Habana, 137, 28036 Madrid, Spain. Phone: 34-1-359-1961; Fax: 34-1-359-4731.

President's Message

Robert S. Haber, MD
Mayfield Heights, Ohio

These have become difficult times to preside over an International Society. A Society with many members who may find themselves in political opposition to American policies and interests. A Society with members who might fall victim to the temptation to believe in stereotypes and prejudice. A Society whose very existence depends on a cooperative and supportive International community.

And yet I am confident that the Society will emerge from this period of time stronger than ever, because the very diversity that brings together divergent viewpoints is coupled with the maturity and collegiality that is required to face and conquer these conflicts.

The ISHRS has forged friendships between people of divergent backgrounds, views, nationalities, and religions. We are a united nations of sorts, yet one that appears to have been more successful in guiding ourselves into a closely-knit and mutually respectful alliance.

I have found myself sitting next to and conversing with erudite scholars and gifted surgeons from "third world" nations not generally thought of as contributing to the art and science of our field. I always come away from these interactions pleasantly surprised, and very pleased that our small area of interest brings together individuals from so many backgrounds and nations.

Our governments could look to us for a lesson in politics. Find a common thread to bind us, and cooperation follows. Certainly, we do not all agree about everything. Rather, we seem to disagree about most things. But at the end of the day we still enjoy each other's company, enjoy socializing, and look forward to the next day's challenges.

Headlines aside, the business of the Society is proceeding smoothly. Works in progress include the formalization of the ISHRS Fellowship Training Programs Guidelines, the goal of which is to codify the process by which future hair transplant surgeons should be trained. This will be invaluable to us as we seek to further enhance the reputation of the field.

We can also look forward to interesting and possibly controversial findings from the committees looking into artificial hair fibers and the Internet. The remainder of the committees are busy carrying out their duties. The Society is in capable hands.

The ISHRS-sponsored Live Surgery Workshop in Orlando was successful, and the New York meeting is taking form as well, and should be an extraordinary experience. Make plans to attend.

See you in New York!✧
Bob Haber, MD

To Submit an Article or Letter to the *Forum* Editors

Please send submissions via a 3½" disk or e-mail, double space and use a 12 point type size. Remember to include all photos and figures referred to in your article as separate attachments (JPEG, Tiff, or Bitmap). For e-mail submissions, be sure to ATTACH your file(s)—*DO NOT* embed it in the e-mail itself. We prefer e-mail submissions with the appropriate attachments. *Send to:*

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Submission deadlines: July/August, May 15; September/October, August 10.*

**Please note earlier submission deadline for this issue.*

Co-Editors' Messages

Michael L. Beehner, MD
Saratoga Springs, New York

Six years ago, I wrote an article for the *Forum* that presented my "Top Ten List" of things in hair restoration surgery that needed improvement (Jan. 1997). I thought I would update the list for 2003, and also provide two additional more upbeat lists—one listing the "Top Ten" good things about our specialty presently, and the other a list of the ten biggest changes since 1989, the year I started in hair transplantation. Remember, these are simply the very subjective opinions of one of your editors. Here goes:

Top Ten List of Things That Need Improvement (negatives)

1. Very difficult to get started in HT. Having a trained staff available, starting a flow of patients, expense of starting, paucity of training programs, etc.
2. Still too many "pitted" grafts (FUs and others) at front hair line by too many HT clinics.
3. Over-aggressive harvesting of donor hair for mega-size cases (3,000+) with concomitant risk of wide donor scars.
4. Specialists who do very occasional hair cases, attend no meetings, and do poor work.
5. Not enough "individualization" in HT. Too many doctors/clinics "paint all the rooms the same color."
6. Too many front hairlines have that "transplanted look." Too round, too perfect, too dense at the edge, lack of "micro-contouring"—or, worst of all, too "pluggy."
7. Too many hair surgeons do not align the angle of their grafts acutely enough.
8. Negative comments and attitudes tend to dominate many of the Internet hair sites.
9. Use of "lay consultants" can lead to inappropriate candidates having HT surgery (with subsequent disastrous consequences).
10. Still too many doctors who feel they have to put everyone else down in order to push themselves up.

Top Ten Good Things in Hair Restoration Surgery 2003

1. The annual ISHRS meeting is outstanding, with more and more good research reports every year.
2. Much greater sense of "collegiality" among hair surgeons in general
3. Large majority of results today are excellent.
4. Most HT doctors are quite open to other surgeons observing their practices.
5. Using large numbers of very small grafts yields far more natural results.
6. Less alopecia reductions and the negative consequences of same (scar, stretchback, etc.).
7. More public figures have had HT, which makes it more acceptable in public's eye.
8. Excellent "live surgery workshops" now take place a few times a year.

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William M. Parsley, MD
Louisville, Kentucky

A recent article from Dr. Richard Shiell about "plagiarism" caught my interest. In the surgical area of hair restoration, perhaps this is an admirable quality, not one to cause censorship. In creating transition zones and hairlines, we often create solutions in our minds to bring about a pleasing result. In order to create a soft natural hairline, we often look at spatial distributions and place grafts in any irregular pattern to accomplish this goal. In an attempt to avoid the old "bowl" look to the frontal hairline, we throw in undulations in a random fashion, using our imagination to create asymmetry and irregularity—then start naming and categorizing these creations. To quote Ansel Adams: "There is nothing worse than a sharp image of a fuzzy concept." The truth is that we have no need for all this creativity. Nature tries to guide us if we would only listen. All we have to do is closely observe and attempt to categorize nature's own hairlines and follow them. Thus far, very little attempt to study natural hairlines has been made, but much can be done. What are the natural patterns of a soft hairline? Where do natural undulations occur and with what frequency? What is the most common location for temporal points in relationship to the eyebrows or orbit, and what is the natural range of locations? How about vertex patterns? Once we know these natural patterns and their variations, we will be armed with material to use in problem solving. An understanding of natural patterns will be followed by compiling knowledge on how to use them. When and how would you want to use natural mounds (undulations) on the frontal hairline? Which patterns would you use on a narrow head, or a wide head? On which people should you use a frontal forelock? We appear to be concentrating on Problem B (application) before we have reasonably resolved Problem A (knowledge of natural patterns).

This is not to say that some excellent work has not already been done. Dr. Beehner's work in studying frontal forelocks and Dr. Craig Ziering's work with hair direction patterns in the vertex come to mind. Dr. Jim Arnold has suggested mosaic patterns of alopecia and has made observations on the vertex (suggesting the name "coronet" for the second smaller area of loss inferior to the larger "crown" pattern). Dr. Limmer, through the use of stereomicroscopes, introduced the hair restoration world to follicular units as the natural pattern (Dr. Headington wrote an article in the

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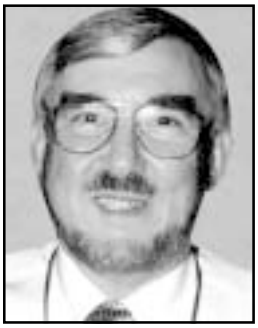
Notes from the Editor Emeritus



Richard C. Shiell, MBBS
Melbourne, Australia

Decline in Patient Numbers

There seems little doubt that hair transplant patient numbers are declining worldwide in spite of the higher skills of practitioners and the unprecedented quality of modern results. There are individual exceptions, of course, as some large clinics and individual practitioners seem to be able to maintain numbers by expensive advertising and PR campaigns. Nevertheless, even they admit that the return per dollar spent has declined significantly in recent years. Our Websites gain plenty of "hits" and result in some consultations, but the patients tend to be young and in early stages of baldness, and very few graduate through to the operating room in my practice.

What Is Going On?

First, there is little doubt that the balding male in the Western world is now more likely than ever before to cut his hair short rather than resort to transplant surgery or wigs. The fashion for long hair that has persisted since the mid-1960s is over. Let us hope that the new fashion for short hair does not last 50 years as it did from 1914–1964.

Second, medical treatment of baldness is delaying surgery. This is often a good thing as desperate young men in their late teens and early 20s are known to be poor candidates for hair surgery. Many older patients are unrealistically expecting a "miracle cure" within a year or two when transplantation now would be their better option.

Third, the new techniques involving small grafts and FUT in particular have greatly increased the initial cost of hair restoration surgery. A first-up charge of $7–10,000 is much more likely to frighten the patient away than a charge of $2–3,000, even if the latter patient knows that follow-up surgery will be necessary.

Fourth, we surgeons have become more aware of the progressive nature of male and female baldness and the psychological factors that sometimes accompany hair loss. We are more aware of diffuse alopecia in males and females and are cautious in our approach to these patients. Litigation is becoming more common and overall many of us now reject perhaps twice the number of patients for surgery that we did a decade ago.

Fifth, for persons used to conducting research on the Internet, there is an abundance of conflicting advice and even negative advice regarding hair transplantation. The unhappy patients seem much more ready to tell of their experiences than do the satisfied clients who make up the vast majority of our patients. This makes it extremely confusing and alarming for anyone seeking information on a surgical remedy for baldness on the Internet.

Finally, members of the general public seldom see good hair transplants any more, as the best examples are almost totally indistinguishable from normal hair. Sometimes even the linear donor scars are too faint to be noticed by hairdressers. What is very conspicuous is the bad or incomplete transplant of the past. This is what the average hairdresser and man on the street has in mind when we speak of hair transplants. It is little wonder that the public and even medical practitioners are cautious about recommending surgical hair restoration.

"A Patient's Story"

Many of us were deeply moved by this well-written piece, in the March/April 2003 *Forum*, from a patient who has had 20 years of anguish and regret from an unsatisfactory series of reduction and transplant procedures. I would like to say that it could not happen today, but unfortunately this is not the case. Because patients have become much more discerning these days, they expect a greater degree of perfection in their results, and when this is not delivered, they can feel all the pain and disappointment so eloquently expressed by the anonymous author.

The author felt that a ban on the use of Sales Consultants would solve much of the problem. While a glib salesman might be the initial source of some problems, I would like to remind readers that the surgeon has the ultimate moral and legal responsibility to accept or reject a patient, or to modify the course of treatment suggested by the Consultant. It is the doctor's duty to make sure that the Consultants in their employ or in the employ of a large company are adequately trained so that patients are not being misled. If patients are unhappy, no one benefits from the surgery in the long term.

I cannot overemphasise the importance of conservative management. A patient under 25 years of age should "earn" his transplant after a couple of years of medical management. If he has a possibility of type 5 baldness or greater, then the transplant must be planned as if the patient was *not* using finasteride. We have no guarantee that the patient will continue to use such drugs over the coming decades. Indeed, current experience in my practice shows that about half the patients do not continue for more than a year or two.

Fashion Swings

In the March/April *Forum*, I spoke of the pendulum of scientific fashion. Since the mid-1990s, the pendulum of surgical opinion has swung so far that the FU has attained almost sacred status. Ignoring the fact that the vast majority of patients never utilise all their potential donor hairs, it is declared categorically that the microscope MUST be used to prepare these sacred offerings prior to implantation. Little mention is seen in the *Forum* of the Choi technique that is practiced widely in Japan and Korea and has been adopted in a small number of clinics outside Asia. The one-handed dissection without magnification works well with coarse Asian hair, however, microscopes are certainly used to obtain Choi donor material at the DHI clinic in Athens and

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