HAIR TRANSPLANT forum INTERNATIONAL

Volume 25
Number 3
May/June 2015

Inside this issue

President's Message 94
Co-editors' Messages 95
Notes from the Editor Emeritus: William Reed, MD 97
Controversies: Is Finasteride Safety Data Adequately Reported in Published Trials? 99
LLLT Part 3: Critically Assessing Recent Published LLLT Device Trials: Limitations, Recommendations, and Conclusion 102
Chronotrichology: An Additional Weapon to Prevent and Treat Hair and Scalp Disorders 106
How I Do It: How to Distribute Follicular Units in the Recipient Area 108
Cyberspace Chat: PRP: Pseudoscience or Fact 110
Complications & Difficult Cases: A Case of Alopecia Totalis Following Hair Transplant Surgery 115
Hair's the Question: When Is a Graft "Grafted"? 121
Review of the Literature 123
Meetings & Studies: Review of the ISHRS Asian FUE Workshop 124
Regional Societies Profiles: ASHRS 126
Messages from the 2015 ASM Program Chair 128
Surgical Assistants Chair 129
Classified Ads 130

PLAN TO ATTEND!

www.ishrs.org/AnnualMeeting.html

CHICAGO'15
ISHRS 23RD ANNUAL SCIENTIFIC MEETING
SEPTEMBER 9-13

Androgenetic Alopecia: How It Happens

Rodney Sinclair, MBBS, MD, and Niloufar Torkamani, MD *Melbourne, Victoria, Australia*
rodney.sinclair@epworthdermatology.com.au

Androgenetic alopecia (AGA) affects both genders and is characterised by hair loss in a distinctive and reproducible pattern from the scalp.[1] Local and systemic androgens transform large terminal follicles into smaller vellus-like ones.[2] Follicular miniaturization is the histological hallmark of AGA.[3,4]

Diffuse hair thinning and increased hair shedding precede the appearance of baldness by a number of years. This is because the follicular miniaturization of AGA does not simultaneously affect all follicles within a follicular unit (FU). Instead, there is a hierarchy of follicular miniaturization with a follicular unit's secondary follicles affected initially and primary follicles miniaturized last.[5]

Scalp hairs arise from FUs that are best seen on horizontal scalp biopsy. FUs comprise a primary follicle that gives rise to an arrector pili muscle (APM), a sebaceous gland, and multiple secondary follicles that arise distal to the APM (Figure 1). Hairs from secondary follicles commonly emerge from a single infundibulum (Figure 2). In contrast, hairs over the beard, trunk, and limbs do not give rise to secondary hairs and exist singly or in groups of 3, known as Meijeres trios (Figure 3). Miniaturization occurs initially in the secondary follicles, leading to the reduction in hair density that precedes visible baldness (Figure 4). Baldness ensues when all of the hairs within a FU are miniaturized.

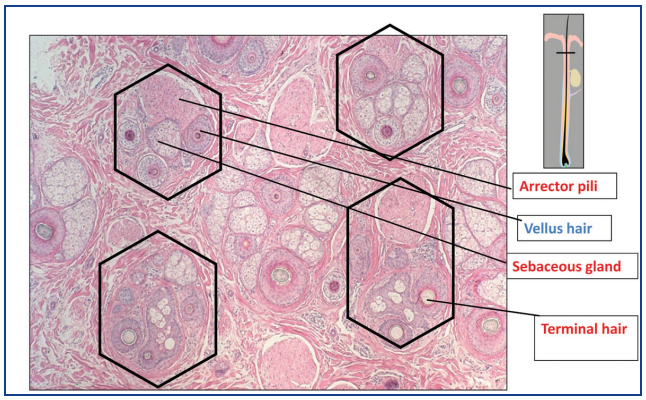


Figure 1. Horizontal section of skin biopsy from a hairy scalp showing features of early androgenetic alopecia. Follicles exist within follicular units comprising arrector pili muscle, sebaceous gland and derived secondary hairs, some of which have miniaturized to become secondary vellus hairs.



Figure 2. Multiple hair fibres can be seen to emerge from a single infundibulum.

One vexing question is that identical hair follicle miniaturization is seen histologically in lesions of alopecia areata. In this condition, miniaturization of all follicles occurs simultaneously. Unlike AGA, miniaturization in alopecia areata is potentially fully reversible.

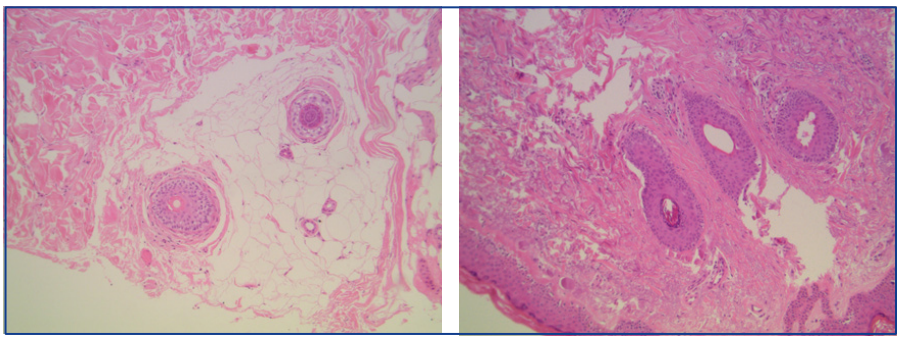


Figure 3. Horizontal section of skin biopsy from a hairy forearm showing follicles to exist singly (*left*) or in groups of 3 (*right*), known as Meijeres trios.

This apparent paradox can be explained by investigation of the arrector pili muscle (APM) and in particular its proximal attachment to the hair follicle bulge.[9] The APM is a small band of smooth muscle that runs from the hair follicle to the adjacent upper dermis and epidermis. This muscle contributes to thermoregulation and sebum secretion. The APM arises proximally at the hair follicle at the bulge, which is an epithelial stem cell niche. Three-dimensional reconstructions of scalp biopsy specimens demonstrate that preservation of the APM predicts reversible hair loss (Figure 5) and conversely

⇨ page 100

Hair Transplant Forum International
Volume 25, Number 3

Hair Transplant Forum International is published bi-monthly by the International Society of Hair Restoration Surgery, 303 West State Street, Geneva, IL 60134 USA. First class postage paid at Chicago, IL and additional mailing offices. POSTMASTER: Send address changes to Hair Transplant Forum International, International Society of Hair Restoration Surgery, 303 West State Street, Geneva, IL 60134 USA. Telephone: 1-630-262-5399, U.S. Domestic Toll Free: 1-800-444-2737; Fax: 1-630-262-1520.

President: Sharon A. Keene, MD, FISHRS skeene@ishrs.org

Executive Director: Victoria Ceh, MPA vceh@ishrs.org

Editors: Mario Marzola, MBBS; Robert H. True, MD, MPH, FISHRS editors@ishrs.org

Managing Editor, Graphic Design, & Advertising Sales: Cheryl Duckler, 1-262-643-4212 cduckler@ishrs.org

Controversies: Russell G. Knudsen, MBBS, FISHRS

Cyberspace Chat: John Cole, MD; Bradley R. Wolf, MD, FISHRS

Difficult Cases/Complications: Marco Barusco, MD

Hair Sciences: Jerry E. Cooley, MD

Hair's the Question: Sara M. Wasserbauer, MD, FISHRS

How I Do It: Timothy Carman, MD, FISHRS

Meeting Reviews and Studies: Henrique Radwanski, MD

Regional Society Profiles: Mario Marzola, MBBS; Robert H. True, MD, MPH, FISHRS

Review of Literature: Nicole E. Rogers, MD; Jeffrey Donovan, MD, PhD

Copyright © 2015 by the International Society of Hair Restoration Surgery, 303 West State Street, Geneva, IL 60134 USA. Printed in the USA.

The views expressed herein are those of the individual author and are not necessarily those of the International Society of Hair Restoration Surgery (ISHRS), its officers, directors, or staff. Information included herein is not medical advice and is not intended to replace the considered judgment of a practitioner with respect to particular patients, procedures, or practices. All authors have been asked to disclose any and all interests they have in an instrument, pharmaceutical, cosmeceutical, or similar device referenced in, or otherwise potentially impacted by, an article. ISHRS makes no attempt to validate the sufficiency of such disclosures and makes no warranty, guarantee, or other representation, express or implied, with respect to the accuracy or sufficiency of any information provided. To the extent permissible under applicable laws, ISHRS specifically disclaims responsibility for any injury and/or damage to persons or property as a result of an author's statements or materials or the use or operation of any ideas, instructions, procedures, products, methods, or dosages contained herein. Moreover, the publication of an advertisement does not constitute on the part of ISHRS a guaranty or endorsement of the quality or value of the advertised product or service or of any of the representations or claims made by the advertiser.

Hair Transplant Forum International is a privately published newsletter of the International Society of Hair Restoration Surgery. Its contents are solely the opinions of the authors and are not formally "peer reviewed" before publication. To facilitate the free exchange of information, a less stringent standard is employed to evaluate the scientific accuracy of the letters and articles published in the Forum. The standard of proof required for letters and articles is not to be compared with that of formal medical journals. The newsletter was designed to be and continues to be a printed forum where specialists and beginners in hair restoration techniques can exchange thoughts, experiences, opinions, and pilot studies on all matters relating to hair restoration. The contents of this publication are not to be quoted without the above disclaimer.

The material published in the Forum is copyrighted and may not be utilized in any form without the express written consent of the Editor(s).

President's Message



Sharon A. Keene, MD, FISHRS *Tucson, Arizona, USA* skeene@ishrs.org

Dear Colleagues,

The first of its kind, stand-alone Assistants Workshop will be completed by the time of this publication. Experience is the greatest teacher, and I know we will have gained so much from this workshop hosted by Dr. James Harris and his experienced and excellent course faculty, Tina Lardner and Emina Karamanovski. This workshop underscores the ISHRS's long-standing and continued commitment to assistant education and training. There are rapid changes occurring in the field of hair restoration surgery and the more we are able to adapt to the varying needs and requests of our patient population, the better able we and our staff will be to meet them.

However, some of the changes we have experienced are not all about innovation and surgery. In recent years, we have witnessed the proliferation of the unlicensed practice of medicine by some assistants previously trained under the auspices of ISHRS members. Disappointingly, we have even witnessed the abuse of our efforts to recognize assistant contributions, with former assistant members advertising their awards or teaching at workshops as a credential to perform surgery and practice medicine without a license. When ISHRS members complained about seeing advertisements with the ISHRS logo used to advertise alleged illegal activity among some of these assistant members, the Executive Committee and Board of Governors spent many hours to find a way to preserve our commitment to our valued assistant members and their educational program, while curtailing abuse of the ISHRS reputation. I would like to take this opportunity to review what has changed, and what hasn't, and I want to assure our members that we continue to welcome them to bring their assistants to meetings and to take advantage of training opportunities and professional collegiality.

Recent changes in membership requirements have been made and voted on by the ISHRS Board of Governors and General Membership to preclude ISHRS membership for assistant technicians who do not work for an ISHRS doctor. This means that independent technicians, some of whom are amongst those offering to perform surgery in place of a physician—will not be allowed membership in the ISHRS. Membership is also no longer allowed for business consultants, some of whom allowed technicians to perform surgery and hired a doctor only as a figurehead—rather than as a specialist in HRS. It is also the case that assistants who run a clinic and hire a doctor—a similar paradigm—are not allowed to be members.

In addition to these changes for membership, future assistant applicants will be required to have some type of medical license—such as registered nurse, licensed practical nurse, etc., so that if they operate outside the scope of their licensure, then there is a regulatory body that can take action to ensure that they do not continue to perform outside the boundaries of their licensure. However, many of our current assistant members are medical assistants with no licensure and would not have been able to continue their membership under the new requirements. In order to avoid penalizing our loyal assistants, a provision was made to "grandfather in" all current assistant members in good standing for continued assistant membership. These assistants will be eligible for continued membership for as long as they remain employed and in good standing with an ISHRS physician member and maintain their membership dues.

But questions have been raised: What about the future of medical assistants attending ISHRS meetings? While new attendees who are unlicensed medical assistants may not be eligible for ISHRS membership, they will still be able to attend ISHRS meetings, and participate in our assistant teaching programs, as long as their ISHRS doctor is attending the meeting, and will vouch for their full-time or permanent part-time employment status. This means medical assistants employed by ISHRS member doctors can still attend our meetings, learn valuable skills, and make new friends.

The bulk of our current curriculum for teaching assistant education was designed by nurse members who worked for ISHRS physician members in the earliest days of our Society (Marilynn Gillespie, Anne Knudsen, Helen Marzola, MaryAnn Parsley,

⇨ *page 98*

Co-editors' Messages



Mario Marzola, MBBS *Adelaide, South Australia* editors@ISHRS.org

We, your editors, are now halfway through our tenure with the *Forum*, so it's good to pause and see if we are fulfilling your needs, the reader. Is there a good balance of practical tips in surgical hair restoration, medical hair maintenance, all sprinkled with some hair science that might show us the future? Obviously, Dr. True and I have our pet subjects, but the basic principle in publications is to cover the subjects the reader needs. Also, some fun, photos, gossip, and things less serious. We hope you find there is a good balance of all of these.

Part 3 and the final installment of Dr. Sharon Keene's marathon work on low level laser therapy (LLLT) in hair restoration appears in this issue. What a wonderful effort from our congenial president. All three installments have been at peer-reviewed standard, deeply researched and accurately referenced, and we thank her warmly for what must have been many late nights of work.

As editors, we wonder if this is the standard of article that we should aim for in our *Forum* journal. Certainly it would add respectability in the scientific community, and perhaps we can slowly move in this direction. However, it would take more time to prepare such articles so ideas and developments would take longer to reach the readers. There is a lot to be said for sharing our ideas quickly, to read what is topical, and to feel involved in the process. If we can engender a feeling of continuing our conversations in the corridors of our conferences, that may be the best way of enhancing our learning process.

Cyberchat is great reading again. Dr. John Cole finishes up with so much information on PRP that it will be very worthwhile making a pot of coffee and sitting down comfortably to digest it all. Platelets and their growth factors are at the forefront of cell-based therapies for many things including hair loss. If I had little else to do, I would chase this technology to the Nth degree and home in on protocols that genuinely produce hair growth, as little as that may be, then develop it to something worthwhile. This is somewhat akin to developing the technology of cultivating very expensive truffles. It was said for so long that it could not be done, but now farms of oak trees whose roots have been inoculated with the truffle fungus are common and produce truffles enough for the masses. Wonderful breakthrough, enjoy with pasta, mashed potatoes, or omelet!◆



Robert H. True, MD, MPH, FISHRS *New York, New York, USA* editors@ISHRS.org

The ISHRS has many benefits for its members. The most important being its educational offerings. This year has already started with some excellent regional workshops. It was my pleasure to be part of the Asian FUE workshop held in New Delhi and for Dr. Marzola to attend the live surgery workshop in Bangkok. Reviews from both meetings have been very positive. The Delhi meeting report is in this issue and the Bangkok meeting will be in the next issue. Live surgery workshops are really vital educational opportunities as they provide extended, in-depth direct demonstration of techniques by expert faculty. I personally value the opportunity to serve as faculty in these workshops as I feel they give me a chance to really get to the nitty-gritty (or key details) of clinical practice. I will participate as faculty in two more clinical workshops this year: the Mediterranean FUE Workshop in Istanbul (not ISHRS sponsored) in June and the St. Louis Cadaver Workshop (co-sponsored by the ISHRS) in November. Both will have great faculty and will present wonderful educational opportunities. For the researchers and hair geeks among us, there is also the 9th World Congress for Hair Research in Miami in November. And, if you are like me, you are already eagerly looking forward to being in Chicago in September for our 23rd Annual Scientific Meeting. I have complete confidence that with Dr. Nilofer Farjo chairing, it will be one of our best.

Dr. Rodney Sinclair's fascinating presentation at our November meeting in Kuala Lumpur stimulated a lot of discussion, and so we are pleased to publish his concept in this issue of the *Forum*. He proposes a provocative new model for the development of androgenetic alopecia in which he introduces the concepts of primary and secondary follicles, atrophy and detachment of the arrector pili muscle, and the loss of secondary follicles first as central to the underlying pathobiology. Further research will be needed to substantiate these hypotheses. If proven, new therapies directed at inducing or increasing smooth muscle of the arrector pili muscle may become important in the control and reversal of androgenetic alopecia.

There have been several papers recently identifying the potential for HRS to trigger cicatricial alopecia such as lichen planus pilaris and frontal fibrosing alopecia. In his case presented in this issue, Dr. Farhad Rejali illustrates that HRS can also act as a trigger for alopecia areata. Such reports are of great value to us all in that they make us even more aware of the need to identify patients at risk.

I want to echo Dr. Marzola's comments in thanking ISHRS President, Dr. Sharon Keene, for her outstanding three-part series on LLLT. She has gone a long way in helping us to understand the realities of the scientific evidence for this technology.◆

INTERNATIONAL SOCIETY OF HAIR RESTORATION SURGERY

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.

2014–15 Chairs of Committees

American Medical Association (AMA) House of Delegates (HOD) and Specialty & Service Society (SSS) Representative: Carlos J. Puig, DO, FISHRS (Delegate), Paul T. Rose, MD, JD (Alternate Delegate)
Annual Giving Fund Chair: John D.N. Gillespie, MD, FISHRS
Annual Scientific Meeting Committee: Nilofer P. Farjo, MBChB, FISHRS
Audit Committee: Robert H. True, MD, MPH, FISHRS
Bylaws and Ethics Committee: David Perez-Meza, MD, FISHRS
Communications & Public Education Committee: Robert T. Leonard, Jr., DO, FISHRS
CME Committee: Paul C. Cotterill, MD, FISHRS
Regional Workshops Subcommittee: Matt L. Leavitt, DO (Chair) & David Perez-Meza, MD, FISHRS (Co-Chair)
Subcommittee on EBM and Research Resources: Marco N. Barusco, MD
Subcommittee Expert Panel: Paul C. Cotterill, MD, FISHRS
Core Curriculum Committee: Anthony J. Mollura, MD
Fellowship Training Committee: Robert P. Niedbalski, DO
Finance Committee: Ken Washenik, MD, PhD
FUE Research Committee: James A. Harris, MD, FISHRS
Hair Foundation Liaison: E. Antonio Mangubat, MD
International Relations Committee: Bessam K. Farjo, MBChB, FISHRS
Membership Committee: Michael W. Vories, MD
Nominating Committee: Sungjoo Tommy Hwang, MD, PhD, FISHRS
Past-Presidents Committee: Carlos J. Puig, DO, FISHRS
Pro Bono Committee: Edwin S. Epstein, MD, FISHRS
Scientific Research, Grants, & Awards Committee: Carlos J. Puig, DO, FISHRS
Surgical Assistants Committee: Janna Shafer
Surgical Assistants Awards Committee: Tina Lardner
Ad Hoc Committee on Database of Transplantation Results on Patients with Cicatricial Alopecia: Jeff Donovan, MD, PhD
Ad Hoc Committee on Issues Pertaining to the Unlicensed Practice of Medicine: Carlos J. Puig, DO, FISHRS
Ad Hoc Committee on Regulatory Issues: Paul T. Rose, MD, JD
Subcommittee on European Standards: Jean Devroye, MD, FISHRS
ISHRS Representative to CEN/TC 403
Subcommittee on Alberta, Canada Standards: Vance Elliott, MD, FISHRS
Task Force on Finasteride Adverse Event Controversies: Edwin S. Epstein, MD, FISHRS

2014–15 Board of Governors

President: Sharon A. Keene, MD, FISHRS*
Vice President: Kuniyoshi Yagyu, MD, FISHRS*
Secretary: Sungjoo Tommy Hwang, MD, PhD, FISHRS*
Treasurer: Ken Washenik, MD, PhD, FISHRS*
Immediate Past-President: Vincenzo Gambino, MD, FISHRS*
Alex Ginzburg, MD
Robert S. Haber, MD, FISHRS
James A. Harris, MD, FISHRS
Francisco Jimenez, MD, FISHRS
Melvin L. Mayer, MD, FISHRS
Paul J. McAndrews, MD, FISHRS
William M. Parsley, MD
David Perez-Meza, MD, FISHRS
Robert H. True, MD, MPH, FISHRS
Arthur Tykocinski, MD, FISHRS
**Executive Committee*

Global Council of Hair Restoration Surgery Societies

Membership proudly includes:
American Board of Hair Restoration Surgery
Asian Association of Hair Restoration Surgeons
Association of Hair Restoration Surgeons-India
Australasian Society of Hair Restoration Surgery
Brazilian Society of Hair Restoration Surgery (Associação Brasileira de Cirurgia de Restauração Capilar – ABCRC)
British Association of Hair Restoration Surgery
French Hair Restoration Surgery Society
Ibero Latin American Society of Hair Transplantation (Sociedad Iberolatinoamericana de Trasplante de Cabello – SILATC)
International Society of Hair Restoration Surgery
Italian Society for Hair Restoration
Japanese Society of Clinical Hair Restoration
Korean Society of Hair Restoration Surgery
Polish Society of Hair Restoration Surgery
Sociedad Iberolatinoamericana de Trasplante de Cabello

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

1. Articles should be written with the intent of sharing scientific information with the purpose of progressing the art and science of hair restoration and benefiting patient outcomes.
2. If results are presented, the medical regimen or surgical techniques that were used to obtain the results should be disclosed in detail.
3. Articles submitted with the sole purpose of promotion or marketing will not be accepted.
4. Authors should acknowledge all funding sources that supported their work as well as any relevant corporate affiliation.
5. Trademarked names should not be used to refer to devices or techniques, when possible.
6. Although we encourage submission of articles that may only contain the author's opinion for the purpose of stimulating thought, the editors may present such articles to colleagues who are experts in the particular area in question, for the purpose of obtaining rebuttal opinions to be published alongside the original article. Occasionally, a manuscript might be sent to an external reviewer, who will judge the manuscript in a blinded fashion to make recommendations about its acceptance, further revision, or rejection.
7. Once the manuscript is accepted, it will be published as soon as possible, depending on space availability.
8. All manuscripts should be submitted to editors@ishrs.org.
9. A completed Author Authorization and Release form—sent as a Word document (not a fax)—must accompany your submission. The form can be obtained in the Members Only section of the Society website at www.ishrs.org.
10. All photos and figures referred to in your article should be sent as separate attachments in JPEG or TIFF format. Be sure to attach your files to the email. Do NOT embed your files in the email or in the document itself (other than to show placement within the article).
11. We CANNOT accept photos taken on cell phones.
12. Please include a contact email address to be published with your article.

Submission deadlines:
June 5 for July/August 2015 issue
August 5 for September/October 2015 issue
October 5 for November/December 2015 issue

www.ISHRS.org

Notes from the Editor Emeritus



William H. Reed, II, MD *Asheville, North Carolina, USA* wreedmd@me.com

As some of you know, I retired last year from HT leaving my practice in the capable hands and artistry of Dr. Tim Carman and his caring staff. When Mario asked me to write an Editor Emeritus column, I told him that I have little to say about hair that people would want to read and that my interests since retiring are under the categories of politics and religion or metaphysics, each a subject that my mother warned me as not being topics of conversation for polite company. Mario responded that perhaps some of you readers might be interested in my experiences in retirement, this last chapter of our lives.

With respect to remarks about hair directly, all I have to say is that in the last year I have noted a marked thinning of my donor hair, especially to those hairs outside of the "safe zone." To those who say, "Well you got good use of a head of hair for decades," I must say that at 67 I still care about not having a mangy, thin head of head and certainly wouldn't want pocked, scarred donor skin showing through when I get my hair wet. Harvesting to 50% density outside of the safe zone does not account for the progressive thinning with age and I believe this practice, depending in part on the patient's age, should be considered as cautiously as transplanting the hairline of a 20-year-old with Norwood Stage II hair loss.

So that's the relevant remark that I have for you, my colleagues. Now, politics or religion? Well, my political interests have more in common with hair than religion and here is why: the precautionary principle, that is, "First do no harm." There is an interesting struggle going on between the USA and Europe now over this issue in their discussions about the Trans-Atlantic Trade Agreement. *The New York Times* had a revealing op-ed not long ago (http://nyti.ms/1A22MTC) that discusses these difficulties of what is a fundamental cultural and philosophical difference between the two sides of the Atlantic. It remarks: "… the European approach incorporates the so-called precautionary principle and requires companies to establish that new chemicals are safe before they are put on the market. The American approach puts the onus on regulators to show some evidence of danger before taking action against new chemicals." Fine, let's trust the EPA and the FDA. After all, that's what they are for, right? This would be a reasonable, ideal position, but an article referred to in the op-ed states that the EPA has removed only 5 of 80,000 chemicals introduced into the environment since the 1970s. Another study cited states that there are 82 instances of pesticides allowed in the United States that are barred or restricted in Europe. The article uses atrazine as an example. It is a Swiss herbicide that is banned in the EU and even in Switzerland itself. In 2013, it was used in the United States in more than half of corn, two-thirds of sorghum, and 90% of sugar cane even though there are serious concerns about its persistence in our water supplies and about studies that show it to be a serious endocrine disruptor. Yet another *Times* editorial states that for the multiple bills introduced into Congress since 2008 that used the wording "reasonably safe" for regulating chemicals and drugs, none has received even a single Republican vote. These facts highlight the fundamental difference between the United States and Europe in applying the precautionary principle and, the editorial noted, it's very likely that the EU, with its current economic struggles, will have to give in in the trade negotiations and yield to the power of the USA's agro-chemical industry in the upcoming months.

Another drug, fluoride, reveals the intransigence of the FDA and EPA in revising their risk-to-benefit ratios on an ongoing basis. Fluoridation of community water supplies and its benefits to teeth is a 70-year-old scientific "fact," you know, from the era of DDT, scientific reassurances of cigarette safety, leaded gasoline, and the use of X-rays for acne and for measuring how new shoes fit. I think most of us are in positions from our training to have experienced how funding and egos of people in positions of authority can make "medical truths," including public health policies, difficult to change. Two studies are the more recent of many studies that raise concern about fluoride's safety.[1,2] Not surprisingly, these studies from quality institutions and appearing in quality journals are derided by industry's usual panel of "credentialed experts." If we were like Continental Europe, which in general doesn't fluoridate its water, or Israel, who has responded to the increased concerns about fluoride's safety by planning on removing it from their water next year, the U.S. regulatory agencies would also acknowledge at least some of the concerns that have been raised in the last 70 years. Regrettably, such is not the case. Visit fluorideactionnetwork.org or momsagainstfluoridation.org or the National Research Council's 2006 report[3] on fluoride and form your own opinion about the talking heads of the trade groups such as the ADA or the dentists of the Oral Health Division of the CDC.

I could keep going on with examples that make it hard not to conclude that there is a swinging door between jobs with business and government and Supreme Court decisions that ensure that the U.S. government is for sale to the highest bidder. See the documentary Boughtmovie.com. All of this, perhaps, should make us feel all the more responsible for what we do in our little corners of the world, responsibilities to our patients for educating them so that they can decide the amount of risk they want to assume in the services we offer and perhaps taking time to be socially responsible regardless of its efficacy vs. the Powers That Be.

Life after a career in hair transplantation at its fundamental levels isn't so much different than from within our careers. It lets us do more of whatever we really value, which is something that differs radically with the individual. Decades lived as a physician has led many of us to value service and the intellectual curiosities that don't end at the borders of our medical practice. I've described a partial list of what engages me. I would love to hear of how others of you are engaged. We physicians, and hair transplant surgeons of this era in particular, are the fortunate ones to have such freedom and breadth of choice.

References

1. Malin, A., and C. Till. Exposure to fluoridated water and attention deficit hyperactivity deficit disorder among children and adolescents in the United States: An ecological association. Environmental Health. 2015; 14:17.
2. Peckham, S., D. Lowery, and S. Spencer. Are fluoride levels in drinking water associated with hypothyroidism prevalence in England? A large observational study of GP practice data and fluoride levels in drinking water. J Epidemiol Community Health. doi:10.1136/jech-2014-204971.
3. http://www.actionpa.org/fluoride/nrc/NRC-2006.pdf◆

President's Message from page 94

Carol Rosanelli, and Cheryl Pomerantz, to name a few) . We have always valued their work and contributions and look forward to this continued educational commitment from our future assistant members. However, because the Distinguished Assistant Award has been used by some award recipients as an advertising tool to confuse patients about who is medically licensed to perform surgery, we have opted to change the appearance of the assistant award, to distinguish it from the physician follicle award. The new design is a beautiful crystal statue with engraving to illustrate a hand placing grafts. If you have other ideas to recognize the contributions of dedicated assistants, please forward them. We are always open to new ideas.

Our specialty is changing, and we must be open-minded to changes and innovations that can benefit patient care, safety, and outcomes. However, change for the sake of change, when it does not benefit patients, should not be embraced. As often occurs when "rules" or laws become necessary to control negative behavior, restrictions of some sort are imposed on law-abiding people, too. The Board of Governors has worked diligently to create a solution that does not harm our loyal assistant staff, and these changes were voted on and supported by the General Membership at our last meeting.

I hope this message clarifies what has changed—and especially that our commitment to assistant education and training has not!

Finally, I would like to encourage our members to get involved personally in the upcoming annual meeting in Chicago, Illinois, September 9-13, 2015, even if you did not submit an abstract. We have two ways for you to do that. Our scientific chairman, Nilofer Farjo (dr.nilofer@farjo.com), has put together an outstanding program—but seeks to provide more member participation in the form of **case submissions for the very popular panel on post-operative complications**. Such cases provide important discussions and learning experiences for all of us. Some cases will be included in the General Session Complications session and others in the M&M Conference being chaired by Marco Barusco (drbarusco@tempushair.com). With that in mind, we also wish to **invite members to submit cases to Márcio Crisóstomo** (marcio@implantecapilar.med.br), **the chairman for the Live Patient Viewing session, for presentation at the live session in Chicago**. Please keep in mind that if you are accepted to present a patient for the Live Patient Viewing session, you will also be accepting responsibility for travel and accommodations expenses. There are few opportunities like this one to share your surgical results with your peers—so please let Márcio know if you would like to participate.

I look forward to seeing you all in Chicago!◆

Visit our booth in Chicago!

Omano Microscope *with* Ergo-Sect Board

SPECIAL OFFER

$675.00*

**When you mention this ad.*





Kenny Moriarty

Vice President

cell: 516-849-3936

kenny@georgetiemann.com

A to Z

www.atozsurgical.com

Controversies



Russell G. Knudsen, MBBS, FISHRS *Sydney, Australia* drknudsen@hair-surgeon.com

Is Finasteride Safety Data Adequately Reported in Published Trials?

A recent paper reported in JAMA Dermatology (Belknap, S.M., et al. Adverse event reporting in clinical trials of finasteride for androgenic alopecia. A meta-analysis. *JAMA Dermatol.* Published online 1 April 2015) states that a meta analysis of the safety reporting in 34 published trials demonstrably shows that there is inadequate published reporting of both side-effect incidence and severity for 1mg finasteride in the treatment of male pattern baldness.

The study, performed by Northwestern University, concluded that there was inadequate information to establish the safety of finasteride in treating male pattern balding. It stated that the available toxicity information is very limited, of poor quality, and appears systematically biased.

Given that we physicians have been reassuring our usually young and healthy patients for 18 years that toxicity is infrequent and does not persist for long after cessation of therapy, how should we respond? The data we cite to our patients not only includes the 12-month original trial but the ongoing efficacy of treatment for the patients in this trial extending for a period of 5 years.

Discussion of the sexual side-effect incidence for 1mg finasteride has generated a lot of publicity in recent years. Almost every new patient I see has "researched" the internet on this topic and arrives at the consultation with an opinion as to whether they would consider its use. The assumption they seem to make is that everyone who uses 1mg finasteride gets this side effect!

It is worth noting that population studies report a significant incidence of sexual dysfunction in young men that appears to exceed the reported incidence of sexual side effects in the original 1mg finasteride trial. Given that sexual dysfunction is a complex area of medicine, with both physical and psychological etiologies, it is difficult to assign with confidence any lingering side effects after cessation of therapy as being solely due to drug toxicity.

In my personal clinical experience with my patients, side effects are uncommon and invariably recover after cessation of therapy. Again, in my experience over 18 years and prescribing to over 6,000 men, there largely appears to be two groups of men who develop sexual side effects. The first group develops the side effects quickly (within the first 2-3 weeks) and the second group seems to only slowly develop symptoms after some months of therapy (typically 4-12 months). As stated above, in my experience, the men all recover after cessation of finasteride although this can take weeks or in some cases a couple of months to resolve. It is my theory that the long tissue half-life of finasteride (t1/2 is 30 days) can allow a buildup of finasteride in the tissues over time and possibly explains both the delayed onset of the side-effect group and the delayed recovery group.

Many physicians have concluded that with the plethora of claims about sexual side effects related to 1mg finasteride use, additional information on this topic, (such as a hand out) accompanied by an informed consent, signed by the patient, can be useful. That said, any such document provided in this context should be carefully written so that it does not become an issue in a situation of any dispute with a patient.

Many physicians, myself included, use interval dosing of finasteride to limit buildup of finasteride in the tissues in patients who develop side effects on 1mg daily finasteride. Indeed, I sometimes recommend patients cease therapy for 1 month in every 6 months of treatment. In my experience, interval dosing of finasteride significantly reduces the incidence of sexual side effects to well below 1% of my treatment population.

It is also worth remembering that we physicians will tend to under-report the incidence of sexual side effects if we don't actively follow-up all of our patients. It is not uncommon for patients to develop side effects, not report this to their physician, but merely stop therapy and not return to the treating physician.

Post-market experience in our patient populations seems to support the original data regarding both the safety and efficacy of 1mg finasteride. We should always be aware that we are commonly asking young men to take this medication for a prolonged period of time. We should be mindful of the potential for disconcerting side effects to develop, even after a significant period of time. It might also be time for members of the ISHRS to collectively pool data regarding side effects to counter concerns of inadequate safety data being reported.

Editor's note: Thank you to Dr. Knudsen, our latest Manfred Lucas Award winner, for this information and his experiences. There is more on the subject of finasteride and its side effects in the Review of the Literature column.

Is it time to ask all patients to sign a detailed informed consent before giving them this medication? Perhaps it is.

Dr. Paul Rose, who is also an attorney, responded this way when asked that question:

"I think that it is easy to dismiss consent forms, but I would argue that the form—if done reasonably well—at least elucidates the risks a patient has consented to take and there is clear documentation. When you consider that every hospital uses consent forms, and these hospitals have access to some of the best legal minds, they have chosen to have consent forms. A written record is far superior to recollections that are tainted. If an attorney asked you: Did you tell the patient this or that? How could you really back it up? Rely on your staff's recollections? Is it possible you forgot to tell the patient X, Y, or Z? Of course, it's possible….

While the consent is not perfect, it is far better than flying by the seat of your pants."

—MM◆

Biostimulation and LLLT *from front page*

loss of attachment between the APM and hair follicle bulge is associated with irreversible or partially reversible hair loss (Figure 6).

The APM plays a significant role in maintaining hair follicle integrity. Restoration of the APM in transplanted hair follicle units has been shown to induce the regeneration of the neurofollicular and neuromuscular junction in the follicle bulge in single follicular unit transplant in androgenic alopecia patients.[7]

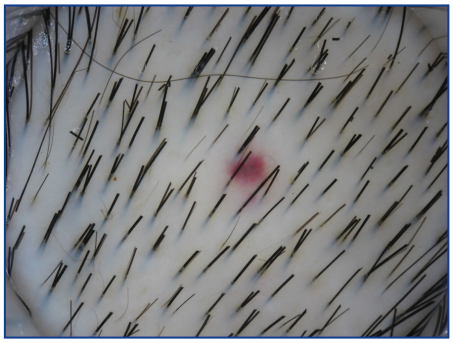


Figure 4. In AGA, there is a reduction in the number of hairs per FU that precedes the development of baldness.

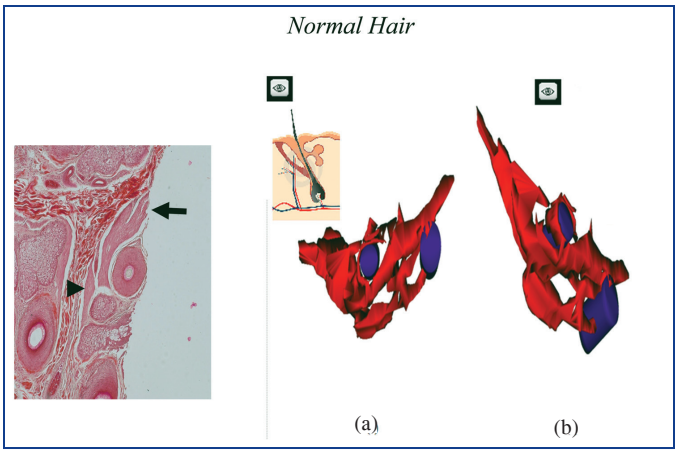


Figure 5. In telogen effluvium and also alopecia areata, the arrector pili muscle (red) can be shown to be attached to the hair follicle (purple).

The discovery of progressive muscle volume loss and fat infiltration in AGA samples that was associated with total or near to total loss of the muscle attachment to the primary follicle bulge[8] led to the hypothesis that maintenance of the attachment between the APM and the bulge might differentiate between reversible and irreversible hair follicle miniaturization as these features were exclusive to AGA. The finding that the APM is preserved in telogen effluvium and alopecia areata supports this view.

It appears likely that the interaction between the mesenchyme-derived APM and the follicle bulge epithelium is essential for the integrity of the pilosebaceous unit, much in the same way as the interaction between the mesenchymal-derived dermal papilla and the epithelial hair follicle matrix.

Follicle cycling is associated with the movement of cells between the dermal papilla and dermal sheath.[10] It is thought that disruption of this process in AGA causes a loss of cells from the dermal sheath and then the dermal papilla that consequently leads to hair follicle miniaturization (Figure 7). Cells from the dermal papilla and dermal sheath are capable of undergoing both smooth muscle and adipose differentiation *in vitro*. Cells from the follicle mesenchyme might also contribute to maintenance of the APM, and the muscle degeneration seen in AGA could be caused by the loss of a progenitor cell population that maintains both the APM and the dermal papilla.

In conclusion, we propose a new model for AGA (Figure 8). In early stages of hair loss, the arrector pili muscle remains attached to the primary follicle, but loses its attachment to some

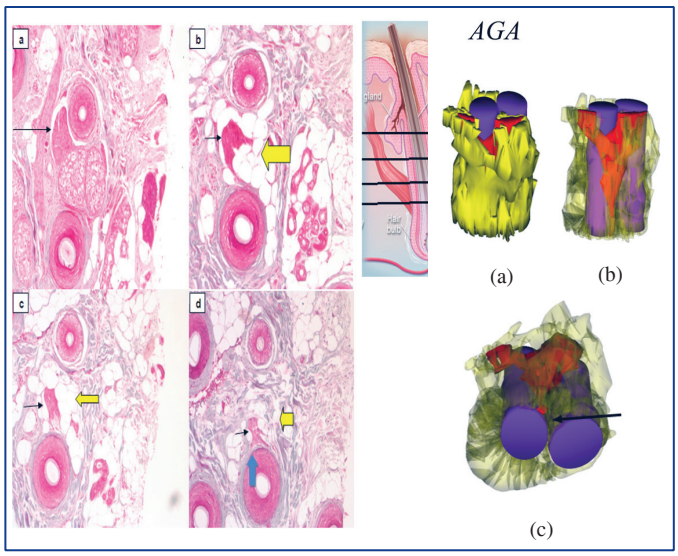


Figure 6. In androgenetic alopecia, the proximal arrector pili muscle (red) is progressively replaced by adipose tissue (yellow) and loses its attachment to the hair follicle bulge (purple).

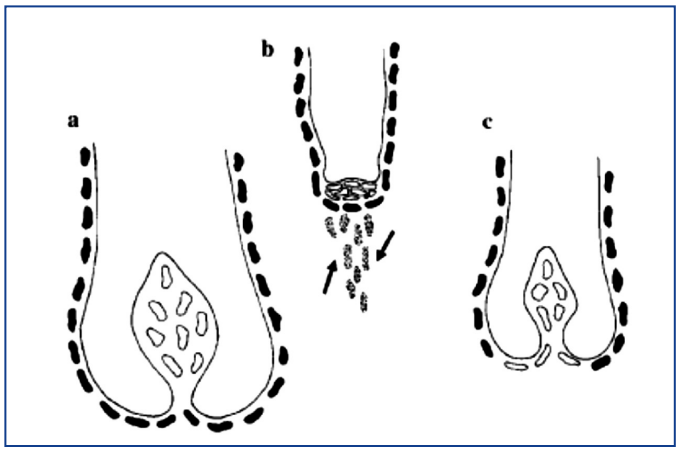


Figure 7. Reduction in dermal papilla cell numbers as an indirect result of changes to the dermal sheath. The sheath cells (solid cells) that surround the follicle are an integral part of the follicle dermis (a). If they are functionally lost (dotted cells arrowed) from the follicle (b), then dermal papilla cells (outline only) move from the papilla to replace them (c). As a result, the papilla and the follicle become smaller. (Reproduced from: Jahoda C. Cellular and developmental aspects of androgenetic alopecia. *Exp Dermatol.* 1998; 7:235-248.)

of the regressing secondary follicles in some follicular units. Miniaturization of secondary follicles and detachment of the APM from these follicles extends to the rest of the follicular units. At this stage, patients may complain of hair thinning and loss of volume in their ponytail without any visible baldness.

With further progression, miniaturization continues and the muscle loses attachment to the secondary follicles in affected follicular units completely. Primary follicles eventually miniaturize and this leads to visible baldness. When primary follicles lose muscle attachment, the hair loss becomes irreversible. Hopefully this model facilitates a clearer understanding of normal hair growth and also hair loss conditions.

References

1. Sinclair, R. Male pattern androgenetic alopecia. *BMJ.* 1998; 317:865.
2. Ellis, J.A., R. Sinclair, and S.B. Harrap. Androgenetic alopecia: pathogenesis and potential for therapy. *Expert Rev Mol Med.* 2002; 4:1-11.
3. Sinclair, R., et al. The reliability of horizontally sectioned scalp biopsies in the diagnosis of chronic diffuse telogen hair loss in women. *J Am Acad Dermatol.* 2004; 51:189-199.

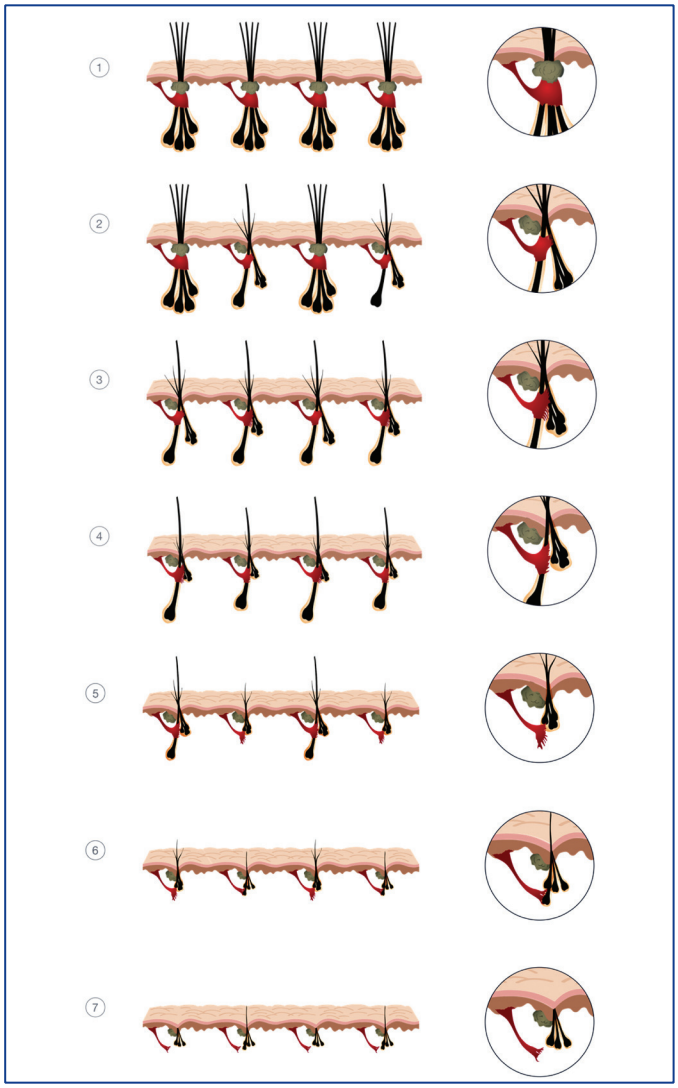


Figure 8. Scalp follicles exist as compound follicular units. In AGA, miniaturization occurs initially in the secondary follicles. This leads to a reduction in hair density that precedes visible baldness. Bald scalp only becomes visible when the all of the hairs within a FU are miniaturized. With miniaturization, the muscle initially loses attachment to the secondary follicles. When primary follicles eventually miniaturize and lose muscle attachment, the hair loss becomes irreversible.

4. Yazdabadi, A., et al. The Ludwig pattern of androgenetic alopecia is due to a hierarchy of androgen sensitivity within follicular units that leads to selective miniaturization and a reduction in the number of terminal hairs per follicular unit. *Br J Dermatol.* 2008; 159:1300-1302.
5. Messenger, A.G., and R. Sinclair. Follicular miniaturization in female pattern hair loss: clinicopathological correlations. *Br J Dermatol.* 2006; 155:926-930.
6. Torkamani, N., et al. Beyond goose bumps: does the arrector pili muscle have a role in hair loss? *Int'l J Trichol.* 2014; 6:88-94.
7. Sato, A., et al. Single follicular unit transplantation reconstructs arrector pili muscle and nerve connections and restores functional hair follicle piloerection. *J Dermatol.* 2012; 39:682-687.
8. Torkamani, N., et al. Destruction of the arrector pili muscle and fat infiltration in androgenic alopecia. *Brit J Dermatol.* 2014; 170:1291-1298.
9. Yazdabadi, A., et al. Arrector pili muscle and alopecia. *Int'l J Trichol.* 2012; 4:154-157.
10. Jahoda, C. Cellular and developmental aspects of androgenetic alopecia. *Exp Dermatol.* 1998; 7:235-248.

Editor's note: I asked Professor Sinclair why dermal papilla cells are lost to the dermal sheath at cycling resulting in a smaller papilla and therefore a smaller hair. What is it that makes them move out? It seems that if we can identify the process here, we may be able to reverse that process. We know that a larger dermal papilla equals a larger hair.

He quoted from Jahoda: "Reduction in dermal papilla cell numbers are an indirect result of changes in the dermal sheath cell numbers. The sheath cells that surround the follicle are an integral part of the follicle dermis. If they are lost from the follicle during catagen or telogen, then dermal papilla cells will move from the papilla to replace them at the onset of anagen. As a result the papilla and follicle become smaller." (Jahoda, C. Cellular and developmental aspects of androgenetic alopecia. *Exp Dermatol.* 1998; 7:235-248.) Maybe the dermal sheath will give us some answers in due course.

Also, we know that FUE aficionados are now refining the harvesting process by only partially harvesting an FU, that is, leaving behind one hair of a multiple FU. This way there are no gaps left in the donor area. Professor Sinclair talks of primary and secondary follicles so the question is, if the primary follicle is taken, would the secondary follicles left behind perish? Conversely, if only secondary follicles are taken, will they grow without their primary hair?

He replied that there is a risk of damage to the remaining follicle in partial harvesting of a follicular unit, but he felt that the primary/secondary follicle concept should not affect growth. —MM

• •

Editor's note: What appears to be an FU on the surface of the skin may actually be one or more FUs. We are in the age of sub-follicular unit grafting not only in FUE but also because cutting down FUs has been very widespread with FUT for several years.

Actually, in its most contemporary iteration, FUE is done with fractional harvesting. We look for clusters of hair (usually more than 1 FU) and split off the tightest groups leaving the other hairs in the cluster. Very often, actual FUs are not split apart, though sometimes they are, but it is a misconception to characterize current FUE as associated with routine splitting of follicular units. —RHT

• •

Note from Dr. Jerry Cooley: In this paper, Drs. Sinclair and Torkamani report that in androgenetic alopecia the arrector pili muscle (APM) is lost and replaced with fat as balding progresses. There is both a practical and theoretical outcome to this finding. It is sometimes hard to distinguish androgenetic alopecia from other non-scarring alopecias, such as chronic telogen effluvium. A biopsy showing loss of the APM and replacement by fat would certainly suggest AGA; it might be worthwhile asking our dermatopathologists to start looking for this in the biopsies we send them.

Theoretically, detachment of the APM from the hair follicle may represent the "point of no return" when a miniaturizing follicle can no longer be medically revived (e.g., finasteride, minoxidil) and will progress to the vellus state. To bolster this theory, it would be nice to see sequential biopsies over time in patients on medical therapy, looking specifically at the APM attachment to the follicle. While it may be hard to carry out such a study, it would help prove that APM detachment is irreversible and lend considerable support to this new theory.◆

LLLT Part 3: Critically Assessing Recent Published LLLT Device Trials: Limitations, Recommendations, and Conclusions

Sharon A. Keene, MD, FISHRS *Tucson, Arizona, USA* skeene@ishrs.org

In this final installment evaluating the science and application of LLLT to treat hair loss, evidence will be evaluated in the context of recent published data, recognized methods to measure treatment response, and known properties of biostimulation. Limitations of methodologies will be discussed, as well as how this information may be used to assist patients in decision making if they are considering the purchase of a cleared and legally distributed LLLT device.

Clinical trial data from randomized, controlled studies is the sine qua non of evidence used to determine effectiveness for any medical therapy.[1] The U.S. FDA has established acceptable methods of assessing effective hair growth therapy when approving topical minoxidil, and similar methods for finasteride. These include before and after phototrichograms, and recommended time blinded global photo assessments.[2] However, because LLLT devices go through a 510(k) clearance process, rather than pre-market or FDA approval, many of the LLLT devices that have been cleared and currently marketed in the United States have no clinical proof of efficacy.[3] As licensed medical practitioners, doctors have an obligation and patients have an expectation that recommended medical treatments are, above all, safe, but also proven effective. Ethical considerations, as promoted by organized medicine, dictate a patient's best interests take precedence over any profit motive.[4] With this in mind, recommendations for use of an LLLT device to treat hair loss begins with recommending only those devices independently evaluated and cleared by a regulatory body for safety (in the United States, this is 510(k) clearance), and that have provided acceptable medical evidence of efficacy beyond anecdotal response. Preferably, a randomized controlled trial. However, as this review will address, even data from randomized controlled trials need to be evaluated with a critical understanding of both recognized hair growth promoter assessment techniques as well as the principles and limitations governing LLLT and biostimulation. Many hair research doctors are well versed in the former, and laser therapy specialists the latter—a critical review of the available LLLT trials for hair growth suggests a need to better integrate the two areas of expertise.

In 2013-2014, there were four newly published "randomized controlled trials" studying various LLLT devices for treating hair loss.[5-8] Three studies involved helmets with multiple diode lasers, some of which included LED lights. The fourth and largest study assessed response to several models of a laser comb, each with increasing numbers of laser diodes—7, 9, and 12 diodes, respectively. All of the four published studies considered increases in hair counts in a small study area as an endpoint. All studies used a recognized methodology for assessing hair counts, using a single tattoo on the specified scalp study area, where hair was trimmed prior to obtaining "before" and "after" phototrichograms. Global photo assessment with "before" and "after" comparisons were done in the Laser Comb and Korean helmet study, but not in the two U.S. "Top Hat" helmet trials.[5-8] None of these trials used stabilization of hair loss as an endpoint, and could not have done so because of the short trial duration (26 weeks or less). Furthermore, none of the studies described how they determined the "dose" of therapy (duration and frequency of treatment) and, therefore, did not address the possibility of a biphasic dose response risk where too short or too long an exposure would have either no impact or adverse impact on hair growth. In addition, none of the studies addressed which of the multiple diode lasers or LEDs were positioned to effectively biostimulate the single area trimmed for the hair counts. In contrast to systemic treatments (finasteride) or topical applications to the skin (minoxidil) where hair trimming made hair counts easier to perform, researchers for the LLLT studies did not address how trimmed hair vs. the presence of hair could be confounding variables for the application of light therapy to scalp. Realizing the effect of these variables suggests that study designers should have developed an alternate method or used standardized hair pattern and hair color characteristics for evaluating the same treatment application. Each study reached varying degrees of a positive conclusion regarding the effectiveness of their LLLT device to treat hair loss. However, closer scrutiny of data, methodology, short study duration, as well as an awareness of the scientific principles of biostimulation, biphasic dose response, light properties, and melanin as a chromophore in skin and hair must be considered when assessing the validity and utility of information obtained from these trials.

Performing Accurate Hair Counts & Comparing Phototrichograms

When evaluating phototrichogram data intended to compare hair counts, investigators must be experienced in photo preparation of the study area as well as how to photograph for uniform "before" and "after" data collection accuracy and ease of comparison. An awareness of how to interpret or evaluate this methodology is important for readers to understand, in order to evaluate the accuracy of study conclusions. Hair counts are tedious and difficult and require adherence to specific comparative techniques. Most studies utilize a single tattoo in the midpoint of a study area, usually 1-2cm^2 where a phototrichogram (magnified photo of follicular units) is taken. (In the U.S. helmet studies, this area was reportedly 2.5cm^2). When a single dot tattoo is used, rather than 2 dots, it is more difficult to avoid frame of reference errors because rotating a camera only 1mm north, south, east or west of the dot can potentially change the number of follicular units/hairs included in the assessment area. Hair length is a critical factor for accuracy in hair counts, too. Too short or completely shaved hairs will not be visible for counting. However, researchers do use the shaving method as a means to determine anagen from telogen hairs—by shaving and then photographing 3-5 days later, you can discern which hairs are actually growing (anagen) from those in the telogen phase. The photos taken at 3-5 days would then constitute the baseline phototrichogram for counting hairs before and after treatment. No apparent efforts were made to assess anagen from telogen hairs in these studies, and this might influence study results. Trimmed hairs left too long (>1-2mm) allow hairs to overlap, obscuring those beneath or adjacent. These factors are especially important for automated counting methods—none of which have yet proven accurate without some form of manual assistance. Methods to standardize hair length to 1mm will optimize

counting ease and accuracy, and when not used will call accuracy into question.[9,10] Furthermore, comparing phototrichograms visually where hair is longer in an after photo is misleading, as longer length creates the illusion of greater coverage. Phototrichogram images can be enlarged on a computer screen, follicular units marked and counted, with sentinel groupings to ensure perspective is the same and area perimeters are identical.

Because opportunity exists for error using these methodologies, particularly if performed or interpreted by inexperienced photographers, it is imperative that published hair count data be accompanied by sufficient numbers of "before and after" phototrichograms and global photos to establish the credibility of reported results. Notably, none of these trials had multiple examples included in their publication to support their data or positive conclusions. The most accurate and credible response example was provided in the Laser Comb study where global photos of a female patient were substantiated with accurately illustrated before and after photo trichograms—marking sentinel groupings and new hairs. However, as was pointed out by an astute researcher (verbal communication), it is remarkable that in a study where more than 100 patients were treated, only one notable example was published. As previously mentioned, there were no phototrichograms or global photos included in the Korean helmet study, and no global photos in the two U.S. "Top Hat" helmet studies. Of the phototrichograms provided in the U.S. helmet studies, when hairs were counted, results did not match the labeled numbers of purported increased hairs. The latter point illustrates the importance of including these photos, so reviewers may confirm for themselves and avoid drawing clinical conclusions from potentially inaccurate hair count reports.

Comparison LLLT Device Data with Established Hair loss Treatment and Each Other

Credibility of hair count data accuracy, when not readily corroborated by visual assessment, can also be suggested by comparing reported hair counts to results from other credible studies of recognized hair growth promoters. Dramatic hair growth claims should be an indication for closer scrutiny. Table 1 compares device characteristics including wavelength, number of laser diodes, and LED lights, as well as dosing regimens or energy (E) applied in each of the randomized, controlled trials. In order to compare device results, similar data points such as percentage hair count increase or absolute hair counts were used and can be found in Table 2. Absolute hair counts from raw data were available for the smaller helmet studies, but not for the largest study with the Laser Comb. In order to compare the helmet studies with the Laser Comb, the data point of percentage of patients with an increase > 20 hairs/cm^2 was used, as this appeared to be the parameter demarcating response to an LLLT laser comb above growth generated by the sham (placebo) device. Table 2 summarizes and compares the percentage of patients in each device study group (LLLT vs. sham) that achieved hair growth results either >20 hairs/cm^2 or >15% increases in hair counts during the study period. These comparisons made it possible to understand the substantial variations in reported increased hair counts between these devices, and to compare them to increases in hair counts among patients treated with the FDA-approved drug, finasteride. Particular scrutiny was engendered by extraordinary growth claims from the U.S. helmet studies.

Device	N M/F	Wavelength (nm) Laser Diode (LD) LED	Power (mW) Area (A)	Dur/Freq PD for one LD or LED E (J)= Watts (P) x s	Study Length (wks)
Laser Comb (moving) FDA-510K	128 M 141 F	7,9 beam: 655 nm 12 beam: 6-655nm 6-635 nm	P=5mW (.005W) Beam A=?	15,11min 8 min X3/wk— moving 1 cm/ 4s E= .02J	26
LLLT/LED Helmet 1 stationary KFDA	26 M 14 F	27 LD @ 650 nm 24 LED@ 630 nm 18 LED@ 660 nm (69 beams)	P=4 mW P=3.5mW P=2.5mW A=?	18 min/d E=4.32J E=3.78J E=2.7J	24
LLLT/LED Helmet 2 stationary FDA-510K	44 M 47 F	21 LD 655 nm 30 LED 655 nm (51 beams)	P=5mW Beam A=?	25 min,qod E=7.5J	16

Table 1. Comparing Light Parameters and Dosing Schedules for LLLT Devices in This Report

Device N=LLLT/Sham	% Pts >20 hair/ cm2 LLLT	% Pts >20 hair/cm2 Sham	% Pts > 15% incr LLLT	% Pts >15% incr Sham
L Comb-M 7,9,12 beam 67/36	38-68%	0-14%	N/A No raw data	N/A
L Comb-F 9,12 beam 82/40	40-41%	5.5%	N/A	N/A
Helmet 1 M/F 15/14	26.6%	7.1%	33% Ave 29%	14.3% Ave 25%
Helmet 2-M 22/19	72.7%	21.0%	100% Ave 67.2%	37% Ave 75.7%
Helmet 2-F 24/28	79.1%	3.6%	95.8% (Ave 50% increase)	30% (Ave 24% increase)

Table 2. Hair Count Comparisons: Laser Comb, Korean Helmet, U.S. "Top Hat" Helmet

In performing data reanalysis, first the LLLT device data was compared to an average 15% increase in hair counts achieved with the FDA-approved finasteride. Previous published reports of response to finasteride revealed an average increase in hair counts after a year of therapy was 14%, and rose to 16% at 2 years (mean increase 15%).[11] The three published helmet studies were sufficiently small to include raw data for re-analysis to make this comparison. In the Korean helmet group, 33% of patients achieved a reported >15% increase in hair counts—similar to increases seen with finasteride treatment—interestingly, so did 14.3% of placebo patients. When assessed by absolute hair counts, 26.6% of patients had increased >20 hairs/cm^2, compared to 7.1% in the placebo group. Coincidentally, the same percentage of treated patients who experienced increases >20 hairs/cm^2 were noted by investigators and patients to have a visible global improvement, but this comparison (hair counts to visible global improvement) were not done. What this finding also illuminates is that nearly 70% of treated patients did not experience a significant clinical response.

➪ page 104

Part 3: LLLT from page 103

There were two separate published studies sponsored by the U.S. helmet manufacturer referred to as the "Top Hat" device. One study included only males and another, only females. (Notably one of the authors of the study, R.J. Lanzafame, has received consulting fees and fees for manuscript preparation, and has ownership interest in Apira Science—the device manufacturer). Remarkably, raw data in the male study revealed a surprising number of patients in both the placebo and the treatment group who reported to have 100% increases in hair counts. However, there were no published global photos. Phototrichograms, which were published, did not support hair growth claims. A visual analysis of the published phototrichograms suggested errors in hair counting methods and photography. In both studies, published phototrichograms revealed non-uniformity in hair length and camera perspective. More importantly, as noted, reported increases in hair counts, as labeled in the article, were substantially inaccurate by my manual count—raising doubts about the accuracy of all data reported. In the male study, the percentage of patients with a >15% increase was 100%, and nearly 96% for the female study. But not only did these reports indicate a growth response comparable to those seen with finasteride—achieved after only 4 months of therapy—they far exceeded them. In the male study, average increased hair counts were 65% (vs. 15% in finasteride-treated patients); for women, this number was a whopping 50% increase. Both of the published studies regarding this device were small (males: 22 treated, 19 sham; females: 24 treated, 28 sham), and as noted, the study duration was only 16 weeks.

In the fourth study to be evaluated, the Laser Comb study had the largest number of patients (n=225) and did not present raw data. Therefore, it was not possible to determine what percentage of patients achieved a >15% increase in hair counts, which, as noted, is comparable to finasteride response in men. However, in reviewing the bar graphs for treated patients with increases in hair counts >20 hairs per square centimeter, the Laser Comb achieved this for 38-68% of men, depending on the number of laser diodes; for women, this was 40-41%. These numbers also reveal that the number of non or minimal responders was significant; for women, 60% of patients did not achieve a growth response >20 hairs/cm^2, and for men, this range was 32-40%. Again, there was insufficient phototrichogram evidence or global photos to support efficacy claims.

Other Limitations and Caveats

In addition to questions raised by the paucity or absence of phototrichogram evidence—as well as questions raised when LLLT studies boast hair count increases far beyond those achieved by proven medical therapies—other questions remain unanswered, too. In the Laser Comb study, nearly 50% of placebo patients reported "minimal to improved" global appearance, and this response report was increased by approximately 10% among patients who were actually treated. Even if hair counts in the study area are assumed accurate, is there another reason this effect cannot be observed? Furthermore, since none of the studies provided long-term follow-up, what evidence exists to suggest gains could be sustained? In fact, considering the known biphasic response nature of biostimulation, it is expected an LLLT dose exists where excessive duration of stimulation may actually cause follicle damage. This question is pertinent to the fact that none of the studies addressed dosing, or discussed how duration and frequency of treatment was determined in order to avoid the biphasic response. This question is further pertinent to the development of devices that boast higher energy levels, without evidence that higher energy will improve results, or that this may actually have the opposite effect on hair growth. There are a number of published studies in animal models that describe the phenomenon and how dosimetry (J/cm^2) and time are critical to achieving a biostimulatory effect—or to producing no effect at all. For example, differences in irradiance matter. In a hamster model of mucositis treatment, using a 660nm laser in the first group at 55mW/cm^2 × 16 sec and in the second group at 155mW/cm^2 × 6 sec—both with comparable (J/cm^2)—only group 1 had a positive response.[12] The extent to which this phenomenon is seen in human patients is not yet known, but is believed to be the reason for some ineffective LLLT trials.

Another looming, unanswered question was raised in Part 1 of this series, and observes the basic principle of biostimulation that provides that a particular wavelength creates a cellular response when absorbed by a cellular target. Biostimulation can only occur if light reaches its target in the skin at the proper dose. Melanin in hair and skin is a chromophore absorbing laser light—preventing it from penetrating skin to reach cellular targets below. Depending on the angulation of a light beam, it can also be completely reflected, so, for example, laser helmet beams on the side of a helmet if beamed tangentially against hair on the top of the scalp will be reflected and cannot reach cellular targets there. As reported in Part 1 of this series, computer models estimate melanin in hair can reduce light transmission to the skin by close to 40% at an assumed length of only a few mm.[13] It should be expected this will be further reduced by long or layered hair, especially black hair containing the most absorptive pigment, eumelanin. A similar computer model verified the effect of skin color in reducing transmissible light for photodynamic therapy—indicating that medium to dark skin significantly impedes light transmission.[14] Dosing schedules that are the same despite differences in hair length, hair color, and skin color, cannot be assumed to render equal biostimulation to cellular targets. Unless patients have minimal hair or a shaved head for treatment, it is not clear how studies or LLLT devices will overcome this obstacle. Devices that part the hair and are moveable across the scalp are likely to reach more cellular targets. However, even these devices will have their limitations when dosing regimens ignore the known relevance of hair and skin color.

A similar limitation in the ability of LLLT to reach all cellular targets on the affected scalp must be considered for stationary devices—where light beams can only affect cells in their path. Light transmission is affected by distance and angulation, in addition to chromophores. LED lights, as mentioned in Part 1, cover a broader area as they are less coherent and collimated—distance from the skin reduces their power, while proximity to skin reduces their area of coverage. At no time did researchers indicate which of the light beams was being applied to a given study area—neither were explanations offered as to why multiple light beams were part of a device, and how the study model was designed to assess each of them. In fact, study methodology made it impossible to know whether various wavelengths used had equal utility, or contribution to results. Presumably, if each laser diode or LED were comparable in biostimulating properties, there would be no need for variation. Regardless, these studies did not provide information to elucidate these questions.

Conclusion

What can we advise patients who ask about LLLT for treating their hair loss? To summarize, evidence supporting efficacy of current LLLT devices is fraught with limitations due to erroneous or improper use of existing hair growth promoting assessment methodology and with study designs that don't consider known variables affecting light transmission for biostimulation. Therefore, no accurate conclusions can yet be reached, and recommendations should include the caveats listed here. Hair counting methods require hair to be cut short in the study area, and this disturbs the ability to evaluate the effect of LLLT in the case of patients who have pre-existing, longer hair everywhere but the study area. While LLLT may work for some patients (short hair, decreased pigment: blonde, fair skin), credible evidence (phototrichograms, global photos) to support effectiveness for MOST patients who use these devices is lacking. Important questions about dosing for LLLT therapy remain unanswered.

Only those devices 510(k) cleared are legal for sale in the United States, and it behooves patients everywhere to make sure any medical device they purchase has been evaluated for safety—mislabeled lasers are a safety hazard.

Future Research Recommendations

In reviewing copious literature establishing the science of biostimulation, it seems if we can identify the optimal wavelength and adjustable dosing regimens, and create the device that can bypass hair and skin to uniformly reach cellular targets, we should be able to achieve a hair growth benefit. Even so, existing research using LLLT for biostimulation has not determined if results from these devices can be sustained.

Nevertheless, there are patients unable to tolerate existing therapies such as finasteride or topical minoxidil. An alternate effective therapy could be very useful. The *in vitro* data from cultured cells documented a variety of wavelength ranges that would optimize stimulation of DNA synthesis, which, ostensibly, promotes growth factors to grow hair. As previously noted in this series, only one device currently cleared for use (a helmet) includes a wavelength promoting optimal DNA synthesis in cell cultures. This device has not been used to conduct a controlled study. The optimal study population for standardized LLLT device evaluation are men with moderate thinning, very short/shaved blonde hair, and fair skin—so identical dosing regimens may be used and the same light dose would be expected to pass through hair and skin to reach cellular targets. Who will conduct this study? As long as patients continue to purchase existing LLLT devices, and doctors continue to sell or recommend them, it is unlikely businesses will be motivated to test alternate wavelengths or dosing regimens. Inherent limitations in study design and clinical application will apply as long as dosing schedules fail to consider melanin or other chromophores in hair and skin—and as long as stationary application of light beams occur that cannot hope to stimulate cellular targets outside their beams.

References

1. Akobeng, A.K. Understanding randomised controlled trials. *Arch Dis Child.* 2005; 90:840-844.
2. http://www.accessdata.fda.gov/drugsatfda_docs/nda/2006/021812s000_MedR.pdf
3. www.fda.gov, 2014
4. http://virtualmentor.ama-assn.org/2009/05/ccas2-0905.html
5. Jiminez, J., et al. Efficacy and safety of a LLLT device in the treatment of male and female pattern hair loss: a multicenter, randomized, sham device-controlled, double-blind study. *Am J Clin Derm.* 2014; 15:115-127.
6. Kim, H., et al. LLLT for AGA: a 24-week, randomized, double-blind, sham device controlled multi-center trial. *Derm Surg.* 2013(Aug).
7. Lanzafame, R., et al. The growth of human scalp hair mediated by visible red light laser and LED sources in males. *Lasers in Surgery & Med.* 2013; 45:487-495.
8. Lanzafame, R., et al. The growth of human scalp hair in females using visible red light laser and LED sources. *Lasers in Surgery & Med.* 2014; 46:601-607.
9. Van Neste, D. Variants of phototrichogram methods. Bioengineering of the Skin: Skin Imaging & Analysis. 2006(Sep); 282.
10. Dhurat, R. Phototrichograms, *Indian J Dermatol Venereol Leprol.* 2006; 72(3).
11. Shapiro, J., and K. Kaufman. Use of finasteride in the treatment of men with AGA. *J Invest Derm Symp Proceedings.* 2003; 8:20-23.
12. Huang, Y.Y., et al. Biphasic dose response in low level light therapy—an update. *Dose Response.* 2011; 9:602-618.
13. Mustafa, F.H., et al. Influence of hair color on photodynamic dose activation in PDT for scalp disease. *IFMBE proceedings.* 2011; vol 35.
14. Farhad, H., et al. Red diode laser in the treatment of epidermal diseases in PDT. *World Academy of Science, Engineering and Technology.* 2010; 46:779-783.◆

Stop by our booth at the Chicago meeting!

Our New Pouches—Easy to Pack for Patient Travel



RSVP:
Chicago Deep Dish Pizza Party

info@HelpHair.com

1-561-499-2111

Chronotrichology: An Additional Weapon to Prevent and Treat Hair and Scalp Disorders

Fabio Rinaldi, MD, and Anna Trink, MD *Milano, Italy* *fabio.rinaldi@studiorinaldi.com*

Introduction

The so called circadian rhythm (from the Latin expression "circa diem" referring to a period of about 24 hours) regulates several daily physiological processes and the body's relationship with its surrounding environment, such as the sleep/wake rhythm and body temperature and hormone secretion. The Earth rotates around its axis once every 24 hours. The circadian system has been developed to adapt to this rhythm so that the body can make an effective use of sunlight, from the photosynthesis by plants to the hunting for food of animals. In fact, sunlight interacts with retinal receptors and triggers a series of signals that start from the central nervous system and are then delivered to the whole body. As a result, daily events can be anticipated, thus allowing a significant saving of time and an effective use of energy.[1,2]

The circadian rhythm is ruled by a central clock and some peripheral clocks.[3] The light/dark cycle involves the central clock at the level of the suprachiasmatic nucleus (SCN). This latter is located in the hypothalamus, where it regulates the rhythm of some related activities, such as the sleep/wake cycle, the autonomic nervous system, body temperature, and melatonin secretion. On the contrary, the feed/fast cycle involves the peripheral clocks that are located in most tissues and that regulate some local physiological processes, such as glucose and lipid homeostasis, hormone secretion, immune response, and the digestive system. The central clock interacts with the local clocks through neuronal and humoral signals in order to synchronize their related activities.[4]

Some recent studies have demonstrated the occurrence of circadian rhythms in leukocytes, in the oral mucosa, and in skin and follicles.[5-8]

Hair follicles are one of the most complex organs in the human body. In fact, they undergo an extremely complex biological cycle, where the alternation of the anagen/catagen/telogen phases occurs thanks to the precise regulation of the signals of cell proliferation, migration, and differentiation of bulge stem cells, germ cells, matrix cells, and hair shaft cells. Within this cycle the circadian clock is regulated at several levels, in different cell types and cell processes.[9,10]

Some recent studies have started to investigate the occurrence of circadian rhythms in the bulge and progenitor cells.[11-13] The pioneer study by Lin et al. has shown the bulge to be the key site of the peripheral circadian activity at the level of hair follicles during their telogen phase and their transition to an early anagen phase.[12] Gaddameedhi et al.[14] and Geyfman et al.[15] have demonstrated that, at the level of epidermal keratinocytes, the circadian rhythm causes the progression of the S phase of the follicle cycle. A recent study by Plikus et al. has demonstrated the epithelial matrix cells and the dermal papilla fibroblasts to be the sites where the circadian rhythm reaches its maximum expression.[16] Moreover, a self-sustained circadian cycle occurs at the level of the follicle matrix. This cycle results in the daily mitotic rhythm of the anagen phase (as Comaish et al. have demonstrated, this explains why a higher growth occurs during the day in comparison with the night, and why hair undergoes growth alterations depending on the season.[17]

Hair follicles are the target of several substances that influence their life cycle, although it has now been demonstrated that the follicles themselves (as every body organ) produce several essential active substances, such as oestrogen hormones and thyroid hormones, cortisol, erythropoietin, prolactin, and melatonin.

It has also been pointed out that hair follicles are involved in the peripheral regulation of the hypothalamic–pituitary–adrenal hormone axis. As the studies by Paus have shown, it follows that follicles are capable of an autonomous hormone secretion that auto-regulates their life cycle.[9,10] The alteration of such physiological process triggers the occurrence of several hair and scalp conditions. In this self-sustained although coordinated mechanism that regulates the hair cycle and the circadian rhythm, melatonin and serotonin play an essential role to maintain the life cycle of the bulbs and to produce the melanin that gives hair its colour. Specifically, melatonin exerts a triple action to regulate the follicles: 1) it has a modulatory and regulating effect on the hair cycle; 2) it blocks free radicals (radical scavenger) by means of an anti-apoptotic activity through the stimulation of the repair mechanisms directly on the DNA; and 3) it extends the life cycle of the bulbs (anagen phase), which makes bulbs healthy and leads to the lengthening of hair shafts. This process preserves hair pigmentation and delays hair whitening. Thanks to these mechanisms, melatonin and serotonin play an essential role in alopecia areata and androgenetic alopecia. Melatonin can also influence the hair loss due to chemotherapy and the inflammatory forms causing cicatricial alopecia.

On the basis of this evidence, three years ago our équipe started evaluating the variables of the chronobiology of the hair bulb at the level of every single patient's chronobiology.

Preliminary Study

There were 136 patients with histologically confirmed telogen effluvium recruited in the preliminary study. In all cases, it had not been possible to identify a precise cause of the disorder, which was not respondent to traditional therapy. A detailed anamnesis of the life and eating habits of every patient was collected: the hours of sleep required per night, a regular/irregular sleep schedule (night shifts, life habits, frequent jet lagged journeys), meals at regular/irregular times. An abnormality of the circadian rhythm was established in case of the presence of at least two of these alterations (Figure 1). In these subjects, the salivary melatonin at 22.00, 03.00, 13.00 (Figure 2), the level of blood cortisol at 08.00 (Figure 3), and the body temperature at 03.00 were evaluated (Figure 4).

The results showed the presence of an anamnestic abnormality of the circadian rhythm (sleep/wake cycle, meal times, exposure to sunlight) in 48.5% of the evaluated cases (66 out of 136 patients), with a salivary melatonin level 8 times lower than average, levels of cortisol 4 times higher than average, a mean body temperature of 37.6° at 03.00am, with no infective or inflammatory episodes.

In these patients, the therapy with the administration of therapeutic dosages of melatonin (10mg/die) in association with

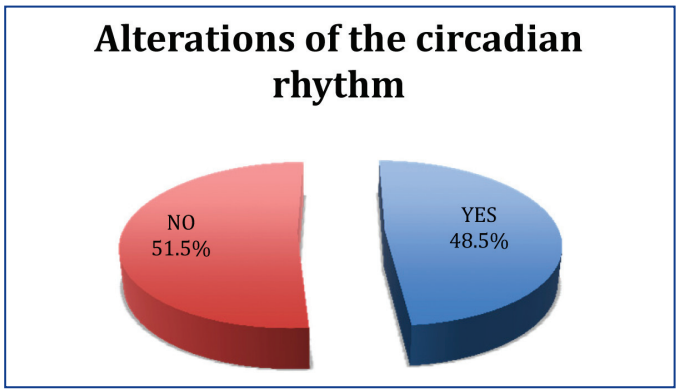


Figure 1. Circle graph showing anamnestic alterations of the circadian rhythm.

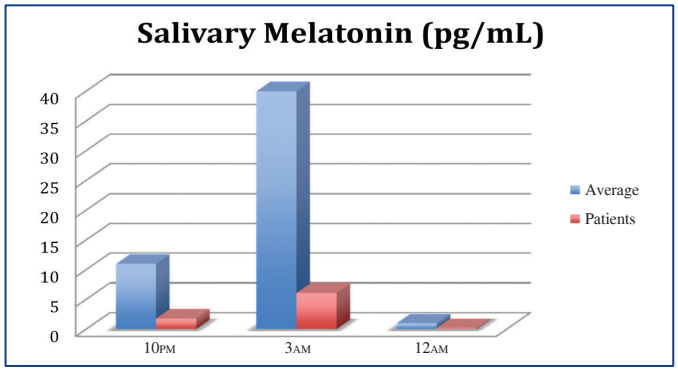


Figure 2. Bar graph showing levels of salivary melatonin (pg/mL) at 10PM, 3AM, and 12AM.

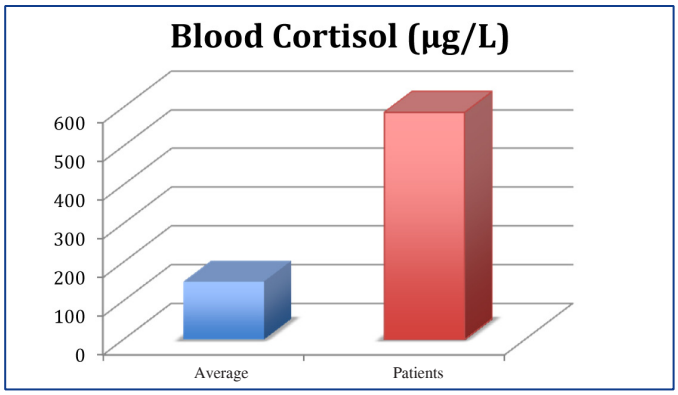


Figure 3. Bar graph showing levels of blood cortisol (micrograms/L).

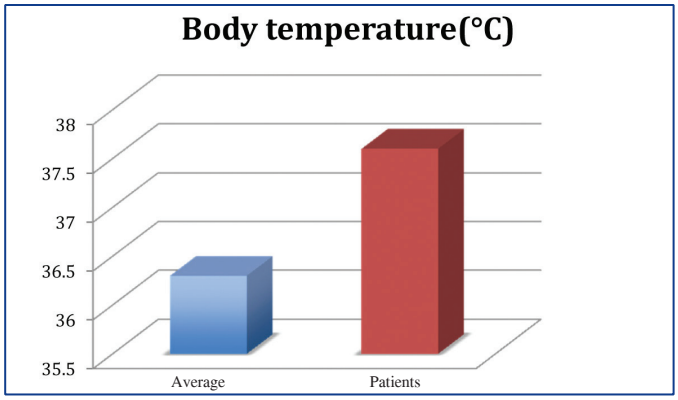


Figure 4. Body temperature (°C) at 3AM.

serotonin (5mg/die) a few minutes before going to bed, the dermophoretic application of melatonin (2%) and a chrono-nutritional supervision stopped hair loss and led to a regrowth of hair on the whole scalp at 2 months after the beginning of the therapy.

Conclusion

The peripheral circadian cycles regulate the cycle of human follicles and play an essential role in regulating the whole hair cycle (Nuami et al.).[18] The alteration of circadian rhythms has to be taken into account in the subjects with trichological or hair scalp symptoms that may be caused by the apoptotic damage due to oxidative stress in case of an altered sleep/wake rhythm or in case of a reduced secretion of melatonin (for instance, in subjects over 50 years). An appropriate therapy with melatonin or its precursors (tryptophan, serotonin) can relieve or resolve several of these conditions, even when traditional therapy does not have any positive response.

References

1. Pittendrigh, C.S. Temporal organization: reflections of a Darwinian clock-watcher. *Annu Rev Physiol.* 1993; 55:16-54.
2. Lowrey P.L., and J.S. Takahashi. Genetics of circadian rhythms in Mammalian model organisms. *Adv Genet.* 2011; 74:175-230.
3. Tahara, Y., and S. Shibata. Chronobiology and nutrition. *Neuroscience.* 2013; 253:78-88.
4. Richards, J., and M.L. Gumz. Advances in understanding the peripheral circadian clocks. *FASEB J.* 2012; 26(9):3602-3613.
5. Bjarnason, G.A., et al. Circadian expression of clock genes in human oral mucosa and skin: association with specific cell-cycle phases. *Am J Pathol.* 2001; 158:1793-1801.
6. Fukuya, H., et al. Circadian expression of clock genes in human peripheral leukocytes. *Biochem Biophys Res Commun.* 2007; 354:924-928.
7. James, F.O., et al. Expression of clock genes in human peripheral blood mononuclear cells throughout the sleep/wake and circadian cycles. *Chronobiol Int.* 2007; 24:1009-1034.
8. Akashi, M., et al. Noninvasive method for assessing the human circadian clock using hair follicle cells. *Proc Natl Acad Sci USA.* 2010; 107:15643-15648.
9. Paus, R., S. Müller-Röver, and V.A. Botchkarev. Chronobiology of the hair follicle: Hunting the "hair cycle clock". *J Investig Dermatol Symp Proc.* 1999; 4(3):338-345.
10. Paus, R., and K. Foitzik. In search of the "hair cycle clock": a guided tour. *Differentiation.* 2004; 72(9-10):489-511.
11. Tanioka, M., et al. Molecular clocks in mouse skin. *J Invest Dermatol.* 2009; 129(5): 1225-1231.
12. Lin, K.K., et al. Circadian clock genes contribute to the regulation of hair follicle cycling. *PLoS Genet.* 2009; 5(7):e1000573.
13. Janich, P., et al. (2011) The circadian molecular clock creates epidermal stem cell heterogeneity. *Nature.* 2011; 480(7376):209-214.
14. Gaddameedhi, S., et al. Control of skin cancer by the circadian rhythm. *Proc Natl Acad Sci USA.* 2011; 108(46):18790-18795.
15. Geyfman M, et al. Brain and muscle Arnt-like protein-1 (BMAL1) controls circadian cell proliferation and susceptibility to UVB-induced DNA damage in the epidermis. *Proc Natl Acad Sci USA.* 2012; 109(29):11758-11763.
16. Plikus, M.V., et al. Local circadian clock gates cell cycle progression of transient amplifying cells during regenerative hair cycling. *Proc Natl Acad Sci USA.* 2013(Jun 4); 110(23):E2106-15.
17. Comaish, S. Autoradiographic studies of hair growth in various dermatoses: Investigation of a possible circadian rhythm in human hair growth. *Br J Dermatol.* 1969; 81(4):283-288.
18. Al-Nuaimi, Y., et al. A mathematical model of the human hair cycle. *J Theor Biol.* 2012(Oct); 310:143-159.◆

How I Do It

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



When placing a finite amount of FU grafts into a given area of scalp, there are many factors to consider when making decisions regarding placement density. While such factors as hair color, hair strand thickness, scalp/hair color contrast and hair strand quality (straight vs. wavy) are certainly critical in the decision-making process, a mathematical assessment that considers objective absolutes, such as graft yield vs. area to be covered, is needed as well. Dr. Mauro Speranzini of São Paulo, Brazil, shares his method for calculating follicular distribution in the recipient area. Sharing our ideas with one another makes us clinically stronger as a collective group in the ISHRS. Please email me your ideas at tcarmanmd@mac.com for consideration for publication.

How to Distribute Follicular Units in the Recipient Area

Mauro Speranzini, MD *São Paulo, Brazil* Mauro@clinicasperanzini.com.br

How many FUs must be harvested to fill the recipient area? How do you distribute the FUs in the recipient area? To answer these questions, we use a template to mark and add up the 4cm^2 squares and consult the "Table of Densities."

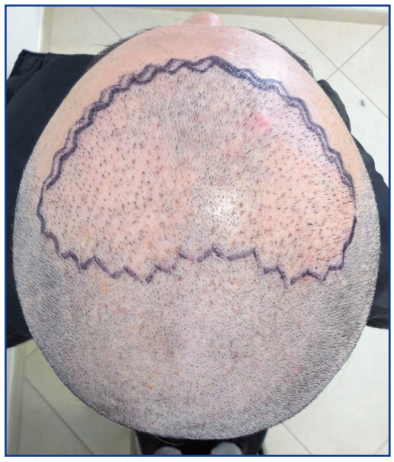


Figure 1. Recipient area boundaries are drawn.

Method

After drawing the boundaries of the recipient area (Figure 1), we use a template to mark 2cm × 2cm squares (4cm^2) (Figure 2). After performing anesthesia in the recipient area, we tattoo all the lines with methylene blue in order to avoid erasing the lines before all the recipient sites are made (Figure 3).

We count the number of "full" squares, and count the number of partial squares. Partial squares are divided by 2 to get an approximate number of full squares (full squares + partial squares/2 = number of squares). From the Table of Densities (Figure 4), we can choose the desired density of recipient sites for the calculated surface area given a specific number of grafts or we can determine the exact number of FUs that must be harvested to achieve a desired density.

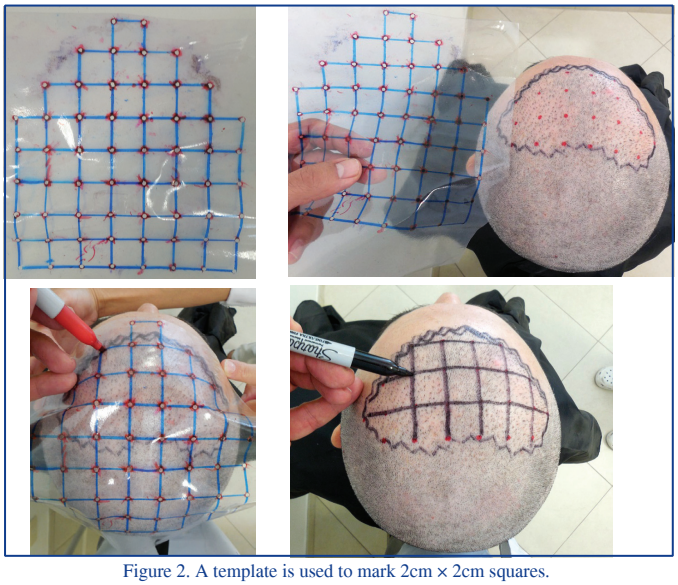


Figure 2. A template is used to mark 2cm × 2cm squares.

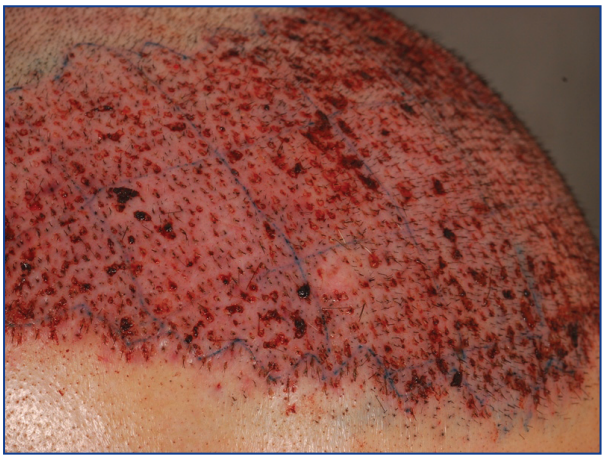


Figure 3. After the template is made, all the lines are tattooed with methylene blue.

Examples

If the recipient area has 18 squares (18 × 4cm^2 = 72cm^2) and we harvest 1,980 grafts, I check the Table of Densities to know I must make 21.2 recipient sites/cm^2, or 110 sites in each 4cm^2 square. Or, if the recipient area has 18 squares (72cm^2) and we want to place a density of 25 FUs/cm^2, I check the Table of Densities to know that I will need to harvest 1,800 grafts and must make 100 sites in each 4cm^2 square.

Conclusion

The template allows a rapid and precise way to mark the recipient area into 4cm^2 squares. The Table of Density is an easy way to either determine the number of grafts necessary to fill the recipient area with a specific density or to determine the density of sites to place in each square to give the total number of grafts harvested.◆

⇨ *Figure 4, top of page 109*

	10 sq. 40 cm^2	11 sq. 44 cm^2	12 sq. 48 cm^2	13 sq. 52 cm^2	14 sq. 56 cm^2	15sq. 60 cm^2	16 sq. 64 cm^2	17 sq. 68 cm^2	18 sq. 72 cm^2	19 sq. 76 cm^2	20 sq. 80 cm^2	21 sq. 84 cm^2	22 sq. 88 cm^2	23 sq. 92 cm^2	24 sq. 96 cm^2	25 sq. 100 cm^2	26 sq. 104 cm^2
80 F.U./ sq. 20 F.U./ cm^2	800	880	960	1040	1120	1200	1280	1360	1440	1520	1600	1680	1760	1840	1920	2000	2080
85 F.U./ sq. 21,2 F.U./ cm^2	850	935	1020	1105	1190	1275	1360	1445	1530	1615	1700	1785	1870	1955	2040	2125	2210
90 F.U./ sq. 22,5 F.U./ cm^2	900	990	1080	1170	1260	1350	1440	1530	1620	1710	1800	1890	1980	2070	2160	2250	2340
95 F.U./ sq. 23,7 F.U./ cm^2	950	1045	1140	1235	1330	1425	1520	1615	1710	1805	1900	1995	2090	2185	2280	2375	2470
100 F.U./ sq. 25 F.U./ cm^2	1000	1100	120	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600
105 F.U./ sq. 26,2 F.U./ cm^2	1050	1155	1260	1365	1470	1575	1680	1785	1890	1995	2100	2205	2415	2415	2520	2625	2730
110 F.U./ sq. 21,2 F.U./ cm^2	1100	1210	1320	1430	1540	1650	1760	1870	1980	2090	2200	2310	2420	2530	2640	2750	2860
115 F.U./ sq. 27,5 F.U./ cm^2	1150	1265	1380	1495	1610	1725	1840	1955	2070	2185	2300	2415	2530	2645	2760	2875	2990
120 F.U./ sq. 30 F.U./ cm^2	1200	1320	1440	1560	1680	1800	1920	2040	2160	2280	2400	2520	2640	2760	2880	3000	3120
125 F.U./ sq. 31,2 F.U./ cm^2	1250	1375	1500	1625	1750	1875	2000	2125	2250	2375	2500	2625	2750	2875	3000	3125	3250
130 F.U./ sq. 32,5 F.U./ cm^2	1300	1430	1516	1690	1820	1950	2080	2210	2340	2470	2600	2730	2860	2990	3120	3250	3380
135 F.U./ sq. 33,7 F.U./ cm^2	1350	1485	1620	1755	1890	2025	2160	2295	2430	2565	2700	2835	2970	3105	3240	3375	3510
140 F.U./ sq. 35 F.U./ cm^2	1400	1540	1680	1820	1960	2100	2240	2380	2520	2660	2800	2940	3080	3220	3360	3500	3640
145 F.U./ sq. 36,2 F.U./ cm^2	1450	1595	1740	1885	2030	2175	2320	2465	2610	2755	2900	3045	3190	3335	3480	3625	3770
150 F.U./ sq. 37,5 F.U./ cm^2	1500	1650	1800	1950	2100	2250	2400	2550	2700	2850	3000	3150	3300	3450	3600	3750	3900
155 F.U./ sq. 38,7 F.U./ cm^2	1550	1705	1860	2015	2170	2325	2480	2635	2790	2945	3100	3255	3410	3565	3720	3875	4030
160 F.U./ sq. 40 F.U./ cm^2	1600	1760	1920	2080	2240	2400	2560	2720	2880	3040	3200	3360	3520	3680	3840	4000	4160
165 F.U./ sq. 41,2 F.U./ cm^2	1650	1815	1980	2145	2310	2475	2640	2805	2970	3135	3300	3465	3630	3795	3960	4125	4290
170 F.U./ sq. 42,5 F.U./ cm^2	1700	1870	2040	2210	2380	2550	2720	2890	3060	3230	3400	3570	3740	3910	4080	4250	4420

Figure 4. The Table of Densities.

Hex Technology For Hair Restoration Is Revolutionizing FUE Surgery



The Dynamic Difference

The powered S.A.F.E. System allows the physician to isolate, dissect and extract single follicular units with unprecedented speed and precision. The system includes the disposable Hex and Round punches.



The Hex for FUE is a disposable blunt dissection tip that combines speed, efficiency and accuracy providing physicians an innovative graft harvest system.

Features:

- New Hex technology for FUE
- Low transection rate of 2.8%
- Single use disposable
- Rapid increase in productivity
- Deeper dissection rate to 4mm depth
- Available in 0.8mm, 0.9mm, 1.0mm, and 1.2mm
- Easy to learn technique
- Excellent clinical results
- Training is available

S.A.F.E. system℠

HSCDevelopment
ADVANCING EXCELLENCE IN FUE

HSC Development | 877.265.9667 Toll Free | 720.536.4897 Phone | For Information or to Order: Visit hscdev.com

Cyberspace Chat

John P. Cole, MD *Alpharetta, Georgia, USA* john@forhair.com, and
Bradley R. Wolf, MD, FISHRS *Cincinnati, Ohio, USA* wolf@wolfhair.com


John P. Cole


Bradley R. Wolf

Platelet Rich Plasma (PRP): Pseudoscience or Fact

In a recent online discussion, Bob Leonard stated: "After hearing the lectures in Kuala Lumpur about PRP, I am less sure of using it versus not. I want to add it to my treatment options; however, I'm not sure about it enough to use it on paying patients right now."

This began a discussion with a variety of opinions both positive and negative. Bob True stated that in addition to minoxidil and finasteride, he "would also do two PRP/ACell injections 6 months apart to 'jump-start' medical therapy. I would use 120-160cc whole blood (WB) at 2% hematocrit, getting 3-5cc of PRP." He would then add platelet poor plasma (PPP) to a total volume of 8-10cc and 50mg of ACell MatriStem because he has "been encouraged by the added benefit of this measure for young men on medical therapy with finasteride and minoxidil."

Bob Haber replied: "One of the aspects of PRP that keeps me doubting are the protocols that involve widely spaced out procedures, such as Bob True just mentioned. Hair loss is a chronic condition, and there are virtually no chronic conditions that can be successfully treated with just a few interventions. Certainly there are no other hair loss treatments that do not require indefinite daily or at least weekly interventions. Growth factors are rapidly degraded. What long-term effect could result from 2 interventions spaced out by 6 months?"

Bob True added: "The effect of PRP/ACell is purely temporary UNLESS it is combined with finasteride and minoxidil. The reversal of miniaturization and reactivation that it (PRP/ ACell) stimulates can be maintained for much longer with ongoing finasteride and minoxidil."

Jerry Cooley added: "If PRP/ ACell was like a single shot of minoxidil, I agree it would be useless. But I believe that this treatment stimulates stem cell activation and gene transcription, creating a 'pro-hair' cascade that can then be maintained with finasteride and minoxidil. I don't agree with the assertion that there are no chronic conditions that can be repeated periodically. In fact, it seems to be the way of the future: monthly shots of biologics for psoriasis and yearly shots for osteoporosis. Single series of PRP treatments are being successfully used for chronic arthritis and tendonitis. There is an ever increasing number of reports in the literature that PRP does something and it is up to us in the trenches to figure out the best way to use it. I don't believe there will be a one-size-fits-all protocol because the duration of the PRP (± ACell) will almost certainly depend on 1) whether the patient is on finasteride, and 2) the patient's underlying genetic programming. The results of finasteride wane in most patients after 5 years, and this gives us a good option to regain some of that original thickening."

Paul Rose replied: "In reading the recent comments, I am uncertain as to the science we speak. It seems like a broad statement to say that gene transcription is stimulated and stem cells are stimulated. What genes? Are they all pro hair? Are some pro neoplastic? Which stem cells are activated? Do they go to the dermal papilla, fibroblasts, epidermal cells, neural cells, or neoplasms? We are speaking in such broad terms that it does not seem like a good scientific approach. I still cannot get clear answers about concentrations of platelets to use, depth of the injection, amount per injection, type of PRP, type of delivery system, distance from one injection to another, etc. Until we develop a rational approach to these techniques, it is pseudoscience in my humble opinion."

Bill Rassman responded: "It is difficult for me to accept treatments such as PRP in the situations outlined in these correspondences without evidence of clinical proof. Offering treatments like PRP without proof and making money on each treatment taints those who are doing it. Let's stop this subjective process and apply the science to the test."

Bob Haber then replied: "I think pseudoscience is probably not the best term. That suggests fake science. Rather, there is a scientific vacuum with regard to PRP and hair. Pioneers push the limits of science and often do not follow proper methods. That's important. The next group generally tests the conclusions of the pioneers prior to mainstream acceptance. That step has been skipped for PRP. Highly concerning is the profit motive that clearly motivates many adopters, fueled by the economic projections distributed by various PRP companies. We need pioneers, but we must insist on science or we look like profiteers."

Jerry Cooley responded: "I think some of you are confusing the merits of PRP with the marketing of PRP. You object, and I strongly agree, with the over-selling and deceptive advertising, in many cases by inexperienced docs trying to make a buck. This doesn't make PRP bad; it makes the docs bad. In my practice, patients are fully informed about the variability in results and given realistic expectations. I don't market it at all. I offer it to patients who my experience tells me will benefit, such as those with extensive miniaturization. Substitute low level laser therapy (LLLT) for PRP. How can you recommend LLLT to your patients?"

Bill Parsley answered: "I purchased the Angel PRP machine and some ACell powder. I injected one of my transplant patients for free, injecting the right vertex (with PRP and ACell) but not the left. Even though I tried to make the density of graft quality the same, there was definitely more volume on the injected side. In another patient, who underwent his 5th hair transplant procedure along with injections of PRP and ACell, he noted that his grafts grew 'more quickly and thicker' than any of his other procedures." Since this time, Bill has used PRP and ACell alone or in conjunction with surgery on 15 more patients noting that "so far they (the patients) have been happy and have had outcomes in the higher end of expectations." He goes on to quote a Chinese

proverb: "The person who says it cannot be done should not interrupt the person doing it."

Francisco Jimenez then offered: "I lean on the side of those who consider PRP pseudoscience. I miss some good double blind clinical studies. Carlos Puig presented one in Malaysia that showed no difference between PRP and placebo."

Jerry Cooley replied: "It is especially hard to do a study. There are a multitude of variables with the procedure and an expected bell-shaped variability curve with results requiring both an experienced doctor doing it and a large enough study population to ensure statistical validity. Furthermore, you need a population who are not using any other hair treatment with good follow-up for 1 year. Most of my patients see their results between 8-12 months, so I do not find 6-month results useful."

Paul Rose added: "Having done several assays on platelet concentrations with different devices, I would suggest that anyone doing PRP take some of the fluid and assay it at a local lab for platelet counts. The numbers you get from manufacturers' printed material may not coincide with what you think you have compared to what you really have. This data is important so that we can more accurately compare protocols." Paul also expressed great concern over the "lack of uniformity" in protocols and machines to prepare PRP.

Mario Marzola has experience using PRP to treat osteoarthritis. He added: "PRP's effect in rhytids or hair loss is less certain. Like Bob Haber said, the effect was for 1-2 months with PRP, then arthritis symptoms recurred. A course of 5 to 6 treatments 2 months apart was the average routine."

Brief Introduction to PRP

It was discovered that a number of bioactive substances were discharged from the α-granules of platelets into plasma when platelets were destroyed or activated. Platelets promote stromal stem cell proliferation and angiogenesis. In 1998, PRP was used to accelerate wound healing and tissue repair in dentistry. The role of PRP has expanded to other fields including cardiac surgery, ophthalmology surgery, maxillofacial surgery, plastic surgery, sports medicine, and cosmetic medicine. In 2006, Uebel et al. reported that PRP improved hair growth and density when follicular units were pre-treated with PRP.[1] Rinaldi, Greco, and Cole have shown that PRP is useful to treat alopecia areata.[2,3] Greco showed that PRP can improve coverage in male pattern baldness by increasing hair diameter.[4] Cole has seen an improvement in hair mass in women using a 5× concentration, a 2% hematocrit, injected in all layers from upper adipose to upper dermis using a 25 gauge needle, and activation with Calcium gluconate. In one instance, the HMI increased from 60 to 98 after 1 year.[5]

Platelet rich plasma (PRP) and platelet concentrate (PC) are established terminology for blood components for transfusion. Unfortunately, the continued use of the term PRP for autologous, topical platelet products contributes to the misconception that all therapeutic autologous platelet products are equivalent. Platelet-rich therapy products contain a mixture of bioactive compounds and formed elements, and differ quantitatively in the concentration of platelets, mononuclear leukocytes, granulocytes, and red cells, as well as the potential to provide growth factors, cytokines, chemokines, and other biologic mediators. The differences in PRP products may be a potential cause of conflicting clinical reports on the therapeutic efficacy of PRP. The quantitative and qualitative differences in platelet rich products may influence the biological effects and clinical therapeutic outcome of PRP treatment. Growth factors (GF) in PRP are released from α-granules of thrombocytes. The α-granules of platelets include more than 20 GFs and other bioactive proteins including VEGF, IGF-1, HGF PDGF, TGF, EFG, platelet factor-4, interleukin-1, platelet-derived angiogenesis factor, platelet-derived endothelial growth factor, and epithelial cell growth factor. Current clinical practice targets a platelet concentration of approximately 1,000,000 platelets per ml of PRP or a concentration of 5 times whole blood levels.

PRP Studies

It is understandable that a physician would be confused about the benefits of PRP based on the presentations given in Malaysia.

The most important question to address is the benefit of PRP to induce better hair coverage through an increase in the number of growing hairs and/or an increase in follicle diameter. We already know that increasing hair diameter exponentially increases hair volume, while increasing the number of hair follicles only proportionally increases hair volume.[6] Carlos Puig and Robert Reese studied the Angel System (Arthrex).[7] In their study, they evaluated 26 patients (15 study patients and 11 placebo patients). All patients were Ludwig II FPHL(female pattern hair loss) confirmed by history or biopsy. The investigators were blinded to the treatment and results. They found no statistically significant difference between the study and the placebo populations with regard to the HMI (based on the Cohen Hair Check device) or the hair count (based on a $1cm^2$ study area using a Dermlite Pro and a $1cm^2$ reticle). There was a strong placebo effect as 27.3% reported slight improvement in hair thickness following treatment with placebo, while 33.3% reported slight improvement or substantial improvement in the treatment group. However, a few patients experienced as much as a 24% improvement in the HMI in the study group.

Dr. Puig's study carried some limitations in design including a 2% hematocrit, failure to activate the PRP, and a 1.14-fold increase in platelets with an estimated platelet count of 204.44 (k/µl). Such concentrations are useful for wound healing, but the amount of growth factors will be less than in whole blood as I will point out later. Decreasing the hematocrit reduces proinflammatory neutrophils, but it also reduces the platelet count and fold increase. For example, 60cc of whole blood prepared at a hematocrit of 7% and diluted to 20cc with platelet poor plasma (PPP) would yield a 1.68-fold increase and 301.27 (k/µl) concentration of platelets based on the Angel Application (Arthrex). In most therapeutic studies on platelets, the optimal fold increase is 4-5× and a concentration of greater than 1,000,000 (k/µl). Dr. Puig failed to activate the platelets. In such an instance, the growth factors will only gradually be released as the platelets activate or degrade and the growth factors may become trapped in a fibrous network that forms gradually at the point of injury from the injection. One might expect no benefit. Finally, this study consisted of only a single treatment with a 6-month follow-up. Most therapeutic studies consist of three or more treatments and a 1-year follow-up.

Also in Malaysia, Anil Kumar found no benefit from PRP administered during a hair transplant surgical procedure (neither hair count nor hair diameter) in a small sample size of patients

⇨ page 112

Cyberspace Chat *from page 111*

with a concentration of 1 million platelets/µl and activation with calcium chloride or thrombin.[8] Dr. Kumar stated that he used TrichoScan to document his results, but he did not present results that documented the use of a TrichoScan. Dr. Kumar did not study the benefit of PRP to improve hair loss alone.

Cerevelli et al. compared the injection of autologous, activated PRP (AA-PRP) to the injection of placebo in 10 patients ranging from a Norwood II to a Norwood IV according to the method of Cascade-Selphyl-Esforax system where he obtained a small volume of whole blood (18cc) using sodium citrate as an anticoagulant.[3] He performed three treatments monthly with AA-PRP. He excluded all patients who had received topical (such as minoxidil, prostaglandin, analogues, retinoids, and corticosteroid) or systemic treatments for male pattern hair loss (MPHL) (such as finasteride, dutasteride, and antiandrogens) in the previous 12 months. He studied the number of platelets in PRP obtained from all participants through microscopic counting. He performed a randomized TrichoScan evaluator blinded study in both the treated and placebo-treated areas. He spun the whole blood at 1100g for 10 minutes to make 9cc of PRP without concern about the white cell count. He activated with Ca^{2+} from the Cascade-Selphyl-Esforax kit to produce AA-PRP. He divided the head into 4 parts: frontal, parietal, vertex, and occipital. In patients with hair loss isolated to the frontal and parietal areas, he injected the frontal area with AA-PRP and the parietal area with placebo using a physiologic solution. In patients with hair loss in the parietal and vertex parts, he injected AA-PRP in the parietal area and placebo in the vertex. He injected AA-PRP at a volume of 0.1cc mL/cm^2. The same numbers of injections were made in both the treated area and the placebo area. Cereveli studied the patients at T0 (beginning), T1 (14 weeks), T2 (6 months), and T3 (12 months).

All patients were studied with global photography, physician's and patient's global assessment scale, and standardized phototrichograms (TrichoScan). TrichoScan evaluated hair density, hair diameter, anagen/telogen ratio, and vellus hair/terminal hair ratio in tattooed regions following hair dying. The evaluator of the TrichoScan was blinded. He performed 3mm punch biopsies at baseline and 2 months after the last AA-PRP treatment. He performed immunohistochemistry using anti-Ki67 and anti-CD31. At baseline, there was no statistical difference in hair count, hair density, and terminal and anagen hair densities between the treatment and control areas of the scalp. There was a statistically significant increase in mean hair count, 18, in the treated areas versus a mean decrease of 2 hairs in the control area (control versus treatment: $P < 0.0001$). In the treatment area, a mean increase in total hair density of 27.7 hairs/cm^2 compared to baseline was observed after 3 months and the control area displayed a mean decrease of 3.0 hairs/cm^2 (control versus treatment: $P < 0.0001$). In addition, terminal hair density improved significantly by 27.0 ± 15.3 hairs/cm^2 in the treatment area compared to baseline, while decreasing by 2.1 ± 12.4 hairs/cm^2 in the control area of the scalp (control versus treatment: $P = 0.0003$). There was no statistically significant difference in vellus hair density between the study and the control area after 3 months. Histomorphometric evaluation showed an increase in epidermis thickness in the PRP-treated hair skin after 3 months, an increase in the number of follicles compared to baseline, an increase in $Ki67^+$ cells in the epidermis and the hair follicular bulge cells, and a slight increase in small blood vessels around hair follicles in the skin treated area compared to baseline.

Takikawa et al. compared the delivery of PRP & dalteparin and protamine microparticles (D/P MPs) to PRP and saline as a control.[9] They injected PRP & D/P MPs on one side of the scalp and saline as a control on the opposite side of the frontal scalp in 13 subjects. They injected PRP on one side of the scalp and saline as a control on the opposite side of the frontal scalp in another 13 subjects. D/P MPs consist of low-molecular weight heparin (dalteparin) and protamine. Injections were carried out at 0, 2, 4, 6, and 9 weeks, and patients were studied at 12 weeks. They studied several growth factors that bind heparin along with those that do not bind heparin (IGF and EGF). The heparin-binding quality of several growth factors allowed for a sustained release of growth factors from the microparticles upon biodegradation. They found that heparin-binding GFs (over 80%) were absorbed by the D/P MPs, while non-heparin-binding GFs (IGF and EGF) were only 19% absorbed. They evaluated hair counts in 1cm^2, mean cross-sections of all hairs in 1cm^2, and took a 4mm punch biopsy in the PRP & D/P MPs or PRP before the first injection and at 12 weeks. They found that the hair counts in the PRP and PRP & D/P MPs treated area all increased with a mean increase of 15 hairs for PRP and a mean increase of 18 hairs for PRP & D/P MPs, but the results were not statistically significant different from the control group even though there was a much greater increase in hair counts in the treated areas versus the control areas. They also found that while PRP increased the mean hair cross-section, PRP & D/P MPs had a more profound effect on an increase in mean hair cross-section and the results were statistically significant (control versus treatment $P < 0.01$). Comparison of biopsies under H&E staining from baseline to 12 weeks showed a thickening of the epidermis, proliferation of collagen fibers and fibroblasts, and greater numbers of blood vessels around hair follicles in both the PRP & D/P MPs and PRP. Hair growth and thickening after administration of PRP & M/Ps and PRP were observed in all participants, but PRP & D/P MPs appeared to provide more substantial changes than PRP alone.

PRP—A More Detailed Look

The specific gravity for the components of blood differs as follows: the heaviest are the red blood cells (RBCs) (1.095), followed by white blood cells (WBCs) (1.063-1.085), and the lightest platelets (1.032). There is also variation in the specific gravity of WB between men and women. These slight differences in specific gravity allow for the separation of the components by centrifugation. However, there is always going to be some cell contamination. There are also differences between the specific gravity of individuals and differences in the number and composition of blood cells. This makes it nearly impossible to standardize any one method for all patients. In reality, the method should optimally be individualized to the patient.

There is white-blood-cell-containing PRP (W-PRP), PRP, platelet-concentrated plasma (PCP), and noncoagulating platelet-derived factor concentrate (PFC). The presence of RBCs and granulocytes may contribute to inflammation, pain at the injection site, and destruction of extracellular matrix proteins. Mononuclear cells, on the other hand, contain stem/progenitor cells and are desirable. PRP is prepared typically by a slow spin to avoid spinning down platelets. Platelet-concentrated plasma is prepared through a second faster spin so the platelets are spun down. There is no standardized protocol for preparing PRP or PCP. Higher volumes of PRP are obtained from higher centrifugal forces. To

help us better understand platelet-processing protocols, Araki et al. studied platelet concentration and growth factors based on a variety of spin rates and concentration methods.[10] Platelet collection rate increases from 190g to 320g and progressively decreases from 320g to 2330g. Although the optimal centrifugal force varies from individual to individual, the optimal centrifugal force may be 230-270g for 10 minutes. This protocol will produce approximately 80% of the platelets in WB. This spin rate should contain low numbers of WBCs (4.1-5.8% of WB) and may be termed WBC-poor PRP. The WBC collection rate decreases as the spin rate increases. The optimal spin rate for W-PRP is a slower 70g for 10 minutes producing 10-35% WBC and 60-80% platelets.

On centrifugation of WB, WBCs are concentrated in a white layer known as the buffy coat that is located above the RBC layer. Platelets are mostly concentrated right on top of the buffy coat. W-PRP contains part of the buffy coat.

If a second spin is performed, a higher spin rate will precipitate a higher percentage of the platelets that were in the initial PRP. At 1010g, there are only 69% ± 10.5% of the platelets in the original PRP versus 91.2% ± 6.05% at 2330g. A higher force is recommended for the second spin. After the second spin, you may make one-third the volume of PCP by removing the upper two-thirds of the PPP, or one-tenth the volume of PCP by removing the upper nine-tenths of the PPP. The concentration of platelets in one-third the volume of PCP is roughly 3 times the concentration of PRP, while one-tenth the volume of PCP is 7.4 times that of PRP.

There are five major anticoagulants used in clinical laboratories: heparin, sodium citrate, sodium fluoride, ethylene diamine tetraacetic acid disodium (EDTA), and acid citrate dextrose solution (ACD). It appears that the anticoagulant can also affect the platelet yield. The collection rate of nonaggregated platelets is significantly higher when EDTA is used as the anticoagulant rather than ACD.[10] EDTA appears to be a better anticoagulant than ACD.

Akari also studied the total PDGF-BB and the concentration of PDGF-BB.[10] As might be expected, the total PDGF-BB is higher in whole blood than in PRP or in PCP because his method of preparation produces 88.7%, 74.8%, and 72.1% of the original number of the platelets for PRP, PCP, and PFC, respectively. Interestingly, PFC results in a remarkably higher total amount of PDGF-BB than whole blood even though the total number of platelets was less. In making PFC, he reconstitutes the one-tenth volume of PRP with phosphate buffered saline (PBS), which removes almost all the fibrinogen. It is believed that a substantial part of the PDGF-BB is trapped in the fibrin glue that forms after thrombin stimulation. While the fibrin glue may be useful as a controlled-release of growth factors, it may also trap much of the growth factors. The concentration of PDGF-BB is also much higher in PFC prepared with EDTA than PFC prepared with ACD.[10]

Platelet Activation

Physicians activate thrombin in a variety of ways. Some feel their incision sites provide enough patient thrombin to activate the platelets. Some use microneedling. Others use bovine thrombin. There are reported cases of developing an immune response to bovine thrombin and factor 5 and subsequent clinical bleeding. In addition to xenogenic immune reactions, there is a remote risk of transmitting prions and other zoonoses from bovine thrombin. The most dangerous prions cause a fatal spongiform encephalopathy, Jakob Creutzfeldt disease, which can have an incubation period up to 50 years.

Robert True injects thrombin droplets 4-6mm below the epidermis.[11] He reconstitutes 5,000U of bovine thrombin in 20cc of calcium chloride or normal saline (manufacturer suggests reconstituting with 10cc of normal saline) and freezes it in 3cc syringes. He uses approximately 2.5cc per case. Recently he has switched to human recombinant thrombin because of a better safety profile. Jerry Cooley injects small amounts using a jackhammer motion at a very acute angle with minimal pressure on the syringe plunger.[12] There is also a human purified thrombin and today there is a recombinant thrombin called Recothrom (https://www.clevelandclinicmeded.com/medicalpubs/pharmacy/pdf/Pharmacotherapy_XII-6.pdf).

Note that there are six distinct haplotypes for factor 8, which is deficient in hemophilia A. Treatment in severe cases includes treatment with plasma-derived or recombinant factor 8. Haplotype differences are thought to play a role in the development of factor 8 inhibitors, which is the most serious complication of replacement therapy with factor 8. If there are haplotype differences for thrombin along with genetic, environmental, or immunologic factors, this too could play a role in the development of thrombin inhibitors, following the administration of plasma-derived or recombinant thrombin, and could potentially lead to a bleeding diathesis perhaps years later.

Still others use calcium choride or calcium gluconate at a 1:10 concentration calcium to PRP; however, it remains unclear how well calcium activates thrombin. What is known is that calcium is required in the activation process. Another way to activate platelets is through sonication.[13] The safest method to activate platelets may be sonication and this should be studied.

Activation does appear to be an essential component to the delivery of enough GF to a desired response in the treatment of hair loss.

Automated Machines

There are many automated devices on the market today for making PRP. Some produce red PRP, which is high in WBCs and contains more RBCs. Others produce a yellow PRP, which is low in WBCs and RBCs. One should aim for a 5× concentration when evaluating the different machines. Note that a high WBC concentration will lead to more swelling.

The Angel system allows us to dial in specific volumes of WB to make PRP with a specific hematocrit, which we can dilute with PPP to make a specific concentration of platelets. However, as Paul Rose points out, the various manufacturers may not create equipment that produces the stated concentrations of platelets. A new product on the market is the Genesis Pure PRP by EmCyte Corporation. This device eliminates 99% of the RBCs, eliminates 90% of the WBCs (with less than 20% granulocytes and over 80% mononuclear cells, recovers 76% of the platelets, produces a 6.7 or more fold increase over baseline, concentrates mononuclear cells, and provides large concentrations of PDGF, TGF-beta1, VEGF, and SDF-1alpha). The pH of this PRP is 7.5, which is more physiologic than the Harvest SmartPrep 2 PRP, which has a pH of 6.8. A lower pH may require buffering to reduce the pain on injection. However, the manufacturer performed these studies so there is a conflict of interest.

Studies show that PRP is capable of improving hair counts and hair diameter. However, the complexities of creating PRP along

⇨ page 114

Cyberspace Chat *from page 113*

with individual characteristics may alter the response of patients to any one protocol. Optimally, we would individualize the protocol to the patient. However, as Paul Rose points out, we don't even have a standardized protocol for using PRP in the treatment of hair loss. Even papers are a little confusing because they do not always mention the platelet concentration. We need to study a standardized concentration, the depth of the injections, the amount of each injection/cm^2, the method of activation, the hematocrit, the color, the granulocyte count, the mononuclear cell count, the size of needle we inject with, and the method of preparation. From here, the study of PRP only becomes more complex. Do we add ACell and, if so, how much? Should we try adding biologics such as Epi-Fix (MiMedx) and how much? How about platelet liposecretion (PRL) where we combine adipocyte stem cells with PRP? Furthermore, patients should avoid aspirin, NSAIDs, and steroids for two weeks before the surgery and for several weeks following treatment with PRP because these medications may minimize the benefits from PRP. It will probably be many years before we can unravel the mystery behind PRP, but first we all need to get on the same page and begin with a standardized protocol. Only then might we break down the barriers between fact and fiction.

References

1. Uebel, C.O., et al., The role of platelet plasma growth factors in male pattern baldness surgery. *Plast Reconstr Surg.* 2006; 118(6):1458-1466; discussion 1467.
2. Personal communication with Joe Greco on PRP in the treatment of alopecia areata; October 2009.
3. Cervelli, V., et al. The effect of autologous activated platelet rich plasma (AA-PRP) injection on pattern hair loss: clinical and histomorphometric evaluation. *Biomed Res Int'l.* 2014; 2014:760709.
4. Greco, J., and R. Brandt. The effects of autologus platelet rich plasma and various growth factors on non-transplanted miniaturized hair. *Hair Transplant Forum Int'l.* 2009; 19(2):49-50.
5. Cole, J., and B.R. Wolf. Cyberspace Chat. *Hair Transplant Forum Int'l.* 2014; 24(6):220-223.
6. Cole, J. Mathematics of follicular unit transplantation. Presented at the ISHRS Annual Scientific Meeting, 1998; Washington, DC.
7. Puig, C. Multi-center, placebo controlled, double blind study comparing the benefits of PRP on women with congenital female pattern hair loss. Presented at the ISHRS Annual Scientific Meeting, 2014; Malaysia.
8. Kumar, A. Role of platelet plasma growth factors in male pattern baldness surgery: a pilot study. Presented at the ISHRS Annual Scientific Meeting, 2014: Malaysia.
9. Takikawa, M., et al., Enhanced effect of platelet-rich plasma containing a new carrier on hair growth. *Dermatol Surg.* 2011; 37(12):1721-1729.
10. Araki, J., et al., Optimized preparation method of platelet-concentrated plasma and noncoagulating platelet-derived factor concentrates: maximization of platelet concentration and removal of fibrinogen. *Tissue Eng Part C Methods.* 2012; 18(3):176-185.
11. Personal communication with Robert True on PRP activation; November 2015.
12. Personal communication with Jerry Cooley on PRP concentration; February 2015.
13. Bernardi, M., et al. Production of human platelet lysate by use of ultrasound for *ex vivo* expansion of human bone marrow–derived mesenchymal stromal cells. *Cytotherapy.* 2013; 15(8):920-929.

Editor's note: I want to clarify my comments included in this discussion. When using PRP/ACell as an adjunct to surgery or as a nonsurgical treatment, we need enough volume to allow coverage throughout large areas of the scalp. Small whole blood volumes simply do not produce enough PRP. We do lose some platelets during preparation of PRP usually getting only 70-80% of the platelets found in whole blood (WB).

Based upon the experience of Dr. Jerry Cooley, I usually draw at least 120cc WB, and sometimes when we are covering a very large area, 180cc. With the Angel system, we process to a 2% HCT, and with 120cc WB, an average of 3cc of PRP is produced (with 180-4.5cc). Enough PPP is added to produce a 5× concentration. With 120cc WB, the total volume of PRP plus PPP is usually 10cc, and with 180cc WB, total volume is 13cc. I do use thrombin for activation, but I do not inject thrombin, rather, as demonstrated to me by Dr. Cooley, with very light finger pressure on the syringe plunger and inserting the needle depth to 4-5mm, droplets of thrombin are widely and evenly distributed throughout the field. Recently, I have converted from bovine thrombin to human recombinant thrombin to eliminate the potential of allergic response related to the animal-based product. Activation is important to have a sustained effect from the PRP. —RHT

Ellis Instruments, Inc.

State-of-the-art instrumentation for hair restoration surgery!

For more information, contact:

21 Cook Avenue
Madison, New Jersey 07940 USA

Phone: 800-218-9082 • 973-593-9222
Fax: 973-593-9277

Email: ellisinstruments.cellis@gmail.com

www.ellisinstruments.com

Complications and Difficult Cases



Marco N. Barusco, MD *Port Orange, Florida, USA* drbarusco@tempushair.com

In this submission, Dr. Farhad Rejali describes an interesting case of alopecia totalis that occurred after 2 sessions of FUT surgery. Dr. Rejali follows the case presentation with a review of alopecia areata and its clinical manifestations. Alopecia areata is very prevalent in our everyday practice. We encounter many patients who either have active lesions or who have had them in the past, with various degrees of resolution (from complete hair regrowth to permanent hairless areas), so we must always ask the patient about this important medical history item. Many years ago I had a patient who developed alopecia universalis after an FUT surgery. Thankfully, most of the hairs in his scalp and face regrew, but the rest of his body hair did not. He never again wanted to face another hair transplant procedure.

A Case of Alopecia Totalis Following Hair Transplant Surgery

Farhad Rejali, MD *Esfahan, Iran* bamehr2000@yahoo.com

Introduction

Hair transplantation is generally without major complications when performed by experienced surgeons, but rarely complications may occur; one of these is triggering other dermatologic conditions such as alopecia areata (AA).

Case Report

At the time of his transplants, the patient was a 26-year-old man with androgenic alopecia Norwood type V, with baldness in both the frontal and vertex areas. In the consultation, I recommended two sessions of FUT, one for the frontal area and the other for the vertex. The first session results were good and after 6 months the patient came back for the second procedure. In the second procedure, I did another FUT for the vertex and also increased the density of the frontal area.

Donor sutures were removed after 10 days. At that time, the donor and recipient areas were both normal.

After two weeks, when the patient came for a follow-up visit, I saw a circular area of baldness measuring approximately 2×2cm above the donor area. I suggested that the patient come back for follow-up visits every 2 or 3 days to assess the area. The patient came back after one week and I noticed rapid progression of the bald area. Two weeks later, the alopecia had spread to the entire scalp—a condition that we know as alopecia totalis.

The patient was referred to a dermatologist and after two courses of oral cortisone therapy plus minoxidil 10% and immunotherapy he recovered his hair. (See Figures 1-4.)

After that, I didn't see the patient because he was from another city, but I talked with him on the phone about one year later, and interestingly enough he told me that the results of both procedures were satisfactory. At this time, the patient mentioned to me that when he came to me for the hair transplants, he had an alopecic area on his legs but he didn't tell me anything. This indicates how important it is to obtain a complete medical history and medical examination on every patient.



Figure 1. The patient described in the article who experienced alopecia totalis after hair transplantation (before first procedure).

Discussion

AA Signs and Symptoms

Patchy hair loss: The problem begins with 1 or more coin-sized, round, bare patches where hair previously grew.[5] Hair loss occurs mostly on scalp but it can involve eyebrows, eyelashes, beard and body hair.

Exclamation point hairs: These hairs get narrower at the bottom, like an exclamation mark.[5]

Widespread hair loss: Some patients lose all of the hair on the scalp[5] and sometimes they lose all of their body and facial hair as well.

Nail problems: AA also can affect fingernails and toenails. Nails can have tiny pinpoint indentations. They may also have wide spots or lines, be rough, lose their shine, or become thin and split.



Figure 2. Front view after first session.



Figure 3. Top view of that patient showing the vertex area before the second surgery (after good results with the first session the patient came for vertex repair).



Figure 4. Top view of the patient after experiencing alopecia totalis.

Triggers for AA

- Genetic predisposition may be a factor.[9]
- Psychological long-term stress.[9]
- Extreme physical or mental shock (one of the possible triggers after HT).[1]
- Physical trauma (possibly one of the triggers after HT). Cells

⇨ page 116

Complications *from page 115*

under physical stress can produce hit shock proteins (HSPs). These have been implicated in other autoimmune diseases, such as Lupus, some forms of spondylitis, and rheumatoid arthritis.[10]

- Drugs such as Zidovudine (HIV)[6] and Fluvoxamine (antidepressant).

AA and Hair Transplantation

Because AA is an autoimmune disease, patients with moderate to severe forms of AA are generally not good candidates for hair transplantation, because the immune system may attack the transplanted hair follicles and destroy them. However, in mild and limited cases, if the area is small and stable over an extended period of time, we may consider HT but the patient must be informed about the risks of losing the hairs again if transplanted.[8] Sometimes biopsy is helpful.

I personally have had several cases of AA in which I had done HT, and the results were different. For example, I had 2 cases with previous history of AA on the beard with good results after HT on the scalp (Figures 5 and 6). But, conversely, there was another case of beard AA on which the results of HT on the scalp were not satisfactory and poor growth was observed.



Figure 5. Before pictures of other patients with history of AA.



Figure 6. After pictures of above patients (from Figure 5) showing good results.

In my opinion, if the area is on the scalp—whether small or large—biopsy should be done. For patients with AA in which the lesion is not on the scalp, if the lesion is progressing or large, then HT should not be done, but if the lesion is small and not progressing, then the decision should be made after discussing the risks with patient.

Generally speaking, care must be taken before performing HT in patients with a past history of AA, especially in AA with poor prognosis.

Poor Prognostic Factors in AA

- First onset at a young age
- Extensive hair loss
- Rapid progression of disease
- Eyebrow, eyelash, and beard involvement
- Severe associated nail changes

Diagnosis of AA

AA is usually diagnosed based on clinical features. Trichoscopy may aid diagnosis. In AA, trichoscopy shows regularly distributed yellow dots, small exclamation mark hairs, and black dots.

On biopsy, the histologic findings include peribulbar lymphocytic infiltrate.[7]

Differential Diagnosis of AA

Tinea Capitis, Lichen Planus Chronicus (Planopilaris), Pseudo Pelade of Brocq, Folliculitis Decalvans, Lupus Erythematous, Trichotillomania, Secondary Syphilis, Telogen Effluvium.[5]

The most important differential diagnosis of AA after HT is post-surgical effluvium. The post-surgical effluvium of preexisting hair after HT may be telogen or anagen effluvium.[8]

AA Treatments

1. Mild, patchy AA:
   - Cortisone injections
   - Topical minoxidil
   - Anthralin cream or ointment
2. AA totalis or universalis:
   - Oral steroids
   - Topical immunotherapy[9] with chemicals such as diphencyprone (DPCD), dinitrochlorobenzene (DNCB), or squaric acid dibutyl ester (SADBE)
   - Specific immune modulator medication, for example, hydroxychloroquine with possible mechanism of lysosomotropic action interfering with normal physiologic action of subcellular compartments and decreased production of cytokines and other inflammatory mediators.[4]

The most important point in treating severe AA after HT is early treatment. When you see rapid progression of AA to alopecia totalis after HT, early initiation of oral corticosteroids can be a reasonable choice.

Conclusion

This case and other reported cases of poor growth sometimes seen after HT in patients with a previous history of AA support the hypothesis that AA is an autoimmune disease. For example, a study that was done by Tobin et al. showed that the incidence of antibodies to individual hair follicle antigens in AA was up to 7 times more frequent than in control sera and their level was up to 13 times greater.[2]

Also, different responses to HT in patients with AA may be explained by previous studies that show antibodies can be seen in some of the patients and not in others. For example, in one study conducted by Milgraum et al. in 45 children with AA, they showed that 24% had elevation of microsomal antibody levels, in 16%, smooth muscle antibody, and in 4%, parietal cell antibody were present.[3]

Understanding the exact pathophysiology of AA can help us understand the cause of the occasional poor growth that we encounter in our routine practice.

References

1. Wikrmanayake, T.C., and E. Alvarez-Connelly. Heat treatment increases the incidence of alopecia areata in the C3H/HeJ mouse model. *Cell Stress and Chaperones.* 2010; 985-991.
2. Tobin, D.J., et al. Antibodies to hair follicles in alopecia areata. *J Investigative Dermatol.* 1994; 721-724.
3. Milgraum, S.S., et al. Alopecia areata, endocrine function and autoantibodies in patients 16 years of age or younger. *JAAD.* 1997; 17(1):57-61.
4. Stephan, F., M. Haber, and R. Tomb. Successful treatment of alopecia totalis with hydroxychloroquine: report of 2 cases. *JAAD.* 2013; 68(6):1048-1049.
5. Shapiro, J., and S. Madani. Alopecia areata: diagnosis and management. *Int'l J Dermatol.* 1998; 38(S1):19-24.
6. Geletko, S.M., M. Sagarra, and D.J. Mikolich. Alopecia associated with Zidovudine therapy. *The Journal of Human Pharmacology and Drug Therapy.* 1996; 16(1):79-81.
7. Rudnicka, L.,et al. Trichoscopy: new method for diagnosing hair loss. *J Drugs Dermatol.* 2008; 651-654.
8. Unger, W.P., and R. Shapiro. *Hair Transplantation,* 4th Edition. Marcel Dekker. ISBN 0-8247-4110-2, pp. 72-73.
9. Mitchell, A.J., and E.A. Krull. Alopecia areata: pathogenesis and treatment. *JAAD.* 1984; 11(3):763-775.
10. Wallin, R.P.A., et al. Heat-shock proteins as activators of the innate immune system. *Trends in Immunology.* 2002; 23(3):130-135.◆



Invitation to ISHRS Physician Members to Participate as Investigational Site in a Study: Donor Surface Area Response to FUE Surgery

The ISHRS FUE Research Committee chaired by James A. Harris, MD, and the FUE Studies Subcommittee chaired by Ken Williams, DO, are seeking the assistance of the ISHRS hair restoration surgeon community. The respective committees request physician participants in a research study designed by Drs. John Cole (Lead Investigator), Marco Toscani, and Chiara Insalaco, investigating the donor area response to FUE surgery. This study is the first investigation to evaluate the impact of FUE harvesting upon the donor site.

The FUE Research Committee and Dr. Cole are seeking physicians with strong experience in FUE graft harvesting and can enroll at least 10 patients into the study protocol. Hair surgeons wishing to participate will be screened for their FUE experience and motivation. We strongly encourage our members with FUE experience to take part in this study since clinical data is critical to identifying optimal methods and tools for performing FUE donor harvesting. This opportunity may assist you in gaining experience in what it takes to develop and implement a study protocol, too!

If you are interested in becoming an investigational site and would like to review the study protocol, please contact Dr. Ken Williams at **drwilliams@iimcs.org**.

Call for ISHRS Fellowship Training Program Directors

The ISHRS has a long-standing and prestigious Fellowship Training Program in Hair Restoration Surgery whereby it has a rigorous process overseen by the Fellowship Training Committee that ensures Program Directors and Training Programs meet specific guidelines to provide exceptional opportunities and educational environments to acquire expertise in hair restoration surgery. Fellowships may be one or two years in duration. One-year programs are required to perform at least 70 cases per year per Fellow. Two-year programs are required to perform 50 cases per year per Fellow.

The list of ISHRS-sanctioned Program Directors is available on the ISHRS website. The trainees seeking to complete a fellowship inquire directly with the program directors for availability. The ISHRS issues certificates to Program Directors whose programs qualify, as well as to Fellows who complete the course of study.

For those who are interested in developing a program or have an existing program that may qualify, you are encouraged to consider completing the application process.

Application materials may be obtained at: http://www.ishrs.org/member-fellowship-training.php

Questions may be directed to Fellowship Training Committee Chair, Robert P. Niedbalski, DO at: drniedbalski@gmail.com

[Note of clarification: The term "Fellow" as used to describe those who complete an ISHRS-sanctioned Fellowship Training Program is not to be confused with the term "Fellow" category of ISHRS membership.]

CALL FOR NOMINATIONS

2015 ISHRS Awards

GOLDEN FOLLICLE AWARD

Presented for outstanding and significant clinical contributions related to hair restoration surgery.

PLATINUM FOLLICLE AWARD

Presented for outstanding achievement in basic scientific or clinically related research in hair pathophysiology or anatomy as it relates to hair restoration.

DISTINGUISHED ASSISTANT AWARD

Presented to a surgical assistant for exemplary service and outstanding accomplishments in the field of hair restoration surgery.

How to Submit a Nomination

Include the following information in an e-mail to: info@ISHRS.org

- Your name,
- The person you are nominating,
- The award you are nominating the person for, and
- An explanation of why the person is deserving; include specific information and accomplishments.

Nominating deadline: July 15, 2015

See the Member home page on the ISHRS website at www.ISHRS.org for further nomination criteria. The awards will be presented during the Gala Dinner at the ISHRS 23rd Annual Scientific Meeting that will be held September 9-13, 2015, in Chicago, Illinois, USA.

ISHRS Research Grants Available

The International Society of Hair Restoration Surgery (ISHRS) offers research grants for the purpose of relevant clinical research directed toward the subject of hair restoration. Research that focuses on clinical problems or has applications to clinical problems will receive preferential consideration. There are several opportunities this year for hair-related research grant funding through the ISHRS with typical amounts of $1,200 to $2,600 USD per grant. ISHRS members in good standing may apply.

Grant applications deadline: July 15, 2015

Further information and a full application can be obtained on the ISHRS website at **www.ISHRS.org/member-grants.htm.**

HypoThermosol®

THE OPTIMIZED GRAFT STORAGE SOLUTION TRUSTED BY LEADING HAIR RESTORATION PROFESSIONALS WORLDWIDE



Join the growing list of hair restoration professionals that trust *ex vivo* graft storage to HypoThermosol.®

BioLife Solutions®

BIOPRESERVATION TOOLS FOR CELLS, TISSUES, AND ORGANS

866.424.6543 | www.biolifesolutions.com

info@biolifesolutions.com

Hair's the Question*

Sara Wasserbauer, MD, FISHRS *Walnut Creek, California, USA* drwasserbauer@californiahairsurgeon.com

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



How much do you know about the histology of your grafts once you send them home with your patient? When are they permanent? When do they create their own blood supply? How do they regenerate? If you get picky patients like I do—or if you are just curious and want to know the minutiae of what you do (also like I do!), join the nerd section at the next ISHRS meeting (front row!) and test your knowledge.

When Is a Graft "Grafted"?

1. When do hair grafts revascularize post-operatively?
   A. Immediately
   B. On day 2
   C. 72 hours—7 days
   D. Within the first 6 months

2. Scabs/crusting post–hair transplant is
   A. a necessary part of the healing process and should be left alone.
   B. a preventable phenomenon that extends the time a graft is at risk for being dislodged.
   C. NOT water-soluble but can be softened or removed with Vaseline or other oil-based emollients.
   D. a common occurrence that can be rubbed off vigorously starting on post-op day 3.

3. Pulling on an adherent scab/crust (not hair) always results in a lost graft through
   A. day 2.
   B. day 5.
   C. day 9.
   D. any day before the scabs (or crusts) fall off by themselves.

4. Pulling on a hair (not scab/crust) always results in a lost graft through
   A. day 2.
   B. day 5.
   C. day 9.
   D. whatever day the hairs fall off by themselves.

5. How soon after a hair transplant can any plucked hair (with or without a scab) be said to be fully "grafted" (i.e., unable to be dislodged)?
   A. 2 days
   B. 6 days
   C. 9 days
   D. 4 weeks

6. Hair grafts that are transected (horizontally) and only the top two-thirds implanted will
   A. never regenerate.
   B. regenerate non-pigmented (white) hairs.
   C. regenerate 100% of the time but with thinner hairs than intact grafts.
   D. regenerate the bottom half of the follicle before growing a new hair shaft.

7. Hair grafts that are transected (horizontally) and only the bottom two-thirds implanted will
   A. never regenerate.
   B. regenerate non-pigmented (white) hairs.
   C. regenerate 100% of the time but with thinner hairs than intact grafts.
   D. regenerate the follicle and grow a new hair shaft.

8. What fraction of an intact hair graft is needed to actually grow a hair over 80% of the time?
   A. One-fourth of the lower section
   B. One-half of the lower section
   C. Two-thirds of the lower section
   D. Only complete hair grafts will grow a hair over 80% of the time.

9. Which of the following will prevent a graft from growing the most?
   A. Transection (i.e., in half)
   B. Dessication (i.e., more than 3 minutes on a glove)
   C. Crush injury ("hard crushed" at the bulb)
   D. Dense packing (i.e., > 40 FU/cm^2)

10. Which of the following is the best holding solution for a graft to ensure survival?
    A. HypoThermosol®—FRS
    B. Hydrogen peroxide 1% solution
    C. PH balanced (7.4) Saline with PRP/ACell and liposomal ATP
    D. There is no randomized, controlled, double-blinded study with large numbers of patients to determine the answer to this question at this time.

⇨ *Answers on page 122*

Hair's the Question from page 117

Answers

1. **C.** Maintaining an adequate blood supply to our delicate grafts has always been one of the major survival factors (if not THE major factor other than avoiding dessication and or crush/transection injuries). If you can get your grafts to have a good blood supply, you can avoid shock loss and graft non-growth, and optimize outcomes. When the blood supply is established, your graft pretty much is too. This also brings up the point that you should avoid damage to the recipient vascular bed (including smoking and deep recipient sites), but that is a set of questions for another column!
2. **B.** Try to prevent the crusts! Grafts don't need them to survive and they may in fact inhibit their survival. Grafts appear to be completely intact as of day 9, and are very vulnerable up to about Days 3-5, so D is incorrect. The exudate is water-soluble (therefore C is incorrect) initially, so use frequent washing or moist compresses to prevent the formation.
3. **B.** If you want your grafts to "take," realize that through day 5 the grafts are still very vulnerable and you can interrupt their survival most effectively by pulling or rubbing the crusts/scabs. Pulling on the hairs alone is less likely to result in a lost graft in the early post-op period—see the next question!
4. **A.** In other words, in the post-operative period, pulling on a hair alone is going to have a lower risk of killing a graft than pulling on a scab/crust. If you have not formed the scabs/crusts in the first place, you are in better shape and your grafts are more likely to get grafted!
5. **C.** But tell your patients D (4 weeks) just to be sure they are compliant…. Just kidding! By 9 days your grafts can be said to be officially "grafted."
6. **D.** This fact is remarkable to my mind and is part of the reason that we know it is the cells in the bulge area of the follicular unit (about halfway up the follicle) that cause grafts to become grafted. It is these stem cells that we are actually grafting—not the hair that is temporarily in that follicle at the time of the transplant (although if you think about it, it is the hair that we are using to locate the stem cells!). C is partially correct; these transected follicles will generate a thinner graft, just not 100% of the time.
7. **D.** This is still one of my favorite little factoids about hair! Too bad hair trivia is not much in demand as other factual knowledge, or we could all have another career!
8. **C.** This is true 83% of the time according to the original study by Kim and Choi. It takes having the stem cells in the bulge (at the center of the follicular shaft) intact for a graft to grow. Thus, two-thirds of a graft is technically a graft.
9. **B.** Transected and crushed grafts, and even densely packed grafts, all exhibit some percentage of regrowth in various studies
10. **D.** That's it. We don't know what is going to be the best stuff to make grafts "graft." Here is an area for some enterprising new surgeon in the field of hair transplantation to make his or her mark! (I look forward to seeing the results, whoever you are!) In the meantime, A and C are both reasonable options, but hydrogen peroxide (answer B) is likely to decrease your survival rates.

Bibliography

1. Bernstein, R., and W. Rassman. Graft anchoring in hair transplantation. *Dermatol Surg.* 2006; 32(2):198-204.
2. Unger, W.P., and R. Shapiro, editors. Hair Transplantation, 5th ed. New York: Marcel Dekker; pp. 321-325, 330, 334-338. Also, David Perez-Meza in 3rd ed.; pp. 287-294.
3. Wasserbauer, S., D. Perez-Meza, and R. Chao R. Hydrogen peroxide and wound healing; a theoretical and practical review for hair transplant surgeons. *Dermatol Surg.* 2008; 34:745-750.◆

FOLLYSIS

Innovative Solutions for
Future Hair Care Professionals

www.follysis.com
info@follysis.com

Are you looking to give your professional stature a boost?

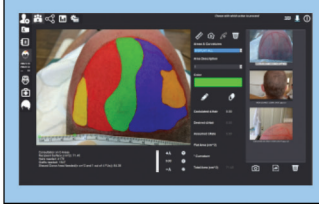
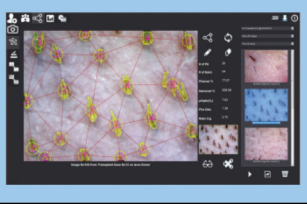
Do you need a convincing and user friendly tool for your consultations?

Would you like a high-tech solution for improving your patient hair care?

TAKE ADVANTAGE OF FOLLYSIS NOW!



- ✓ State of the art Digital Trichometry
- ✓ Accurate and customized consultation
- ✓ Detailed patient follow-up monitoring
- ✓ Patient outcome quantification


Review of the Literature



Jeff Donovan, MD, PhD *Toronto, Ontario, Canada* donovan.jeffrey@gmail.com

Finasteride Long-Term Safety Data: How Good Is the Published Data?

Belknap, S.M., et al. Adverse event reporting in clinical trials of finasteride for androgenic alopecia. A meta-analysis. *JAMA Dermatol.* Published online April 1, 2015.

The safety of finasteride has been an important topic of discussion among the ISHRS, especially at our annual meetings. Concerns over sexual dysfunction, cancer risks, fertility, and mood alterations are active topics of discussion. Two published meta-analyses concluded that finasteride has a good safety profile. But what are the real numbers on risks that we should use to advise and counsel our patients?

A U.S. study from Northwestern University Feinberg School of Medicine set out to assess the quality of safety reporting in published clinical trials of finasteride at doses used to treat hair loss (at doses of 1.25mg or less).

In the study, safety reporting was classified as "adequate," "inadequate," or the study classified a given published trial as having no safety data. Of 34 clinical trials that were reviewed by the authors, none had "adequate" safety reporting. Of those that did, 19 (56%) were rated as partially adequate, 12 (35%) were deemed inadequate, and 3 (9%) reported no adverse events. In 26 of the 34 trials (76%), duration of drug safety evaluation was 1 year or less.

The authors' further analyses concluded that the studies had some degree of bias with 18 (53%) studies disclosing conflicts of interest and 19 (56%) receiving funding from the manufacturer.

Comment: Safety data is important in order to provide our patients with the best possible counseling on risk. Post-marketing safety evaluation of finasteride has met challenges, and many physicians rely on previously published clinical trials as a source of information to relay to patients. The present study reminds us that the safety data we have from current clinical trials is of poor quality and, as the authors found, may have bias. The current study did not take into account the safety data available from studies of the 5mg dose. Further rigorous and high-quality studies are needed to understand the safety of this highly effective hair loss medication.◆

Minoxidil for Frontotemporal Hair Loss in Men: It Does Help!

Hillman, K., et al. A single-centre, randomized, double-blind, placebo-controlled clinical trial to investigate the efficacy and safety of minoxidil topical foam in frontotemporal and vertex androgenetic alopecia in men. *Skin Pharmacol Physiol.* 2015; 28:236-244.

It has long been thought that minoxidil helps men with frontotemporal androgenetic alopecia (AGA) as well as vertex AGA. Until recently, definitive high-quality clinical studies were lacking. In the January issue of the Forum, I shared results of a double-blind, placebo-controlled study of 16 men by Mirmirani et al. that showed that minoxidil benefitted both the frontal and vertex scalp AGA.

Now, a second even larger study from Germany provides further confirmation that minoxidil indeed benefits the frontotemporal scalp in men with AGA.

The investigators assessed the efficacy of twice daily 5% minoxidil foam in the frontotemporal region of male AGA patients after 24 weeks of treatment compared to placebo treatment and to the vertex region. Changes in target non-vellus hair count were the primary end point. Secondary endpoints included changes in hair width as well as clinician and patient ratings of improvement.

Study results showed that hair counts and width increased significantly compared to baseline in both the frontotemporal and vertex scalp. Furthermore, study subjects using 5% minoxidil foam rated a significant improvement in scalp coverage for both the frontotemporal ($p = 0.016$) and vertex areas ($p = 0.027$). Clinician assessors, however, were only able to appreciate a difference in the crown and not in the frontotemporal scalp.

Comment: There is now good evidence to support the notion that twice daily 5% foam promotes improvements in hair density in both frontotemporal and vertex regions in men with moderate stages of AGA.◆

Occipital Neuralgia after Hair Transplantation: How Would You Treat?

Siefferman, J., and Y. Khelemsky. Occipital neuralgia after hair transplant and its treatment. *Case Rep Neurol Med.* 2015; 2015:428413.

Neuralgias after hair restoration are uncommon. However, the immediate recognition and management of nerve injuries are important skills for the hair transplant physician. The International Headache Society defines occipital neuralgia as a type of headache characterized by paroxysmal shooting or lancinating pain in the greater, lesser, or third occipital nerve dermatomes.

Authors from New York shared a case report of a 72-year-old man with occipital neuralgia following follicular unit strip surgery and outlined the complexities of management. The man reported pain, numbness, and tingling extending up to the posterior right ear, consistent with the distribution of the lesser occipital nerve. His pain failed to improve with oxycodone, neuropathic agents, and acupuncture, and only temporarily improved with local anesthetic blocks. He was then started on Pregabalin 75mg three times daily with modest improvement. An initial set of Botulinum toxin type A injections (100 units) temporarily helped, but additional follow-up injections did not help. The patient then underwent pulsed radiofrequency neuromodulation, which is a non-destructive technique to relieve pain by delivering an electrical field to neural tissue. The technique provided 80% pain relief for 5-month intervals. He has had repeat radiofrequency sessions with success.

Comment: This case report provides the hair transplant surgeon with important reminders of the range of strategies for treating occipital neuralgia as well as the challenges that exist in providing some patients with sustained pain relief.◆

Meetings and Studies

Henrique N. Radwanski, MD *Rio de Janeiro, Brazil* hnradwanski@hotmail.com



It is my great honor to contribute to the *Forum* as the new columnist for the Meetings section, and I thank the editors for their kind invitation.

The ISHRS recently sponsored its first event in India, where many young surgeons are applying their creativity and ingenuity to HRS, specifically FUE. A great team of speakers interacted with more than 50 participants, sharing their experience with eager colleagues. A generous mixture of live surgery, lectures, discussions, and cultural activities provided an informal setting for teaching, learning, and fun. Drs. Kapil Dua and Aman Dua and their staff provided excellent accommodations. Here is their lively report on this meeting.

Review of the ISHRS Asian FUE Workshop February 27–March 1, 2015 • New Delhi, India

Kapil Dua, MBBS, MS *Ludhiana, Punjab, India* drkapildua@akclinics.com

The first ISHRS Asian FUE live surgery hair transplant workshop was held in New Delhi, the capital city of India. Drs. Kapil Dua and Aman Dua were directors of this event that included 55 participants from around the world. The key objective of the workshop was to identify the current best FUE techniques for scalp and body hair transplant.

The workshop began with an opening address by Dr. Kapil Dua, welcoming the faculty and the delegates, followed by a welcome from the ISHRS ambassador, Dr. Bessam Farjo from the UK.

This was followed by lectures on Basics of FUE, with Dr. Aman Dua outlining the latest terminology and indications of FUE, and Dr. Jean Devroye presenting different types of punches and devices used for FUE.

The next session was on increasing the efficiency in FUE. Dr. Farjo explained the ARTAS® Robotic technique, and Dr. John Cole talked about ergonomics to achieve maximum efficiency. He also illustrated how the total number of donor grafts available is more in FUE than strip with repeated sessions.

In the next session, the expert faculty gave insights into their own extraction techniques. Dr. James Harris explained his "Hex technique," which uses a hexagonal punch, and noted that it has reduced his transection rates. Dr. Alex Ginzburg explained his unique technique of extraction with his cordless powered device. Although Dr. Koray Erdogan could not personally attend the meeting, his team gave a video presentation about how they do FUE. Dr. Cole explained his sharp punch minimal depth technique and devices. Dr. Kapil Dua explained how he extracts grafts with a dull punch in his 7-step technique.



Dr. Jean Devroye participating in discussion.



Dr. John Cole preparing his patient for extraction.



Dr. James Harris being awarded a faculty memento.

In the following session, Dr. Harris addressed the issue of proper donor site selection and preparation. He explained the safe donor zones for FUE and proper pre-operative planning of the harvest. Dr. Ginzburg discussed how FUE technique must be modified for different ethnicities and for women.

Live surgery demonstrations followed at the AK Clinic. Dr. Harris operated on a case of grade III baldness with traction alopecia and demonstrated his unique Hex technique. Dr. Cole operated on a case of grade III V baldness with the patient in the sitting posture, which was new to the delegates as both the other surgeons were operating with the patient in the prone position. His spectacular skill was clearly obvious to everyone present by the beautiful grafts that he had taken out.

Dr. Ginzburg operated on the third patient, a case of grade V baldness. With his typical cheerful attitude, he put the assisting team at ease and the delegates had a great time watching how he did the surgery in a cool and charming way. Delegates in the audiovisual observation rooms were engaged and entertained by moderators, Drs. Farjo and Robert True.

The day ended with a welcome reception at the hotel. The theme was Punjabi based (North Indian) with Punjabi dance and food. Faculty shed their "tough exteriors" and participated actively. Delegates and faculty joined together for dancing and festivities.

Day 2 began with Breakfast with Experts. Dr. Harris ex-



Delegates and faculty at the workshop.



Guests, delegates and faculty at the Welcome Reception.

plained powered FUE by SAFE Scribe. Dr. Ginzburg discussed scalp micropigmentation. Dr. Devroye presented his instruments and his different sized punches. Dr. Farjo had a lively discussion about robotic FUE, and Dr. True explained various tips and tactics of body hair extraction.

The lectures started with discussion of implantation of FUE grafts, speed of extraction, limits of donor area, transection rate, and complications of FUE. The debate of FUE vs. Strip was addressed, with extensive discussion in the question & answer session. Dr. Kapil Dua also shared how with dull punches he has brought his FTR (follicular transection rate) into the range of 2-3%. Dr. Aman Dua put forward that revision FUE after primary strip surgery had a lower transection rate due to the better virgin area available compared to primary FUE and punch grafting.



Dr. Alex Ginzburg delivering a lecture.

Dr. Farjo discussed post-operative care. Dr. True gave a thorough discussion on the causes and prevention of poor growth in FUE. The delegates had their various doubts cleared at the end of the session.

Adjuvants therapy in hair restoration was the next topic. Dr. Ginzburg helped the delegates understand the intricacies in mixing of colors for scalp micropigmentation. Dr. Aman Dua presented on the effect of platelet rich plasma (PRP) in hair restoration.

Dr. Farjo enthusiastically took the microphone once again in the audiovisual room and had an active discussion running between the surgeons and the audience while the first set of delegates were inside the Operating Room, with Drs. Devroye, Ginzburg, True, and Dua performing their procedures.

The second day ended with the Gala Dinner where delegates were welcomed in the Indian way—with a garland of flowers—and they were treated to a series of performances from the different states of India with the highlight being the Manipuri and Punjabi dance. The third and final day of the workshop was reserved for hands-on practice on models for the delegates, who were again divided into different tables each led by an expert. The workshop ended with an open discussion among the faculty and the participants. Drs. Dua, thanking all the delegates and faculty, and honoring all their team members who had done a spectacular job in organizing and making the workshop a huge success, proffered closing remarks. Dr. Devroye specially commented about the excellent scientific discussion during the workshop, and the entire faculty expressed congratulations for how well the whole event was organized.

The cultural program included a half-day Delhi tour guided by the hosts to see some of the famous heritage sites in India and experience the Cultural Gully at Kingdom of Dreams. The next day gave them an opportunity to visit the famous Taj Mahal in Agra, one of the Seven Wonders of the World.

The workshop proved to be a great stage for transplant surgeons from 13 different countries to discuss and enlighten themselves regarding the latest developments in FUE. They had ample interaction with the experts. Their great enthusiasm helped to make the event a raving success.

In the end, I would like to thank the ISHRS for allowing us to host this prestigious workshop, the first of its kind in the Indian subcontinent. The way the ISHRS guided us made sure that everything was planned and taken care of well in advance to keep the anxiety at bay. No workshop can be complete without teamwork behind the scenes, which was led by Dr. Renu Kothottil, Mr. Aman Bansal, and Mr. Sanjeev Kumar and who made sure that everything went according to the plan. All in all, our intention of providing a worthwhile quality academic exposure and value for every minute spent in the workshop was made possible by the effort of one and all.◆

Regional Societies Profiles

For this issue, we asked Dr. Paul Rose, an ISHRS stalwart, to tell us about the American Society of Hair Restoration Surgery (ASHRS). Sometimes, the ISHRS may seem like an American Society, but there is this society that is truly American and one that we may not have heard much about. Following are Dr. Rose's answers to the usual questions.

American Society of Hair Restoration Surgery (ASHRS)

Q. What is the history of the ASHRS?

A. The name of our society is the American Society of Hair Restoration Surgery (ASHRS). Currently, we have 66 members. It is a specialty section of the American Academy of Cosmetic Surgery (AACS). My understanding is that the ASHRS became incorporated into the AACS in 1995 due to various reasons. I imagine that some of it was financial and some political. I believe that the original ASHRS began with Drs. Bluford Stough and probably Thomas Alt. At the time of incorporation in 1995 the initial chairman in was Dr. Martin Unger and the vice chair was Dr. Robert Cattani. Councilors included Drs. Thomas Alt, Dominic Brandy, Bluford Stough, Daniel Rousso, and Richard Anderson. The way the ASHRS is structured currently is that there is only one officer—a President—who sits on the AACS board. I am the current president. We are in the process of filling the other positions.

Q. Do you hold annual meetings?

A. The ASHRS has a yearly workshop(s) during the annual AACS meeting.

Q. What are the medicolegal challenges to HRS in the United States?

A. The ASHRS is facing the challenges of hair restoration surgery in general. As you may know, the practice of medicine is shifting in the United States. Physicians are concerned about the changes that relate to providing quality care, financial reimbursement, and the role of ancillary personnel working with physicians.

The movement towards the use of Nurse Practitioners (NPs) as solo practitioners, able to have their own offices, may have a profound effect as to how healthcare is provided in the future. The use of unlicensed personnel performing procedures is increasing. This issue is under scrutiny by some of the Boards of Medicine and legislatures in the United States.

With the concern for decreasing reimbursement, many physicians are seeking the means to increase their ability to perform or have someone perform medical procedures that are not reimbursed by insurance companies or the government. This has attracted a great many more physicians who have little or no hair loss/hair restoration experience to enter the field of hair restoration. Some entrepreneurs are developing hair restoration centers and utilizing physicians who have no experience in hair restoration, simply to use the physician's license so that techs can perform the procedures. Some are also using physician assistants (PAs) and NPs in a similar fashion.

Q. Is advertising permitted for HRS in the United States?

A. Yes, unlike some other countries, advertising of medical procedures is legal in the United States. I believe that the United States is probably the largest market for hair restoration procedures. The public has accepted the procedure and there is increased interest by many due to the advertising of the FUE process as a minimally invasive procedure. Nevertheless, the population seeking hair restoration is quite small compared to the population that experiences significant hair loss. This may be due to lack of accurate information, costs, and the current trend amongst young people to have a shaved head appearance.



Paul T. Rose, MD, JD, FISHRS

Q. Are most practitioners busy?

A. There has been a good deal of consolidation in the U.S. hair restoration field with the merger of MHR and Bosley. The solo practitioner understandably has more difficulty competing with Bosley and its ability to market globally. My impression is that there are fewer physicians who perform hair restoration as a primary specialty field and many who are seeking to dabble in the field or to hire technicians to perform the procedure in a practice that does not specialize in hair restoration.

My impression is that most of the hair specialty physicians would like to be busier.

Q. Do you feel more surgeons are performing FUT or FUE surgery?

A. Most seem to be doing more strip surgery, but that is changing. FUE/FIT is becoming more popular. Some physicians are using the ARTAS® Robotic System. (For COI, I own one and I consult for the company and own stock.)

Q. Is anyone investigating cell-based therapies?

A. Yes, I am currently investigating cell-based therapies, but I do not have information as to other members on this topic. I think that since the AACS has devoted a fair number of lectures to stem cell therapy at past meetings, it is certainly possible that members are using these modalities.

Q. Who is active in teaching in the ASHRS?

Q. We have been fortunate to have physicians such as Drs. Marco Barusco, Carlos Puig, Tony Mangubat, Steve Hopping, Bob True, and Danny Rousso at the teaching forefront of the ASHRS. We have also benefitted from the contributions of ISHRS members who have been kind enough to lecture as well.

Q. Where do you think HRS is headed in the United States?

A. It seems that there is increasing demand for FUE/FIT whether manually or with the robotic device or mechanized drills. The advertising being done that denigrates strip procedures and conveys the sense that strip harvesting is a poor choice has been successful. The fact that the public has seen the evolution of hair restoration from plugs to strip harvesting over many years has allowed the bad outcomes to be evident and the great results to be overshadowed. This is in part due to the fact that men tend to be reticent about having undergone the hair restoration procedure.

Because FUE/FIT is relatively new, the public has not had enough time to learn about poor outcomes with this technique. Many of us fear that improperly trained physicians and other personnel will produce poor results with FUE/FIT and there will be a backlash against all hair restoration practitioners.

We are starting to see patients who have been over harvested and the donor area is too thin. We are seeing patients with poor growth, patients with dermatologic disorders that should have precluded surgery, and patients with harvesting outside of what most would consider the safe zone.

I would think that we will see an increasing number of robots placed in the country, and probably businesspeople will try to "corner areas" by purchasing several machines and then hiring doctors or NPs or PAs simply to be on staff while technicians use the devices.

The device companies may pursue a model wherein there is a traveling technician team that would go to the offices that have the machines if the physician is not experienced in hair restoration.

Q. When is your next meeting?

A. Our next meeting will take place in Fort Lauderdale, Florida, in January 2016.

Q. How can the ISHRS and ASHRS work together?

A. I believe that many of the ASHRS members are already ISHRS members. Obviously, the ISHRS meetings and workshops provide intensive training opportunities to an extent that exceeds the ASHRS.

I would certainly welcome having ISHRS participation in the AACS annual meeting.

Dr. Paul Rose is a board certified dermatologist. He has been performing hair restoration surgery for over 20 years. Dr. Rose received his medical degree from the SUNY at Downstate and then interned at the University of Connecticut. He practiced emergency medicine for almost 5 years before entering a dermatology residency at Temple University Skin and Cancer Hospital in Philadelphia.

Dr. Rose has served on the Board of Governors of the ISHRS and also has served as its 2005–2006 president. He has been honored by the ISHRS by being a recipient of the Golden Follicle award. In addition, Dr. Rose has lectured at various ISHRS meetings, written many articles and textbook chapters, and has made numerous contributions to the field of hair restoration.◆



Message from the 2015 Annual Scientific Meeting Program Chair



Nilofer P. Farjo, MBChB, FISHRS *Manchester, UK* dr.nilofer@farjo.com

The preliminary program has now been published and I thank all those on the Annual Scientific Committee for the tremendous effort in getting the plans together so far. There is a lot of behind the scenes arrangements still taking place getting all the workshops organized, especially the hands-on courses, both by the course directors and their faculty but also by the ISHRS annual meeting team. With plenty more to do before September, it's still possible to get involved even if you haven't had an abstract accepted. And if you are presenting, please have a look below for your next step.

How can I get involved?

Live Patient Viewing: Here's your chance to showcase your own work to your colleagues. Bring one or more patients to the Saturday live patient session. Contact the Live Patient Viewing Chair, Marcio Crisostomo, if you have some patients that you wish to bring along with you: anything from a straightforward case to something more challenging such as a repair or even a complication would be welcome. If you're proud of your work, then why not show it off!

M&M Conference: The Morbidity and Mortality Conference will have limited seating to allow physicians to discuss their unexpected complications in a more intimate setting. The session is designed to be a learning experience by critically analysing how and why something went wrong in a procedure and by finding a solution whenever possible. Again, we do need you to volunteer to discuss your cases, so if you have a complication that you wish to present, then please contact Marco Barusco, who is chairing this session.

This meeting is scheduled to run on the Friday over dinner. The session itself is free, but you must pay for the dinner. Attendees cannot come along without payment for the meal as the ISHRS will be charged per seating. This year we have planned a sit-down dinner rather than a buffet to allow the maximum learning experience without interruption. Book to attend early as this session has sold out for the past 2 years.

If my abstract has been accepted, what do I do next?

Get prepared early. You will be asked to send in your PowerPoint presentation several weeks prior to the meeting for two reasons: 1) the moderator for your session needs to see that your talk meets the learner objectives and complies with the time limit, and 2) a copy of your presentation will need to go into the abstract book. Because the program is very full, anyone who goes outside of their time limit risks having their slides turned off so that the next speaker can have their allocated time. So please be respectful of your colleagues and prepare well in advance.

If I have had a poster accepted, what do I do next?

Again, be prepared early as you are required to send in your poster ahead of the conference. The posters will be presented in e-format once again. We need your posters early to be able to set time limits on the rolling screens so that the audience has time to read your poster before the next one appears. If you miss the deadline, your poster will not be included. The other reason we need the posters is to judge posters for awards. The awards committee will select the best posters and the prizes will be made prior to the Saturday business.

If I have a video accepted for presentation, what do I need to do?

Make sure that you note the time limit that has been set for your video presentation. The sessions have been carefully timed to exactly fit in all the allotted videos, so the time limits must be strictly adhered to. Also make sure that you have filmed in high definition so that the projection on the large screens is clear.

How We Can Help You

If you need help in getting any of your presentations together, please ask us. We are here to guide you in any way we can. If English is not your first language and you want someone to check the spelling or grammar of the English in your slides or poster, then please ask as we have volunteers who are happy to assist. Unfortunately, we cannot help out with translation into English, but perhaps we can find a colleague from your country to assist you.

We are working hard to try to meet everyone's educational needs, so I hope that the preliminary program has successfully gained your interest and you are now putting your travel plans in place to be in Chicago. This is the world's largest annual hair restoration meeting, so maximize your continuing medical education credits by attending.◆



Message from the 2015 Surgical Assistants Program Chair



Janna Shafer *Bloomington, Minnesota, USA* janna@shapiromedical.com

The outline for the Surgical Assistants Program in Chicago is nearly finished. I'd like to thank all the presenters who have volunteered to share their expertise. There are 2-3 topics remaining if anyone is still interested. It would be great to get more varying clinics to participate. It's a wonderful opportunity to "show off" your clinic. If public speaking isn't your cup of tea, we can help you find an alternative way to participate or perhaps we can help you overcome your fears of public speaking. All it takes is that first baby step in the right direction. If I can do it, anyone can. I believe the topics being covered in this year's program are very relevant and pertinent to all assistants. Come find out…reminder that the Surgical Assistants Program will be held on Wednesday, September 9, 7:30AM to 12NOON.

Sara Roberts, who works for Drs. Farjo & Farjo, is just about done putting together the faculty for the Surgical Assistants Cutting/Placing Workshop, which will be held Thursday, September 10, 9:00AM to 12NOON. The workshop, geared toward assistants old and new to the field who are looking to get helpful tips in all aspects of assisting in HT surgeries, is traditionally very popular and has limited seating, so be sure to register as soon as possible so you don't miss out. Slivering, cutting, and planting for strip procedures and assisting for FUE procedures will be the main. Please feel free to contact me with questions regarding the Surgical Assistants Program or Workshop in Chicago.◆

SAVE THE DATE!
November 19-22, 2015
St. Louis, MO I USA



Course Director:
Samuel M. Lam, MD, FACS, FISHRS

Honored Guest:
Mario Marzola, MBBS

Physician Faculty:
Marco N. Barusco, MD
Vance Elliott, MD, CCFP, FISHRS
James A. Harris, MD, FACS, FISHRS
Nicole Rogers, MD, FAAD
Lawrence E. Samuels, MD
Robert H. True, MD, MPH, FISHRS
Ken L. Williams, Jr., DO

Assistant Course Director:
Emina Karamanovski Vance, MD

Assistant Faculty:
Rita Kordon, RN
Tina Lardner
Hannah Mehsikomer
Aileen Ullrich

7th Annual
HAIR TRANSPLANT 360 Workshop

Comprehensive Hair Transplant Course & FUE Hands-On Course

- New, Expanded Course Format
- 4 Information Packed Days
- Latest High-Definition Live 3D Lectures and Surgery Dissection
- Extensive, Hands-on Cadaver Workshop with Low Student-to-Faculty Ratio
- New, Fast-Track Stand Alone or Combined Full-Day FUE Course

- Hairline Design
- Donor Harvest/Closure
- Recipient Site Creation
- Graft Dissection
- Graft Placement
- Crown Design
- Female Hairline Design
- Temporal Point Design
- Graft Calculation
- Eyebrow Transplant
- Marketing
- Consulting
- Medical Treatment
- Critical Thinking Day
- Quality Control
- FUE





To learn more or to register - visit http://pa.slu.edu

In collaboration with:
ISHRS
SAINT LOUIS UNIVERSITY

Classified Ads

Hair Transplant Physicians and Technicians

PAI Medical Group is executing its expansion plan. We require physicians and technicians with hair transplant experience for the US mid-western, eastern, and southern states and for Canada's Ontario, Quebec, Alberta and B.C. provinces.
To become part of the growing resources of PAI Medical Group, provide, where applicable, résumé, certification, license information, and your experience.
Please send to one of: www.paihair/en/employment; fcorsale@pa-intl.com; fax 613-225-0717.

Looking for Practice Opportunities in Vancouver, Canada

Canadian licensed, experienced hair restoration surgeon looking for practice opportunities in Vancouver, Canada (or nearby). Looking for full-time (or part-time) opportunities in hair transplantation. Private practice or company based. FUE, FUSS, and ARTAS are all possibilities. Serious inquiries only please.
Email: hairtransplantsurgeonvancouver@yahoo.com

RN / PA / NP with FUE Experience Needed

Seeking RN, PA or NP with FUE or hair transplant experience to join our team. Part- or full-time available. We are a busy dermatology and Mohs surgery practice with a Medicare certified ASC and offices in Thousand Oaks and Santa Barbara. Position includes Neograft FUE and placement as well as assisting with Mohs surgery and reconstruction. Competitive wage and benefits package.
Send your résumé to akaufman@dermatology-center.com or fax to 805-449-4184.

To Place a Classified Ad

To place a Classified Ad in the *Forum*, simply e-mail cduckler@ishrs.org. In your email, please include the text of what you'd like your ad to read—include both a heading, such as "Tech Wanted," and the specifics of the ad, such as what you offer, the qualities you're looking for, and how to respond to you. In addition, please include your billing address.

Classified Ads cost $85 per insertion for up to 70 words. You will be invoiced for each issue in which your ad runs. The Forum Advertising Rate Card can be found at the following link:
http://www.ishrs.org/content/advertising-and-sponsorship

www.ISHRS.org/AnnualMeeting.html

The ISHRS annual scientific meeting is THE premiere meeting of hair transplant surgeons and their surgical assistants.

You don't want to miss it.

GENERAL SESSIONS

- Combining FUE and Strip Surgery
- Advances in Hair Biology
- Update on Finasteride and Side Effects
- Hair Loss Diagnostic Dilemmas
- Unique Issues in Ethnic Transplantation
- Live Patient Viewing
- Small Group Discussion Tables
- Interactive Panels
- Female Pattern Hair Loss
- Management of Complex Cases

OTHER OFFERINGS

- FUE Hands-On Mini-Courses
- Lunch Symposia and Workshops
- Basics in Hair Restoration Surgery Course
- Advanced/Review Course
- Surgical Assistants Program & Hands-On Workshop
- M&M Conference
- Exhibits Program
- E-Poster Exhibits
- Social program including optional tours and activities, Welcome Reception, Gala Dinner/Dance

NEWCOMERS ARE WELCOME!

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

2015 ANNUAL SCIENTIFIC MEETING COMMITTEE

Nilofer P. Farjo, MBChB, FISHRS
Chair | UK

Sara M. Wasserbauer, MD, FISHRS
Advanced/Board Review Course Chair | USA

Ratchathorn Panchaprateep, MD
Advanced/Board Review Course Co-Chair | THAILAND

Nicole E. Rogers, MD
Basics Course Chair | USA

Aman Dua, MBBS, MD
Basics Course Co-Chair | INDIA

Samuel M. Lam, MD, FISHRS
Workshops Chair | USA

Marco N. Barusco, MD
M&M Chair | USA

Márcio Crisóstomo, MD
Live Patient Viewing Chair | BRAZIL

Jennifer H. Martinick, MBBS
Newcomers Chair | AUSTRALIA

Janna Shafer
Surgical Assistants Chair | USA

John D.N. Gillespie, MD, FISHRS
Surgical Assistants Co-Chair | CANADA

Damkerng Pathomvanich, MD, FISHRS
Immediate Past Chair | THAILAND

Jeffrey Donovan, MD, PhD | CANADA

Piero Tesauro, MD | ITALY

Plan to Attend

SEPTEMBER 9-13

CHICAGO '15

ISHRS 23RD ANNUAL SCIENTIFIC MEETING

International Society of Hair Restoration Surgery
303 West State Street, Geneva, IL 60134 | TEL 630 262 5399 or 800 444 2737
FAX 630 262 1520 | info@ishrs.org | www.ISHRS.org



HAIR TRANSPLANT FORUM INTERNATIONAL
International Society of Hair Restoration Surgery
303 West State Street
Geneva, IL 60134 USA

Forwarding and Return Postage Guaranteed

Presorted
First Class Mail
US Postage
PAID
Mt. Prospect, IL
Permit #87

Dates and locations for future ISHRS Annual Scientific Meetings (ASMs)

2015: 23rd ASM
September 9-13, 2015
Chicago, Illinois, USA

2016: 24th ASM
October 19-22, 2016
Panama City, Panama

HAIR TRANSPLANT forum INTERNATIONAL

Advancing the art and science of hair restoration

Upcoming Events

Date(s)	Event/Venue	Sponsoring Organization(s)	Contact Information
March 3-6, 2015 & May 26-29, 2015	University Diploma of Scalp Pathology and Surgery *Paris, France*	University of Paris VI Coordinators: P. Bouhanna, MD and M. Divaris, MD *www.hair-surgery-diploma-paris.com*	Dr. Pierre Bouhanna, Course Director *sylvie.gaillard@upmc.fr*
September 9-13, 2015	23rd Annual Scientific Meeting of the International Society of Hair Restoration Surgery *Chicago, Illinois, USA*	International Society of Hair Restoration Surgery *www.ishrs.org*	Tel: 1-630-262-5399 Fax: 1-630-262-1520
October 2-4, 2015	HAIRCON 2015 *Hotel Fariyas, Lonavala, Maharashtra, India*	Association of Hair Restoration Surgeons–India *http://www.ahrsindia.org/index.html*	Dr. Narendra Patwardhan, President, AHRS-India Tel: +91 9822057712 *ngpatwardhan@gmail.com*
November 18-21, 2015	9th World Congress for Hair Research *Miami, Florida, USA*	North American Hair Research Society *www.hair2015.org*	For details: *info@nahrs.org*
November 19-22, 2015	7th Annual Hair Restoration Surgery Cadaver Workshop *St. Louis, Missouri, USA*	Practical Anatomy & Surgical Education (PASE), Center for Anatomical Science and Education, Saint Louis University School of Medicine In collaboration with the International Society of Hair Restoration Surgery *http://pa.slu.edu*	Dr. Samuel L. Lam, Course Director Emina Karamanovski Vance, Assistant Course Director *http://pa.slu.edu*
December 5-6, 2015	20th Annual Meeting of the JSCHR *Kochi, Japan*	Japan Society of Clinical Hair Restoration (JSCHR) Hosted by Ryuichiro Kuwana, MD	Dr. Ryuichiro Kuwana, Program Chair *der-r-kuwana@mte.biglobe.ne.jp* *www.jschr.org*