

## IN THIS ISSUE

The P&P Hairline  
Laser: A Novel Hands-  
Free Laser-Assisted  
Hairline Device for Hair  
Restoration Surgery

Treating Hair Loss  
Caused by Synthetic  
Hair Implant

One-Month Trial of  
HOCl: An Observational  
Pilot Study

Anesthetic Infiltration  
with Microcannulas

**HYBRID  
29TH WORLD  
CONGRESS**



**LISBON**

**October 21-23, 2021**  
**29thannual.org**

**Don't Miss  
The Big One!**

INTERNATIONAL SOCIETY OF  
HAIR RESTORATION SURGERY



## A Study Comparing Survival of Hair Follicles Stored Cold and at Room Temperature

Michael L. Beehner, MD | Saratoga Springs, New York, USA | [mlbeehner@saratogahair.com](mailto:mlbeehner@saratogahair.com)

### ABSTRACT

Prior to being inserted in the recipient site, grafts are typically stored for hours *ex vivo* at a cold temperature (4°C). However, previous research has suggested that room temperature storage may deliver similar results. Here, I describe a study on three patients to examine whether grafts (2-hair follicles each) have better survival after being stored in a cold (4°C, 330 hair follicles) or a room-temperature (21°C, 330 hair follicles) environment during surgery. I additionally examined whether hair follicles that received one of six different stressors (800 follicles) could be “rescued” by cold or room temperature storage. Results demonstrated that the follicles stored at room temperature survived significantly better (90.9%) than those stored at a cold temperature (80.3%). Neither temperature proved better for follicles that were stressed. In sum, chilling our graft storage solution may not be the best choice when we can achieve consistent superior survival with room-temperature storage.

**Keywords:** chilled, graft, hair transplant, hydrogen peroxide, Plasma-Lyte, solution storage, stress

*This article is open access and may not be copied, distributed, or modified without written permission from the International Society of Hair Restoration Surgery.*

### INTRODUCTION

During the past 60 years, since Orentreich’s introduction of hair transplantation as a cosmetic procedure for hair loss,<sup>1</sup> the most common technique for storing hair grafts during surgery has been to place them in a chilled saline solution (or its near equivalent).<sup>2</sup> The grafts are *ex vivo* from the time of removal from the donor site until they are inserted into the recipient sites. It has always been assumed that since large organs such as kidneys and hearts are kept cold until placed in the body, hair follicles would also survive better if kept chilled.

The temperature of graft storage has been investigated in recent years, but the combined results have not been conclusive. Raposio and colleagues dissected 240 1-hair follicles and placed half of them in room-temperature saline and the other half in cold normal saline (1°C) for 5 hours to replicate the time out of body during a normal transplant procedure.<sup>3</sup> They then cultured follicles in a supplemental medium to mimic an *in vivo* environment. After 10 days, they evaluated the growth of these follicles, sorting them into those that grew any length at all and those that did not grow. They showed that 87% of the follicles cultured at room temperature and 88% of the cold-stored ones showed some microscopic growth. Given nearly identical rates of growth, they concluded that there was no difference between the temperature storage effects. However, this study was conducted entirely out of a human body and extended only 10 days into hair growth.

One of the only other studies to specifically examine temperature storage was conducted in a similar way using growth/no growth after being cultured in a dish for a length of time. Kim and colleagues (who also examined dehydration of follicles) found that follicles stored at room temperature and those stored at 4°C showed no difference in growth when stored up to 6 hours (however, cold storage did increase growth for those stored up to 48 hours). They concluded that, as long as grafts were not mishandled and kept hydrated, cooling grafts during storage was not necessary and only helped survival if the operation time extended over 6 hours.<sup>4</sup>

In a similar study, I showed that chilled grafts seemed to tolerate “stress” (crushing trauma) better than grafts maintained at room temperature (followed up by a study showing that chilling tissue in Hypo-

## TABLE OF CONTENTS

- 165 A Study Comparing Survival of Hair Follicles Stored Cold and at Room Temperature
- 167 President's Message
- 168 Co-Editors' Messages
- 169 Notes from the Editor Emeritus: Dr. Richard C. Shiell
- 170 Executive Director's Message
- 174 The P&P Hairline Laser: A Novel Hands-Free Laser-Assisted Hairline Device for Hair Restoration Surgery
- 177 Treating Hair Loss Caused by Synthetic Hair Implant
- 180 One-Month Trial of HOCI: An Observational Pilot Study
- 184 Anesthetic Infiltration with Microcannulas
- 186 Hair Sciences: Hair Follicle generation in a Mouse Model Using a Combination of Human Dermal Papilla and Follicular Epithelial Cells
- 189 Hair's the Question: Neuroendocrinology of the Human Hair Follicle, Part 1
- 192 Meeting Review: St. Louis University 360 Workshop
- 193 Hear from the Assistants: Mona Mohamed
- 194 Message from the ISHRS 2021 World Congress Program Chair
- 197 ABHRS President's Corner
- 199 Classified Ads
- 201 Calendar of Events

## HAIR TRANSPLANT FORUM INTERNATIONAL

is published bi-monthly by the  
*International Society of Hair Restoration Surgery*

First-class postage paid Milwaukee, WI and  
additional mailing offices.

POSTMASTER Send address changes to:

*Hair Transplant Forum International*  
*International Society of Hair Restoration Surgery*  
1932 S. Halsted St., Suite 413  
Chicago, IL 60608 USA  
Telephone 1-630-262-5399  
U.S. Domestic Toll Free 1-800-444-2737  
Fax 1-630-262-1520

President	Paul J. McAndrews, MD, FISHRS <a href="mailto:president@ishrs.org">president@ishrs.org</a>
Executive Director	Victoria Ceh, MPA <a href="mailto:vceh@ishrs.org">vceh@ishrs.org</a>
Editors	Jeffrey S. Epstein, MD, FISHRS Aditya K. Gupta, MD, PhD, FISHRS <a href="mailto:forumeditors@ishrs.org">forumeditors@ishrs.org</a>
Managing Editor & Advertising Sales	Cheryl Duckler <a href="mailto:cduckler@ishrs.org">cduckler@ishrs.org</a>

## COLUMNISTS

ABHRS President's Corner	Samuel M. Lam, MD, FISHRS
Controversies	Russell G. Knudsen, MBBS, FISHRS
Hair's the Question	Sara M. Wasserbauer, MD, FISHRS
Hair Sciences	Vlad Ratushny, MD, PhD
Hear from the Assistants	Marwan Noureldin, MSc
How I Do It	Timothy Carman, MD, FISHRS
Literature Review	Aditya K. Gupta, MD, PhD, FISHRS Nicole E. Rogers, MD, FISHRS
Meeting Review	Rachael Kay, MBChB
World Congress Program Chair	Marie A. Schambach, MD, FISHRS

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).

Copyright © 2021 by the  
*International Society of Hair Restoration Surgery*,  
1932 S. Halsted St., Suite 413  
Chicago, IL 60608 USA

Printed in the USA.



Official Publication of the  
*International Society of Hair Restoration Surgery*