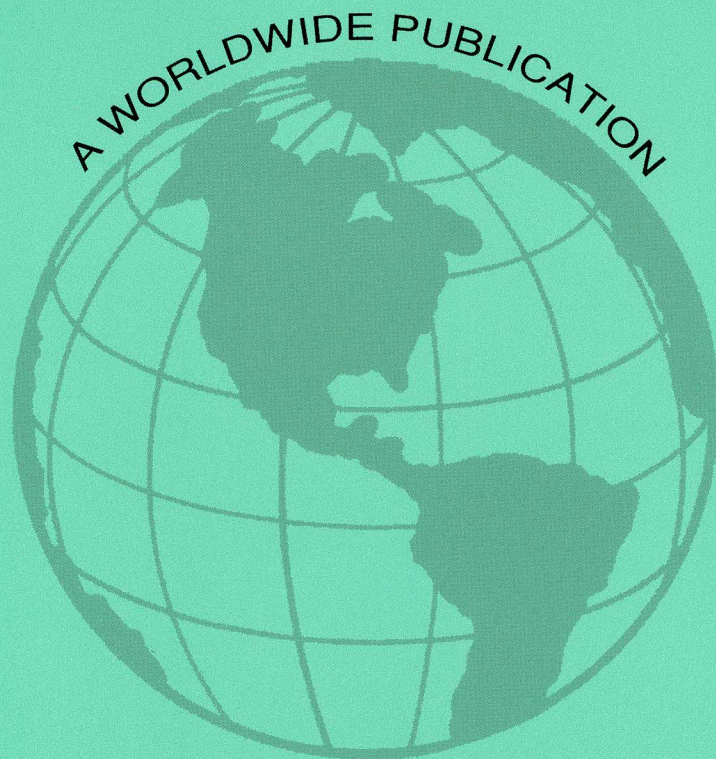


INTERNATIONAL JOURNAL OF AESTHETIC AND RESTORATIVE SURGERY



Official Journal of
The American Academy of Aesthetic and Restorative Surgery
The International Society of Office-Based Anesthesiologists
The American Association of Craniomaxillofacial Surgeons
The American Society of Endoscopic Aesthetic Surgery
Asian Society of Facial Plastic and Aesthetic Surgery
The International Society of Oculoplastic Surgeons
The World Society of Hair Restoration Surgeons
The European Society of Aesthetic Surgery
Philippine Society for Cosmetic Surgery
Japan Society of Aesthetic Surgery
Societe Francaise De Lipoplastie

Volume 4, Number 2

December 1996

4.6.75

Message from the Guest Editor, Zein E. Obagi, MD: The Challenge of Skin Rejuvenation

Skin rejuvenation has never been so popular. New modalities and techniques are continually being introduced and excellent results are being reported. Patient interest continues to grow, and persons who would not have considered undergoing a procedure a few years ago are today becoming serious candidates. Furthermore, this phenomenon is not localized, for I am witnessing the same level of interest in Brazil, Japan, Indonesia, Korea, the Middle East, and Europe as in my own practice in California.

Although I am gratified by the current interest in skin rejuvenation, I am convinced more than ever that no one method is ideal for all patients. Skill in several skin rejuvenation modalities is desirable, if not essential. The physician must be prepared to fit the procedure to the needs of the particular patient, rather than stretching the limits of a single procedure. Involvement in several modalities allows greater control and safety and is more likely to reward both the surgeon and the patient with excellent results.

Regardless of which modality is chosen, both art and science will come into play in skin rejuvenation. A command of the science lays the foundation for the art. The technical aspects of the chosen procedure must first be mastered, including the training necessary for early detection and management of any complications. Artistry is integrated with the science when individual patient factors are taken into consideration, including categorization of skin type, need for preoperative skin conditioning, evaluation of wound healing tendencies, and, for optimal results, the postoperative skin reconditioning regimen.



MODALITY AND OUTCOME

In the correction of damaged or aged skin through a skin rejuvenation procedure, one or more of these mechanisms of action are required:

1. Leveling to correct scars and wrinkles.
2. Skin firming to reverse laxity.
3. Skin thickening to promote new and organized collagen production.
4. Treatment of epidermal or dermal pigmentary disorders.
5. Generation of new and healthy keratinocytes to renew the epidermis.

The capability of different rejuvenation modalities to produce the desired mechanism of action should govern the choice of treatment. Does the particular patient's skin primarily need firming or leveling? Are we dealing with thin skin, in which case laser resurfacing may be the preferred treatment, especially in the upper lip area, or is the skin thicker, in which case a trichloroacetic acid peel may have the edge. If muscle laxity is predominant, a facelift should be considered. If skin texture is also poor, it may be best to combine modalities. When the patient has or is at risk of developing pigmentary problems, an aggressive and prolonged skin conditioning program should be undertaken before any procedure and continued postoperatively. Furthermore, the risk of prolonged erythema after some modalities should be carefully considered, especially in active individuals and in men who often cannot camouflage problem areas with makeup.

COMPLICATIONS AND UNMET EXPECTATIONS

Not unexpectedly, complications such as hypertrophic scars and keloids, demarcation lines, ectropion, infection, pigmentation problems, textural skin changes, as well as unmet patient expectations have increased as skin rejuvenation has become more widespread. These complications usually result from one of the following:

1. Selection of the wrong procedure.
2. Failure to obtain a truly informed consent.
3. Poor perioperative management.

Selection of the appropriate procedure for the patient cannot be overemphasized. Disappointing results can be expected if a facelift is performed on a patient whose predominant problem is skin laxity or if a deep chemical peel or laser resurfacing is performed on a patient with fragile skin. Procedure selection implies that the surgeon has attained sufficient skill in a number of modalities so that he or she is not biased toward selecting the procedure with the greatest "comfort level." This is also known as the "hammer syndrome" where "if the only tool you have is a hammer, everything looks like a nail." Although the learning curve for medium depth peels is steeper than the curve for laser resurfacing, complications are seen in all modalities and can be minimized with good skill and diligent perioperative management. Mastering new techniques, whether they be laser resurfacing, chemical peels,

cosmetic surgery, or a combination of modalities, can be most rewarding to the surgeon and help to avoid the complications that can arise from use of a familiar but inappropriate procedure.

INFORMED CONSENT

The physician's primary concern should be for the patient's safety and preservation of a natural appearance. Prevention of future problems, including skin cancer and dispelling patients' unrealistic expectations, are also of paramount importance.

Potential patients can make a well-informed decision about surgery once they are given the necessary information. This includes a candid presentation of the nature, risks, and effects of the various treatment modalities. The length of the treatment program, cost, and alternatives should be honestly discussed, along with the inconvenience and disruption of lifestyle or ability to return to work. The possibility of prolonged erythema, scarring, infection, or pigmentary changes after any of the modalities should also be indicated.

Informed consent ought to begin with the first patient encounter. Unrealistic expectations cannot be permitted to continue and the physician and patient must reach agreement on what the procedure can be expected to accomplish. Too often an improvement in skin texture and the correction of some scars or wrinkles may indicate success to the physician, whereas the patient may be disappointed because they were expecting an improved total aesthetic look.

For me, the "acid test" for success is patient satisfaction. When a patient who has experienced the cost, results, and inconvenience of a procedure states that they, blessed with the wisdom of hindsight, would still be willing to undergo the procedure, I feel that my work has been successful.

PERIOPERATIVE MANAGEMENT

Perioperative management is also integral to a successful outcome. Proper preconditioning of the skin minimizes complications, especially in patients with fragile skin or those prone to postoperative pigmentary changes. Early intervention in cases of hypertrophic scar formation or pigmentary changes can turn potential disasters into transient inconveniences.

The concept of ongoing maintenance of skin health has received little attention in the dermatology and plastic surgery literature. All skin rejuvenation procedures will produce only temporary improvement unless they are accompanied by an ongoing commitment to skin health. A daily program of topical therapy to promote normal skin function and health can prevent further sun damage and slow down the aging process. Patient reliance on cosmetics for this purpose has been a source of frustration and disappointment, regardless of the claims made by these products.

NOW AND IN THE FUTURE

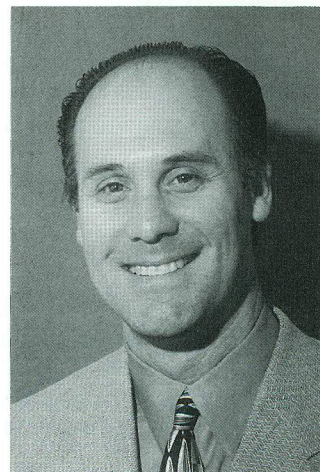
This issue, which is dedicated to skin rejuvenation, carries a wealth of knowledge and experience from physicians all over the world. In conclusion, I urge practitioners to proceed slowly, especially during the learning curve of chemical peels or laser resurfacing. It is far better to have to repeat a procedure because of incomplete results than to face dreadful complications from an overly aggressive approach. There is much to learn in the area of skin rejuvenation. Let us all share our experiences to maximize the benefits and lessen the risk to our patients.

Message from Laurence B. Wiener, MD, Chairman of the International Society of Office-Based Anesthesiologists, A Division of the American Academy of Aesthetic and Restorative Surgery

The transition from the more traditional hospital-based surgical care to alternative and more cost-efficient, office-based surgery continues unabated on an international level. The growth of outpatient surgical procedures since the mid 1980s has been dramatic. Today, more than 60% of the >30 million surgical procedures performed each year in the U.S. are handled on an outpatient basis. By the year 2000 this figure is projected to grow to 80%.

Currently, office-based surgery accounts for approximately 4% of total U.S. outpatient surgical procedures. Office-based surgical procedures have grown rapidly in the past 10 years. More significantly, industry forecasters are projecting that office-based surgery may reach 14% of the total outpatient market by the year 2000. Accordingly, the opportunities and challenges on the horizon for physician anesthesiologists are almost unlimited.

Enthusiasm for an international society committed to the development and nurturing of this new subspecialty has been growing during the past 5 years. The International Society of Office-Based Anesthesiologists (ISOBA) was created in 1995 in response to the demand from anesthesia and surgical colleagues for an organization that is committed to ongoing education and research for office-based anesthesia care.



cosmetic surgery, or a combination of modalities, can be most rewarding to the surgeon and help to avoid the complications that can arise from use of a familiar but inappropriate procedure.

INFORMED CONSENT

The physician's primary concern should be for the patient's safety and preservation of a natural appearance. Prevention of future problems, including skin cancer and dispelling patients' unrealistic expectations, are also of paramount importance.

Potential patients can make a well-informed decision about surgery once they are given the necessary information. This includes a candid presentation of the nature, risks, and effects of the various treatment modalities. The length of the treatment program, cost, and alternatives should be honestly discussed, along with the inconvenience and disruption of lifestyle or ability to return to work. The possibility of prolonged erythema, scarring, infection, or pigmentary changes after any of the modalities should also be indicated.

Informed consent ought to begin with the first patient encounter. Unrealistic expectations cannot be permitted to continue and the physician and patient must reach agreement on what the procedure can be expected to accomplish. Too often an improvement in skin texture and the correction of some scars or wrinkles may indicate success to the physician, whereas the patient may be disappointed because they were expecting an improved total aesthetic look.

For me, the "acid test" for success is patient satisfaction. When a patient who has experienced the cost, results, and inconvenience of a procedure states that they, blessed with the wisdom of hindsight, would still be willing to undergo the procedure, I feel that my work has been successful.

PERIOPERATIVE MANAGEMENT

Perioperative management is also integral to a successful outcome. Proper preconditioning of the skin minimizes complications, especially in patients with fragile skin or those prone to postoperative pigmentary changes. Early intervention in cases of hypertrophic scar formation or pigmentary changes can turn potential disasters into transient inconveniences.

The concept of ongoing maintenance of skin health has received little attention in the dermatology and plastic surgery literature. All skin rejuvenation procedures will produce only temporary improvement unless they are accompanied by an ongoing commitment to skin health. A daily program of topical therapy to promote normal skin function and health can prevent further sun damage and slow down the aging process. Patient reliance on cosmetics for this purpose has been a source of frustration and disappointment, regardless of the claims made by these products.

NOW AND IN THE FUTURE

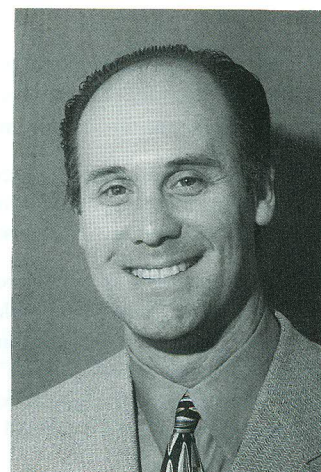
This issue, which is dedicated to skin rejuvenation, carries a wealth of knowledge and experience from physicians all over the world. In conclusion, I urge practitioners to proceed slowly, especially during the learning curve of chemical peels or laser resurfacing. It is far better to have to repeat a procedure because of incomplete results than to face dreadful complications from an overly aggressive approach. There is much to learn in the area of skin rejuvenation. Let us all share our experiences to maximize the benefits and lessen the risk to our patients.

Message from Laurence B. Wiener, MD, Chairman of the International Society of Office-Based Anesthesiologists, A Division of the American Academy of Aesthetic and Restorative Surgery

The transition from the more traditional hospital-based surgical care to alternative and more cost-efficient, office-based surgery continues unabated on an international level. The growth of outpatient surgical procedures since the mid 1980s has been dramatic. Today, more than 60% of the >30 million surgical procedures performed each year in the U.S. are handled on an outpatient basis. By the year 2000 this figure is projected to grow to 80%.

Currently, office-based surgery accounts for approximately 4% of total U.S. outpatient surgical procedures. Office-based surgical procedures have grown rapidly in the past 10 years. More significantly, industry forecasters are projecting that office-based surgery may reach 14% of the total outpatient market by the year 2000. Accordingly, the opportunities and challenges on the horizon for physician anesthesiologists are almost unlimited.

Enthusiasm for an international society committed to the development and nurturing of this new subspecialty has been growing during the past 5 years. The International Society of Office-Based Anesthesiologists (ISOBA) was created in 1995 in response to the demand from anesthesia and surgical colleagues for an organization that is committed to ongoing education and research for office-based anesthesia care.



The mission of ISOBA is:

1. To promulgate through research and community education the philosophy of quality anesthesia care in an office-based setting, which will contribute to its growth as a specialty in the field of anesthesiology.
2. To develop standards and be a proactive voice for corporate and third-party payer agencies.
3. To promote legislative advocacy in the field of office-based anesthesia.
4. To support, encourage, and participate in the development of guidelines of postgraduate education for qualification as a specialist in the field of office-based anesthesia.
5. To develop residency training rotations with accredited anesthesiology programs to better prepare future anesthesiologists for their role in office-based anesthesia.
6. To publish information for the public, the medical profession, and third-party payers concerning the role of office-based anesthesia services.
7. To collect data from all office-based anesthetics to help in outcomes research in the field of office-based anesthesia care.

I have chosen Dr. Barry Friedberg from Newport Beach, CA, as the Vice-Chairman for ISOBA. Dr. Friedberg brings unparalleled clinical and business acumen to the Society. He is known internationally for his "Propofol & Ketamine Office-Based Anesthesia Technique" that he has perfected over the past 8 years. The Board of Advisors for ISOBA is comprised of an international group of anesthesiologists that will bring multicountry experience to this evolving specialty. ISOBA is currently planning its first membership meeting in Chicago for October 1997. This is sure to be a gala event with an opportunity to meet anesthesia and surgical colleagues committed to the field of office-based surgery and anesthesia on an international level. I look forward to seeing everyone at this inaugural meeting.

The International Journal of Aesthetic and Restorative Surgery, the official publication for ISOBA, has committed an entire issue dedicated to office-based anesthesia. This will be an opportunity for anesthesia colleagues internationally to share their clinical experiences. Please send your manuscripts to Laurence B. Wiener, MD, 21 Canter Drive, Newtown Square, PA 19073 (Tel: 1-888-OBANET 1, Fax: 610-359-9152) or E-mail gazzler@chesco.com. In addition, The American Board of Office-Based Anesthesiologists has been created to serve as a credentialing body for office-based anesthesiologists. Governmental agencies and third-party payers are demanding the highest quality of services in the office and this certification will provide a mechanism to ensure the highest standards are met.

There is much excitement and support among anesthesia colleagues worldwide to join together in this burgeoning new subspecialty. Please join us as a member of our new Society as we move closer to the millennium. I welcome everyone to consider membership in ISOBA. Your support and participation will be important in making ISOBA a major force in our rapidly expanding subspecialty. I invite you to visit our website at <http://www.obaamerica.com>.

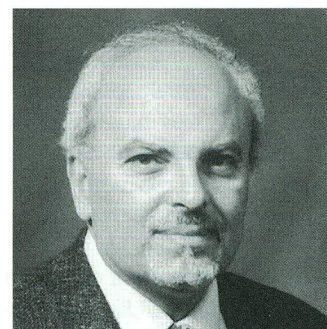
*Message from Anthony Erian, MD, FRCS (Eng),
Chairman of the European Society of Aesthetic Surgery,
Division of the American Academy of Aesthetic and Restorative Surgery*

I would like to thank the American Academy of Aesthetic and Restorative Surgery for formally recognizing the European Society of Aesthetic Surgery to help establish a firm relationship between American and European Cosmetic Surgeons.

Our goal and philosophy is to improve the quality of the art of cosmetic surgery. We will stress training with the establishment of clinical training programs and workshops. This Society has affiliations in most European countries and will unite a multidisciplinary approach for surgeons sharing the same interest in aesthetic surgery.

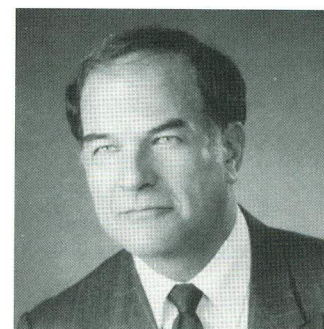
The headquarters of this Society will be in Cambridge, England, at the Cambridge Private Hospital, Cambridge Road, New Wimpole, Cambs SG8 5QP England. My vice-chairman is Dr. Ziya Saylan of Dusseldorf, who has been a great help in organizing the Society. He is a tireless worker and with his help we will move this Division forward.

I am currently working with the French Lipoplastie Society to do a joint world symposium in Paris in 1998. I urge all our European readers of the Journal to contact me to join this new and exciting and forward-moving Division of the AAARS.



Message from Larry Schoenrock, MD, FACS, Future Guest Editor

This is a call for papers for a forthcoming issue devoted to aesthetic and restorative laser surgery. All individuals who have extensive experience in laser aesthetic and restorative surgery are encouraged to submit papers for this landmark issue, which will cover the most contemporary attitudes and treatment protocols. This issue will not feature individual lasers, but rather will be devoted to overall concepts of research, therapy, avoidance of complications, and complications. Individuals who have already submitted papers include Susan Kilmer, Mitch Goldman, Greg Chernoff, Bryan Rubach, Angelo Rapucci, Mark Oyama, Todd Andrews, and David Apfelberg. I encourage you personally to submit your papers so that you may be included with these stellar contributors for this significant issue of the *International Journal of Aesthetic and Restorative Surgery* on lasers.

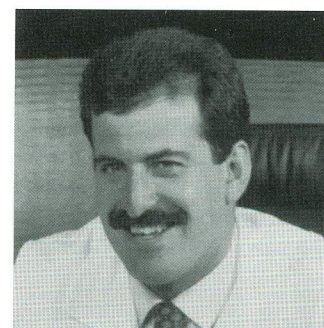


Message from Matt L. Leavitt, DO, Chairman of the World Association of Hair Restoration Surgery, Division of the American Academy of Aesthetic and Restorative Surgery

This past year has seen the hair restoration field evolve into a new level of sophistication. It has been a challenging but stimulating time for us all.

On the scientific side, there have been refinements in techniques and new technologies. The video microscope (which permits microscopic examination of follicular patterns) and the dissecting microscope have been exciting introductions in instrumentation. In terms of social awareness, hair transplantation has become an accepted procedure for men and women alike in greater numbers. However, heightened awareness has brought increased scrutiny from the press and public into the problems and practices of this aspect of medicine.

In response to this new growth phase and the entry of increasing numbers of physicians into the field, the American Board of Hair Restoration was formed this year. The Board, comprised of many of the foremost hair transplant surgeons in the world, is an international medical credentialing body—not affiliated with any organization or sponsoring party. Its charter is threefold: 1) establish the basic criteria for certification in hair transplantation, 2) develop the process for certification, and 3) institute the examination by 1998. Drs. Arnold, Friedman, and Frechet of the World Association of Hair Restoration Surgery (WAHRS) have been selected for this Board and it is my privilege to be a Vice President of the group.



The WAHRS is delighted to announce that James Arnold, MD, has been selected as Vice Chairman of the organization. Dr. Arnold is currently in private practice in California but is perhaps best known for his expertise and innovative instrumentation in the field. He will work with me on administration in the organization and will work with Dr. Patrick Frechet, Chairman Europe, and Dr. Marcelo Gandelman, Chairman Latin America, in the international arena.

The year 1996 also saw the WAHRS's second annual Live Workshop, which received plaudits from participants and faculty alike. The Hair Transplant Forum published an in-depth article on the event, reporting it as a dramatic success and called it "the most intense learning experience they have encountered." By request, the WAHRS will hold two workshops in 1997. The first, April 23–27 in Orlando, will be designed for the "advanced" hair transplant surgeon, whereas the second, November 20–23 in Guadalajara, will be structured for all levels of surgeon. Both programs will feature a range of techniques, an international faculty, and a comprehensive curriculum.

The first hair transplantation issue of the *International Journal of Aesthetic and Restorative Surgery* received excellent reviews from the Hair Transplant Forum. Dr. Richard Shiell, Editor of the Forum, began the review by indicating that for the beginning hair restoration surgeon "it is probably the book of choice." He completed his remarks with "this book is a good 'refresher' for the experienced hair surgeon and invaluable for the beginner." Looking forward to December 1997, there will be a second hair transplant edition of the *International Journal of Aesthetic and Restorative Surgery*, which will be planned for a more advanced level. I would welcome any interesting manuscripts for publication.

Chemical Face Peeling: Eight Years' Experience

ALBERTO M.L. CALDEIRA, PUC/RJ, FICS, FISAPS,¹ AND ALFONSO LUCAS, MD²

ABSTRACT: We present our experience with keratolytic and protein coagulant products for chemical peeling. They agree with the current trend of a less aggressive and endangering treatment by using atoxic substances that provide more effective control of the depth attained. Based on the clinical evaluation of the depth of the lesions to be corrected and aiming at a secure and efficient chemical peeling, they associate different products in reduced concentrations that are gradually increased and repeat the procedure as many times as necessary. The 756 procedures in 297 patients were conducted between March 1988 and March 1996 by the senior author. The final analysis of this group showed a 99% improvement rate and patient satisfaction and a scarring complication rate of 0.528%. It has been demonstrated that chemical face peeling is a simple, quick, safe, and low cost treatment, provided the basic principles of careful planning and adequate selection of patients and materials used are taken in account.

Key Words: *Skin alterations, Superficial, Medium, and Deep peeling, Rejuvenation*

We use highly keratolytic or coagulant agents for chemical peeling. Materials such as trichloroacetic acid (TCA), phenol, and pyruvic or glycolic acid in high concentrations promote lyse of the skin layers.

Together with scab formation, exfoliation, and parallel epidermis regeneration and reorganization, proliferation of collagen bundles takes place, clinically translated into a sequence. The newly restored skin presents a much younger aspect, the surface becomes smoother without fine wrinkles, with significant improvement of the deeper wrinkles, and has higher epidermal hydration and restored elasticity.

The aesthetic result does not depend on the solution applied, per se, but the depth reached during treatment is what will determine the quality and duration of the final result.¹ Therefore, the most important preoperative task is to define the alterations level to be treated and consequently select the most adequate agents.

There are four factors that determine the depth to be reached by the different solutions:

1. The physicochemical characteristics of the solution (i.e., the keratolytic effect over the protein coagulant action). Alpha-hydroxy acids (AHAs) in high concentrations are keratolytic,^{2,3} whereas TCA coagulates skin proteins.⁴
2. Concentration during treatment. Higher concentrations will reach deeper levels in most cases. Full strength 88% phenol allegedly causes immediate coagulation of epidermal keratin proteins and blocks further penetration of phenol.^{5,6} At the same time diluted phenol is of prolonged action and therefore of deeper penetration.
3. Number and duration of peelings.^{7,8}
4. Skin conditions before treatment.

Besides these basic factors, many others may alter the depth and consequent result. Close attention is obligatory and indispensable during treatment, including pre- and postoperative sessions, to avoid possible complications such as scar formation.

Nowadays chemical peelings performed in the physician's office or in an operating room is divided in three groups according to the level to be reached. The first group, superficial, reaches and destroys the stratum corneum down to the papillary dermal zone (superficial peeling). The second (medium peeling) destroys from the stratum corneum to the upper reticular dermal zone. The third group, of deeper action, reaches the intermediary reticular dermal zone (deep peeling).⁹

¹Cirurgia Plástica e Reconstructora, Rio de Janeiro.

²Carlos Chagas Postgraduation Medical Institute, Rio de Janeiro.

Address correspondence and reprint requests to: Alberto M.L. Caldeira, MD, R. Visconde de Pirajá, 414, 508, 22410-002 Rio de Janeiro, RJ.

Table 1. Distribution According to Age Group

Age (years)	Sex		Total	%
	M	F		
11–20		3	3	0.99
21–30	2	8	10	3.31
31–40	4	60	64	21.19
41–50	6	138	144	47.68
51–60	13	68	81	26.83
Total	25	277	302	100

MATERIALS AND METHODS

This study presents a retrospective study of 302 patients treated by the senior author with chemical peeling from March 1988 to March 1996. The age range was between 11 and 60 years (average 44.6 years) and was comprised of 277 females and 25 males (Table 1).

The following keratolytic and protein coagulant solutions were used: high concentrations of AHA (70%), TCA (10–50%), phenol (88%), alphaketoacid (pyruvic acid, 50%), resorcinol, and salicylic acid.

Superficial peeling

AHA	70% concentration
TCA	between 10 and 25% concentration (very mild)
	30% nonocclusive (mild)
Resorcinol	40%
Jessner’s solution	14 g resorcinol
	14 g salicylic acid
	14 cc lactic acid at 85%
	100 cc ethanol at 95%

Considering the action level of a superficial peeling, it is necessary a selection of the solutions to be used. AHAs are currently the most popular acids. The order of preference: glycolic acid in a concentration of 40–70%, lactic or mandelic acid, or benzilic or malic acid at 5–10%. The formula we prefer is a solution of tap water, ethanol, and glycol propylene in a 4:4:2 proportion.

AHAs were used to treat acute acne. Fine and superficial wrinkles were treated mostly with TCA, as well as pigmentation abnormalities.

Medium peeling

TCA	between 30–40% concentration
TCA + CO ₂ snow	nonocclusive
TCA + glycolic acid	nonocclusive
TCA + Jessner’s solution	nonocclusive
Phenol 88%	nonocclusive

To obtain a medium peeling the depth to be reached by the agents must be increased. Protein coagulant solutions can

therefore be chosen because they are more invasive than keratolytic agents. Another possibility is to increase the concentration. However, a less diluted phenol (50%) produces a deeper peeling.^{5,6,10} The third and most popular process among physicians is to combine and associate different products in one single solution or in subsequent applications.

The main objective of a medium peeling is destruction of tissues down to the superior dermal reticular layer, which allows correction of more severe actinic keratoses, notable wrinkles, pigment alterations, and even superficial scars.

Deep peeling

TCA 50%	nonocclusive
	occlusive
Litton’s formula	3 ml of phenol at 88%
	8 dps glycerin
	3 dps Croton oil
	2 ml distilled water
Baker’s, Brown’s, or Gordon’s formula	3 ml phenol at 88%
	8 dps septisol
	3 dps Croton oil
	2 ml distilled water

We use products that are highly irritant and hazardous for deep peelings. Preoperative preparations must be the same as for a major surgical procedure. We perform deep peelings in an operating room with the assistance of an anesthesiologist, because in most cases sedation or anesthesia is inevitable. When using phenol, especially over an area larger than one face unit, use of a cardiac monitor is absolutely necessary.¹¹ A periphery vein should be available for infusion and to help microcirculation of organs, especially the kidneys.

Croton oil, the solution additive, is an irritant agent, produces inflammation, and destroys collagen, which helps the penetration of phenol. Septisol decreases superficial tension even on degreased skin and also helps the penetration of phenol.

Deep peeling was used to treat marked wrinkles caused by the aging process and sun exposure and also for unaesthetic scars.

RESULTS

Superficial peeling (Table 2)

A greater efficiency is obtained from 5-fluorouracyl (5-FU) when it is used with glycolic acid to treat actinic keratosis or for

Table 2. Superficial Peeling

Materials	Procedures
Glycolic acid	409
Resorcinol at 40%	129
TCA at 30%	92

Patients, n = 176; procedures, n = 630.



Figure 1. A and B: 43-year-old patient with diffuse dermatohelioses with discrete dysplastic areas on the nasogenian area. Underwent successive peels with glycolic acid (70%) every 15 days, showing good and improved general skin conditions and decreased dysplastic areas.

wart removal, with a lower concentration of 5-FU (up to 0.5–1.0%). When 5-FU is applied after the acid its pH is neutralized, which relieves the burning sensation.

Pigment abnormalities on the dermal superficial layer benefit from the association of chemical peeling to depigmentation and clearing products because the peeling aids chemical penetration and further enhances the effects.

No photosensitivity secondary effects were observed with the use of glycolic acid (Fig. 1).

The primary effect of TCA is epidermal and dermal protein coagulation. This agent treats fine and superficial wrinkles efficiently. It can be used with tretinoin, 5-FU, phenol, dry ice, and mechanical dermabrasion as an office procedure. The depth reached is easily controlled by the noticeable white clot, the “frosting effect.” No signs of toxicity were observed. We consider TCA a good peel product.

Currently, we do not use Jessner’s solution for various motives because it is necessary to decrease the area to be treated to a single face unit to avoid toxic effects. Salicylic acid presents such a slow effect that it may lead to systemic toxicity. There are reports of salicylism with resultant death.

Resorcinol is another keratolytic agent at a 20–50% concentration. But when applied in large surfaces its process spreads over the entire body and causes vasodilation, which can result in orthostatic hypotension and ECG alterations such as hypothermia. Prolonged treatment can lead to toxicity manifested by methemoglobinemia, tremors, or allergy manifestation. We recommend substituting it for a less toxic agent.

Medium peeling (Table 3)

The use of solid dioxide carbon (dry ice) with TCA in a 30–35% concentration aids in the penetration of the main agent. CO₂ snow produces freezing over the site and results in slight epidermolysis. As it increases the peel depth action, the agent used in this concentration as a product for superficial peeling becomes one of medium effect. This combination showed excellent results for treating unaesthetic face scars, because a solid material dry ice was easier to apply on limited areas.

The treatment primarily used was a mixture of AHAs (especially glycolic acid) and TCA at a 30–50% concentration. AHAs create the conditions for TCA penetration, help the regeneration process, and accelerate neoepidermis formation. Therefore, AHAs promote major pre- and postoperation benefits (Fig. 2).

Deep peeling (Table 4)

Phenol is more invasive in a 50% concentration than at 88% because of its keratolytic effect compared with the keratocoagu-

lant effect, reaching and promoting total destruction of the superior half of the reticular dermis. In addition to correcting intense actinic alterations, treating more prominent wrinkles, and improving scars, it is also effective on certain basocellular carcinomas (Fig. 3).

A more positive effect was achieved by changing the application method. The agent was applied in several layers instead of increasing the concentration. This will produce a uniform mechanism of action and provide a controlled depth penetration by that concentration, which decreases the risk of complications.

As previously stated, the dressing also alters the action of the agent used. The 48 hours of occlusive dressing with adhesive tape or rubber cement will prolong the effect over the surface and creates a highly humid environment, thus helping penetration of the peeling solution.

COMPLICATIONS

Scarring is the most feared complication in chemical peeling, although fortunately it does not occur frequently. Scars are obviously the result of medium and deep peelings. The greater the depth reached, the greater the possibility of encountering this problem. Perioral and periorbitary areas have the highest rates of scarring because of facial movements. One of the ways to prevent this is to keep the patient on a liquid diet during the first postpeeling days (days 5–7) to avoid mastication and mimicry.

The incidence of scarring can be decreased by acting instantly in cases of onset of erythema, oedema, and persistent tissular induration. Immediate treatment with steroid ointment or adhesive tape moistened with steroids should begin.

We observed three cases of scarring during our experience. Two incidences of scarring occurred after glycolic acid peeling at 70% concentration, appearing as small cicatricial areas. Both cases were treated with TCA at 35% 2 months later. The third case involved an upper lip hypertrophic scar after deep peeling with phenol. After steroid treatment the patient underwent another less invasive peeling with satisfactory results.

Infection is a dangerous complication that can also result in scarring. In cases of superficial peelings, skin dryness and small fissures lead to bacteria penetration. However, this is easily controlled with hydrating products and antibiotic ointments. In deep peelings the formation of crusts furnishes a perfect bed for germ proliferation; the solution is antibiotics and a thorough cleaning of the area.

Pain and prurigo on the perioral area after days 5–6 postpeeling could mean herpes zoster. Until proved contrary, the patient should be treated with acyclovir. If the patient has a previous history of herpes, it is prudent to pretreat with acyclovir on the day before the peeling and continue the medication during 5 postoperative days.

We did not detect any cases of infection probably because of the routine use of topical and systemic antibiotics.

Table 3. Medium Peeling

Materials	Procedures
TCA at 40%	41
Glycolic acid at 70% + TCA at 30%	37
Jessner’s solution + TCA at 30%	20

Procedures, n = 98.



Figure 2. A: Patient in her late 70s with cervicofacial flaccidity and photo-induced skin alterations. Underwent chemical dermabrasion with TCA at 45% on the face and 35% on the neck 8 months after a facial rejuvenation operation. B: Postoperative view showing reversal of the cervicofacial skin aging process.



Table 4. Deep Peeling

Materials	Procedures
TCA at 45% on face TCA at 30% on neck	12
Phenol at 50% on face TCA at 30% on neck	9
Phenol at 50% on face	7

Procedures, n = 28.

A third major complication is change of skin color, hyperpigmentation or hypopigmentation, or persistent postinflammatory erythema.¹²⁻¹⁴ Areas of hypopigmentation are best left alone and wait for time to pass. The patients can use makeup until color returns to normal. Controlling any inflammatory process with a strong medication such as steroids is indispensable to avoid postinflammatory erythema to settle in.

A hyperpigmentation episode after TCA peeling at 45% was observed, which according to the patient occurred for lack of sunscreen protection, which was recommended. The blotches disappeared with daily use of a bleaching cream containing hydroquinone. Among the various formulas available we consider the best solution to be Retin-A acid at 0.1%, hydroquinone at 4.0%, and triamcinolone at 0.1% concentration.

A complication specific to phenol is arrhythmia during the peeling. According to Brody,¹⁴ the incidence can reach up to 20% in cases of rapid panfacial treatment. Brody himself offers the solution: to divide the face into 5-8 segments and apply phenol in 10- to 20-minute intervals.

Millia formation, skin dryness, prurigo, or flushing were not considered complications because they do not compromise final results. All resolved on their own with no treatment.

DISCUSSION

Chemical peeling can present complications in the office as well as in the operating room. But contrary to what many professionals believe, chemical peelings, especially deep peelings, are no more dangerous and present similar risks as those of a facial rejuvenation operation. To apply highly caustic solutions on the face of a patient is as delicate as a surgical incision with a knife. Even so, our results showed that with a well-studied methodology the situation is not as formidable. The low number of complications was treated posteriorly with excellent results.

We believe that superficial, medium, and deep chemical peeling that undergoes meticulous planning (accurate evaluation of the depth to be reached, adequate selection of patients, adequate agent selection, manner and number of applications, and type of dressing) is a very simple, rapid, and low cost treatment and in the hands of any experienced professional does not constitute any eminent danger to patients looking for a solution for their aesthetic problems.

Phenol is one of the most commonly used agents and also the most discussed in relation to untoward secondary effects. Since being first applied by Baker in 1961, many problems have been seen regarding the use of phenol as a peeling agent. Its cancerigenic and toxic effects are well known to physicians, but

as reported by Litton¹⁵ the maximum phenol level that should reach the blood stream during a panfacial peel is only 1%, a level (inferior) already measured in a patient that survived phenol intake intoxication.

Toxic shock has also been mentioned in the world literature.¹² One case among millions decreases the reality of this complication. Evaluation of the arrhythmia rate during phenol peelings has been different in most studies, varying between 1 and 23%. As suggested by Brody, phenol applied on small alternate areas at intervening periods will not pose any problem. Maybe all of these controversial aspects are the main cause of phenol progressively losing its importance.

Now we prefer occlusive dressings with vaseline after deep phenol peelings instead of adhesive tape. This is safer because the treated skin is more visible and allows control and early detection of complications. Vaseline also avoids evaporation and thus increases the effect of phenol.¹⁶

During our experience we were partial to TCA peeling. One primary characteristic is that the concentration used can be adapted so that the depth to be reached can be changed according to the level of the pathology to be treated.^{4,6,17,18} The first treatment can be conducted with a less concentrated formula and the number of applications and potency of the agent are gradually increased before correcting complications resulting from a too strong formula. Because we have not used TCA in concentrations over 45%, however, we have never encountered any hypertrophic scars. On the contrary, we have had success with no systemic toxicity, no allergic reactions, or cardiovascular alterations. We have been using it widely even in patients with other kinds of health problems. We have also noticed that recovery time is less than after phenol peelings. Besides this, low concentration TCA (10-20%) has a conditioning effect (i.e., bleaching effect) and provides a certain improvement to hyperpigmented blemishes. In conclusion, TCA treatment is quick, easy to control, usually with no complications, can be applied repeatedly, even weekly, and can be used with Retin-A or lactic acid for results even more satisfactory.

After noting the effects of AHAs, the use with other products have increased even more. For instance, glycolic acid at 70% concentration is an excellent solution for superficial peeling but when used with more invasive agents it prepares the skin and aids penetration of the main agent, balancing the effect of the different parts treated and guaranteeing a more uniform final result.^{2,3,6,17,19}

In search of a new and effective formula with no important complications, we began to use pyruvic acid at 50% in selected cases, which corresponds to a medium depth peeling. Up to now we have not seen any undesirable secondary effects such as toxicity, cancerigenity, or allergic reactions. Note that its characteristics are similar to phenol (i.e., an agent more invasive at 50% than in the concentrated form). Pyruvic acid treatment has provided excellent results in skin rejuvenation.

CONCLUSION

After 568 procedures during 6 years we concluded that chemical peeling is a treatment that is simple, rapid, and can be

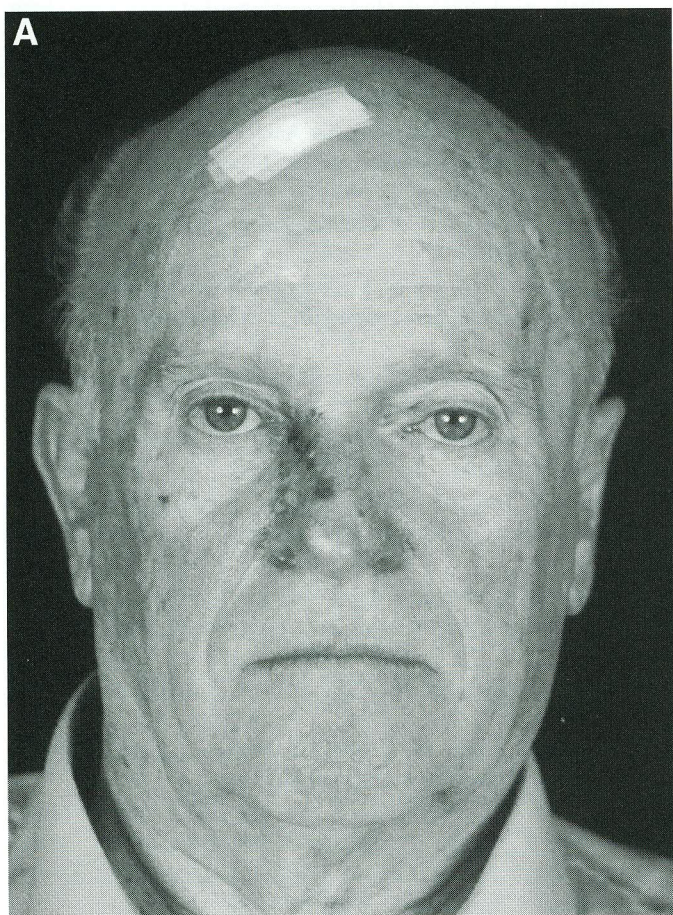
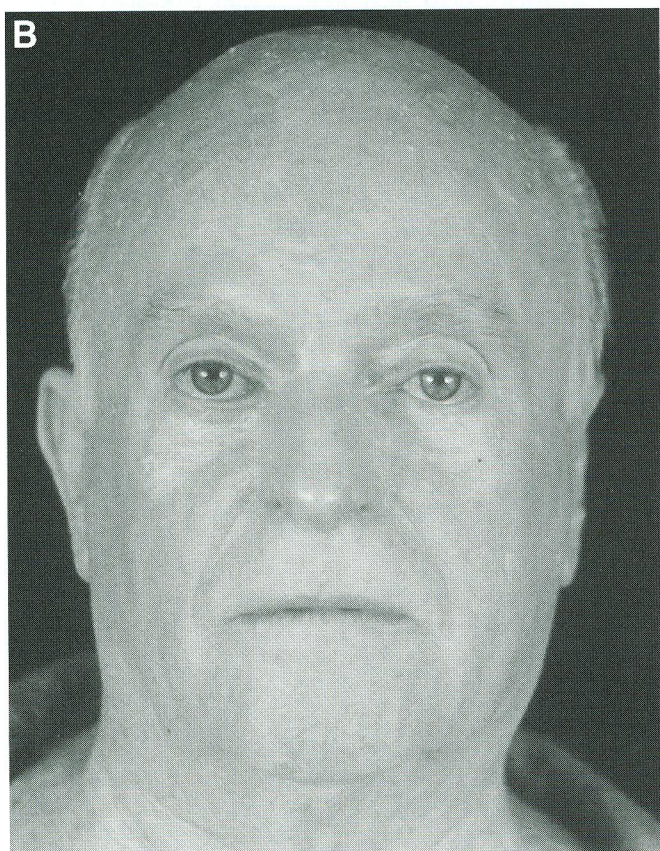


Figure 3. A and B: 78-year-old patient presenting nose basocellular epithelioma and important degenerative face skin process. Treated by reconstruction of all the nasal skin coverage by skin expander and subsequent treatment with phenol at 55% on the face and 30% on the neck. B: Note the new overall skin aspect.



repetitional (except for deep peeling) for a cost lower than a rejuvenation facial surgery, an important detail for the patients. In addition, when conducted with a proper selection of patients, accurate evaluation of the alterations to be treated, and use of less toxic formulas that can be used in a repeated manner and/or by gradual concentration increase, chemical peeling does not present any major risks or undue complications. We believe that chemical peeling is a valuable and indispensable arsenal in the hands of physicians working against the changes caused by the skin's aging process.

Chemical peeling is most beneficial in white patients with fine, light skin and gradual degrees of photo-induced aging.

Chemical rejuvenation is no substitute for facial rejuvenation surgery because the latter aims at restoration of the superficial and deep face segments (i.e., deep treatment of the skin and musculoaponeurotic structures). However, chemical peeling of the face complements and reevaluates the results of a facial rejuvenation operation.

REFERENCES

1. Brody HJ: In Chemical Peeling. St. Louis, Mosby-Yearbook, 1992, 67.
2. Moy LS, Moy R, Murad H: Use of alpha hydroxy acids. *Cosmet. Dermatol.* 1990; 3:32-34.
3. Van Scott EJ, Yu RJ: Alpha hydroxy acids: therapeutic potentials. *Can. J. Dermatol.* 1989; 1:
4. Rubin MG: Trichloroacetic acid and other non-phenol peels. *Clin. Plast. Surg.* 1992; 19:525-536.
5. Baker TJ, Gordon HL: Chemical face peel with phenol. In *Surgical Rejuvenation of the Face*. Baker G, ed. St. Louis, Mosby, 1986; 37-100.
6. Brody HJ: Update in chemical peeling. *Perspect. Plast. Surg.* 1993; 7:127-141.
7. Brody HJ: Variations and comparisons in medium-depth chemical peel. *J. Dermatol. Surg. Oncol.* 1989; 15:953-963.
8. Rubin MG: Multiple Glycolic Acid Peels of the Chest. Presented at the American Academy of Dermatology Chemical Peeling Symposium, Dallas, December 1991.
9. Brody HJ: The art of chemical peeling. *J. Dermatol. Surg. Oncol.* 1989; 15:918-921.
10. Brody HJ, Hailey CW: Medium depth peeling of the skin: a variation of superficial chemosurgery. *J. Dermatol. Surg. Oncol.* 1986; 12:1268-1274.
11. Price NM: EKG changes in relationship to the chemical peel. *J. Dermatol. Surg. Oncol.* 1990; 16:37-42.
12. Kotler R: A discussion with Thomas J. Baker, MD. In *Chemical Rejuvenation of the Face*. St. Louis, Mosby-Yearbook, 1992.
13. Litton C, Trinidad G: Complications of chemical face peeling as evaluated by a questionnaire. *Plast. Reconstr. Surg.* 1981; 67:738-744.
14. Brody HJ: Complications of chemical peeling: a variation of superficial chemosurgery. *J. Dermatol. Surg. Oncol.* 1989; 15:1010-1019.
15. Litton C: Chemical face lifting. *Plast. Reconstr. Surg.* 1962; 29:80.
16. Stuzin JM, Baker TJ, Gordon HL: Chemical peel: a change in the routine. *Ann. Plast. Surg.* 1989; 23:166-169.
17. Monheit GD: The Jessner's + TCA peel: a medium-depth chemical peel. *J. Dermatol. Surg. Oncol.* 1989; 15:945-950.
18. Coleman WP, Futrell JM: The glycolic acid trichloroacetic acid peel. *J. Dermatol. Surg. Oncol.* 1994; 20:76-80.
19. Van Scott EJ, Yu RJ: Alpha hydroxy acids: procedures for use in clinical practice. *Cutis* 1989; 43:222-228.

4.6.75