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# A split-face comparative study between two phenol-based peelings (Baker-Gordon and Hetter formulas) in the treatment of facial rhytids

*Estudo comparativo de hemifaces entre 2 peelings de fenol (fórmulas de Baker-Gordon e de Hetter), para a correção de ríttides faciais*

**ABSTRACT**

**Introduction:** Aging is considered to be a set of inevitable and irreversible physiological changes. Several techniques have been used with the aim of slowing down and even reversing this process.

**Objective:** To compare the efficacy and local side effects of two phenol-based formulas: the Baker-Gordon formula and the Hetter formula.

**Methods:** Seven patients were included in a split-face comparative study. The Baker-Gordon and the Hetter formulas were applied on the right and left facial sides respectively. The pain felt during the procedure and intensity of clinical changes in the period following the peeling were measured through a 3 degrees subjective scale, for each side of the face. The clinic results after 6 months were evaluated by patients and the doctor Who performed the procedures.

**Results:** The pain intensity during the procedure was equivalent for both formulas. With the Hetter's formula the skin's integrity was restored more quickly and the undesirable effects were of lower intensity. Regarding the final clinical results two patients preferred the Baker-Gordon formula, one gave preference to the Hetter's formula and for 4 patients the results were unconcerned. In the medical evaluation, 5 patients had similar results on both facial sides, while 2 presented better clinical results with each formula, respectively.

**Conclusion:** The Gordon-Baker and the Hetter formulas are equivalent for the treatment of facial rhytids

**Keywords:** phenol; aging; skin aging; treatment outcome.

**RESUMO**

**Introdução:** O envelhecimento é um conjunto de alterações fisiológicas inevitáveis e irreversíveis. No intuito de retardar e até de reverter esse processo, várias técnicas têm sido utilizadas.

**Objetivo:** Comparar eficácia e efeitos colaterais locais de duas fórmulas que utilizam o fenol: Baker-Gordon e Hetter.

**Métodos:** Sete pacientes foram incluídas neste estudo comparativo onde, na hemiface direita utilizou-se a fórmula de Baker Gordon e na esquerda, a de Hetter. As avaliações da intensidade da dor durante a aplicação e dos sinais clínicos do desconforto nos dias subsequentes foram feitas através de escala subjetiva de três níveis para cada lado da face. A avaliação dos resultados clínicos após 6 meses, foi feita pelas pacientes e pelo médico aplicador.

**Resultados:** A intensidade da dor durante a aplicação foi equivalente em ambas as fórmulas. Com a fórmula de Hetter, a integridade da pele foi mais rapidamente restabelecida e os efeitos indesejados foram de menor intensidade. Quanto aos resultados clínicos finais, 2 pacientes preferiram a fórmula de Baker-Gordon, 1 a de Hetter enquanto para 4 o resultado foi indiferente. O médico avaliador julgou que 5 pacientes tiveram resultados semelhantes em ambas as hemi-faces, enquanto 2 apresentaram melhor avaliação com cada uma das fórmulas respectivamente.

**Conclusão:** As formulações se equivalem no tratamento de ríttides faciais.

**Palavras-chave:** fenol; envelhecimento; envelhecimento da pele; resultado de tratamento.

## INTRODUCTION

Aging corresponds to a set of inevitable and irreversible physiological changes that affects the entire body, including the skin. The aging process occurs either due to genetic reasons, hormonal changes (intrinsic aging), or to environmental influence such as sunlight, wind, humidity, skin diseases, smoking, alcohol, and food (extrinsic aging).

Cutaneous aging resulting from exposure to sunlight is known as photoaging and leads to the degeneration of collagen and elastic fibers, the appearance of pigmented spots, and the occurrence of pre-malignant or malignant lesions. Ultraviolet radiation promotes the formation of free radicals, increasing the number of unrepaired oxidative reactions, which alter the metabolism and are responsible for premature aging, leading to an increased risk of developing skin cancer.<sup>1-5</sup>

Rejuvenation techniques have been improving not only due to technological advances, but also due to the population's concern with personal health and physical appearance, as well as a desire for greater longevity.<sup>5</sup>

Chemical peeling is also called chemical resurfacing, chemexfoliation, and chemosurgery, and involves the application of one or more caustic agents on the skin, producing the controlled destruction of the epidermis and dermis, which is followed by re-epithelialization. Its popularity is due to the effect of an improved appearance of the damaged skin by intrinsic and extrinsic factors, in addition to residual scars.<sup>5,6,7</sup>

The cosmetic use of phenol began in 1882, with the German dermatologist P. G. Unna, who used it to treat acne scars. However, it was during the First World War (when it began to be used to treat facial scars caused by gunpowder) that its use became widespread.<sup>1</sup>

In 1950, Thomas Baker began his research with phenol to treat facial wrinkles, publishing his classic formulation, along with Gordon, in 1962.<sup>8</sup> The Baker-Gordon formula had its effectiveness proven by several authors in the treatment of moderate to severe actinic wrinkles,<sup>8-10</sup> with excellent aesthetic results. Nevertheless, phenol's systemic toxicity, in addition to undesirable local effects such as hypo and hyperchromies, delimitation lines and delayed re-epithelialization, are factors that limit its use.

Aiming at obtaining a deep peel—which could treat facial rhytids with the same effectiveness—while at the same time trying to reduce local complications, the Canadian plastic surgeon Gregory Hetter started his experiments in 2000 using the Baker's formula's components, however in different concen-

trations. He then published a new formulation—bearing his name—which, according to his studies, can reduce the incidence of undesirable local effects and reduce recovery time while maintaining cosmetic results. To that end, the Hetter formula proposes reducing the 50% concentration of phenol used by Baker to 33% (Table 1). According to Hetter, phenol in this concentration still produces a deep peel because it is combined with agents that increase its penetration through the epidermis and dermis.<sup>11-14</sup>

In the present study, the authors compared the use of a new formulation proposed by Hetter with the classic Baker-Gordon formula—taking into account local side effects, recovery time, discomfort in the period after the peeling and final cosmetic result—in the treatment of facial rhytids.

## METHODS

A prospective, longitudinal, and comparative study was carried out in hemifaces, using the Baker-Gordon formula on the right side and the Hetter formula on the left side. Seven female volunteers were selected from the Corrective Dermatology Sector of the Hospital Pedro Ernesto (Rio de Janeiro, Brazil), between July 2006 and January 2007. The volunteers had ages ranging from 40-55 years (mean = 49 years), Fitzpatrick phototypes grades I to III (Table 2), facial wrinkles (with emphasis in the perioral and periorbital regions), and no history of previous treatment. Exclusion criteria included liver, kidney, heart, or autoimmune diseases; active or recurrent herpes simplex in the face; allergy to any material or medication used in the study, and a history of keloid scarring.

All patients were screened with laboratory tests (liver and renal function tests, electrolytes serum dosage and electrocardiogram), and underwent skin preparation and prophylaxis for herpes simplex.

The preparation of the skin began at least 15 days before the procedure with the daily use of SPF 30 physical filter and cream containing 0.05% retinoic acid, 4% hydroquinone and 0.01% fluocinolone acetonide during the night. Prophylaxis for herpes simplex was performed with 400 mg acyclovir three times a day, starting two days before and kept up until two days after the procedure.

After the initial photographic record with a Canon PowerShot A650 IS camera, the Baker-Gordon formula was applied in the right hemiface and the Hetter formula on the left hemiface.

TABLE 1: Baker and Hetter peelings formulations

Baker-Gordon formula		Hetter formula	
88% Phenol	3ml (50%)	88% Phenol	4ml (33%)
Distilled water	2ml (44%)	Distilled water	6ml (61%)
Liquid soap	Septisol® 8 gotas (2,1%)	Liquid soap	Septisol™ 16 drops (4.6%)
Kroton oil	3 gotas (4,5%)	Kroton oil	2 drops (1,4%)

TABLE 2: Fitzpatrick's skin type classification

Skin type	Color	Reaction to exposure to the sun
I	Fair	Always burns, never tans
II	Fair	Usually burns, tans with difficulty
III	Fair	Burns and tans slightly
IV	Moderate brown	Rarely burns, tans with ease
V	Brown	Very rarely burns, tans very easily
VI	Black	Does not burn and tan easily

After re-epithelialization took place, patients were instructed to use colored sunscreen SPF 30 daily. Those who developed post-inflammatory hyperpigmentation in the treated area were advised to use 0.05% retinoic acid formula, 4% hydroquinone and 0.01% fluocinolone acetonide, as soon as it was tolerable.

The clinical follow-up and photographs (with standardized distance and lighting), were carried out by the applicator physician at 24 and 48 hours after the procedure, and again 15, 30, 45 and 180 days after the procedure.

The results were evaluated through a three-level subjective scale (mild, moderate, and intense) to determine the intensity of pain and clinical signs (erythema, edema, exudate) for each side of the face. Any complications that arose were recorded, and 180 days after the procedure a final assessment was carried out by the patients and the applicator physician to determine whether the Baker-Gordon or the Hetter formula yielded the best result in each case.

The study was approved by the Clinical Trials and Research Committee of the Institution, and the Term of Free and Informed Consent was obtained from all patients.

#### APPLICATION METHOD

The preoperative preparation consisted of oral hydration with 500 ml of mineral water and analgesics (sublingual 10 mg ketorolac trometamol), both administered 30 minutes before the procedure.

The degreasing and cleansing of the skin with ether and gauze, and the delimitation of the areas to be treated (highlighting perioral and periorbital wrinkles) with a marker pen were carried out prior to the application of the phenol solutions. The application of the formulas was carried out with wooden sticks wrapped in slightly moistened cotton, applied to the skin using a continuous friction-causing movement that stretched the treated area (to avoid causing cracks) until the skin obtained a grayish-white color and a texture similar to that of leather. In order to finalize the procedure, the treated area was occluded with adhesive plaster placed directly on the skin and covered with micropored tape for fixation.

As postoperative measurements, intramuscular injections of one vial containing a solution with 6.43 mg of betamethasone dipropionate and 2.63 mg betamethasone disodium phosphate, and one vial of tramadol (50mg/ml) were administered,

in addition to stimulation of oral hydration. Analgesia after discharge was performed with Tramadol 30mg (a tablet taken orally every eight hours up until the pain receded).

The dressing was changed by the doctor after 24 hours and permanently removed 48 hours after, with the cleansing of the exudate with 0.9% sterile saline solution. Use of 0.5 mg betamethasone dipropionate in cream and 1mg gentamicin sulfate was administered thereafter up until the complete re-epithelialization of the area.

#### RESULTS

The seven patients reported a burning sensation immediately after the application of the phenol with both formulas, which initially abated quickly and further yielded at the end of the procedure, lasting for about six to eight hours in total. Four patients reported a more intense burning sensation during the procedure on the right side. One described having more discomfort in the left side, and two did not notice a difference between sides. All deemed the discomfort intense.

On the subsequent day, both hemifaces had intense erythema and edema, and moderate exudate. In five patients the edema was more pronounced in the right hemiface, which was treated with the Baker formula.

After 48 hours, the patients showed a slight reduction of the edema and erythema, with no difference between the two hemifaces, and crusts and small areas of point-sized bleeding.

Fifteen days after the procedure, three patients still had unepithelialized areas circumscribed in the periorbital region of the right hemiface, and one patient on the left hemiface. One patient had acneiform lesions (attributed to the topical steroids and treated with 150mg lymecycline daily for seven days), while another patient had meliceric crusts in the two that were successfully treated with 500mg azithromycin per day for three days.

On the 30th day after the peel, all patients had mild to moderate erythema in the treated areas, however it was less intense in the left hemiface (Hetter formula).

At 45 days, the erythema was still present in the seven patients, and was more intense on the right hemiface. Five patients had mild hyperchromia, which was treated with 0.05% retinoic acid cream, 4% hydroquinone, 0.01% fluocinolone acetonide.

TABLE 3: Characteristics of patients involved in the study and results							
Patient	1	2	3	4	5	6	7
Age	55	45	40	54	55	44	51
Gender	female	female	female	female	female	female	female
Fototipo	II	III	II	III	I	II	II
Patient's preference regarding the results	Baker's phenol	Baker's phenol	Indifferent	Hetter's phenol	Indifferent	Indifferent	Indifferent
Physician's preference regarding the results	Baker's phenol	Indifferent	Indifferent	Hetter's phenol	Indifferent	Indifferent	Indifferent
Observations	n.a.	Milia	Hyperchromia	Hyperchromia	Longer re-epithelization and milia	n.a.	Acne



FIGURE 1: Right hemiface before the procedure

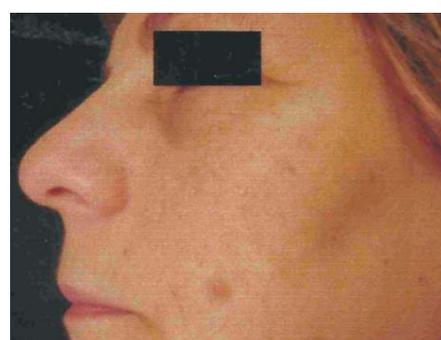


FIGURE 3: Left hemiface before the procedure



FIGURE 2: Right hemiface six months after the procedure



FIGURE 4: Left hemiface 6 months after the procedure

The erythema persisted, though in a decreasing capacity for five to six months, and was always more pronounced on the right hemiface. Two patients developed milia, which were removed manually.

As for the clinical results subjectively evaluated 6 months after the procedure, (Table 3) two patients (28.6%) preferred the Baker-Gordon formula, one (14.3%) the Hetter formula, while for four patients (57.1%) the result was indifferent. The evalua-

tor physician deemed five patients (71.5%) had similar results in both hemifaces, whereas in two (28%) the results were better with each of the formulas, respectively.

### DISCUSSION

In the existent literature, the occlusive dressing remains for 48 hours without manipulation. In the present study it was redone after 24 hours and removed after 48 hours, in an attempt to reduce patient discomfort.

Regarding the recovery process, the authors concluded it was faster on the left side, which was treated with the Hetter formula. The edema and erythema receded faster and hyperpigmentation, when developed, was slightly milder with the Baker-Gordon formula. The authors attribute these facts to the lower amount of phenol, as proposed by Hetter. Despite this, the procedure was not performed at a less deep level, nor was it exempt from a level of care similar to that recommended in the preoperative and postoperative of the phenol peel. Unlike the reports available in the literature, the authors did not identify residual hypochromia in any of the patients in the study.

As for aesthetic results, the authors considered them equivalent for the two formulations—both in the opinion of physicians and patients—with a satisfactory reduction of wrinkles in the seven patients, in the two sides treated (Figures 1 to 4). Further studies must be conducted, with histological evaluations, calculation of the wrinkles' depth, and of the asymmetry between hemifaces.

Corroborating Hetter's studies, the authors concluded that both formulas are effective in the treatment of aging skin, however, the faster recovery and fewer undesired effects obtained with the Hetter formula must be taken into account. ●

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