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Article on "Use of a synthetic film (Bioprocess) in abrasions and second degree burns

by Magnocavallo, etc.

This declaration certifies the accuracy and precision of the translation from Italian into English of the above material and is an accurate reflection of the text as it appeared in Italian.

for the translator:

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USE OF A SYNTHETIC FILM (BIOPROCESS®) IN ABRASIONS AND SECOND DEGREE BURNS

Preliminary Study in Emergency Room

by

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Usage of a synthetic film (Bioprocess) in abrasions and second degree burns. Preliminary research in Emergency Room.

This study analyzes the usage of Bioprocess in abrasions and second degree burns, observing advantages and disadvantages of this treatment. This clinical research shows an important control against pain, a good hemostatic effect, an apparent reduction of healing time, an excellent cicatrization quality.

Key words: **Abrasions - Burns - Bioprocess.**

In recent years there has been increasing interest in the search for synthetic substitutes for human skin which would have the features of protecting the injured tissues, of being well tolerated, easily applicable, and replaceable.[1]

Notwithstanding the continued improvements, in none of these products to date is there the complete set of those features which, by permitting the physiologic response of the injured area, yield an "ideal skin-substitute" bandage.[2]

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This study examines Bioprocess, a synthetic film obtained, via biotechnology, from bacteria of the Acetobacter group.[6]

The purpose of the investigation was to evaluate the efficacy and tolerance of Bioprocess in the treatment of second degree burns of moderate extension and of abrasions resulting from road accidents or to mishaps of other kinds.

The clinical investigation was conducted with the most scrupulous adherence to the ethical principles stipulated in the Helsinki Declaration.

Material and methods

Bioprocess is a film of reduced thickness, c. 0.05 mm, and has the special feature of being transparent.

Among its characteristics we may recall its selective permeability, which permits passage by gases and impedes the passage of liquids and micro-organisms; in addition, it allows exchanges of aqueous vapor between the skin and the environment, thus preventing maceration effects due to the lack of cutaneous transpiration.

Bioprocess is composed of a biologicall inert substance that does not provoke any cutaneous reaction and does not stimulate bacterial growth.[7,8]

Throughout the entire clinical-trial phase, no sign of metabolization of the product was observed, and toxic effects were never evidenced at either the local or the systemic level.

The trial took place from December 1990 to May 1991; selected during this period was a sample of 74 patients who presented abrasions and/or second degree burns.

The protocol followed provides for the application of Bioprocess after cleansing and disinfection of the wound has been performed; the excess disinfectant (aqueous iodized solution) is eliminated with physiological salt solution.

The product is placed over the wound with slight massaging with the fingers; after that, with the use of a gauze tampon

imbued with physiological salt solution, the Bioprocess is caused to adhere to the bed of the wound, the air bubbles being eliminated with slight pressure.

The excess film is then eliminated by cutting away the Bioprocess about 1 cm from the margins and naturally following the shape of the wound.

After these operations, a compress of sterile gauze is applied to the film and is fixed with an occlusive bandage so as to permit better adhesion of the film to the substrate.

The day after the application of the product (about 24 hours afterwards) the occlusive bandage is removed and a non-occlusive elastic net bandage is put on, the patient being asked not to wet the product, in order to prevent detaching it.

The subsequent checks take place every 5 days, on the average.

During these checks, the product is not replaced, and in case serum has collected, complete needle aspiration of the secretion is undertaken.

The hole thus produced is obliterated by the application of about 1 square cm of Bioprocess placed on the wound by the same modalities described above.

In case of possible blood-corpuscle collection (local infection), aggravation of the lesion, or the appearance of any undesirable effect, treatment with Bioprocess is discontinued, the film is removed, and the curative treatments appropriate to the case are instituted.

The protocol applied provides, in addition, that at the beginning of the treatment and at every check, an evaluation of the pain is made according to an analog scale (VAS).

The degree of pain is indicated by the patient himself, who identifies a point on a continuous line 10 cm long; to the left end of this line the degree of pain of "absent" has been assigned and to the right, end, the degree of pain of "unbearable" was assigned (maximum intensity of the pain).

The scale is divided into 5 ranges: a score of from 0 to 2 cm assigned by the patient is considered to be "pain absent"; one of 2.1 to 4 cm, "mild pain"; one of 4.1 to 6 cm, "moderate pain"; one of 6.1 to 8 cm, "intense pain"; and one of 8.1 to 10 cm, "unbearable pain."

At each check, the investigator and the patient express a judgment about the efficacy of the treatment, using in this case a scoring of 1 to 3 (1 = *poor;* 2 = *good;* 3 = *excellent*).

The lesion is documented by means of photography at admission and at the last check with complete cicatrization (Figs. 1, 2, and 3).

At the end of the treatment, the following parameters are observed and recorded:

- the quality of the cicatrization;
- the number of days required for 50% cicatrization of the lesion;
- the length of the period of time for complete cicatrization, expressed in days; and
- the practicality of the use of the product.

Admitted to the study were patients over 18 years of age who had given their oral consent to the trial.

Excluded from the trial were:

- patients with clinically detectable active local infection and patients already treated with topical products at the site of the lesion;
- patients undergoing corticosteroid treatment by the systemic route;
- patients suffering from generalized dermatitis; and
- patients who were not very cooperative and who did not adhere to the check-up cycles.

Throughout the whole period of the trial, the patients were not subjected to any other type of local treatment.

Only therapeutic measures necessary for the treatment of any concomitant diseases were permitted, which were, however, reported on the technical form.

Results

The sample subjected to examination during the investigation was composed of 74 patients, 36 of them women (48.7%) and 38, men (51.3%); their mean age was around 41 years, the youngest patient being 18 years old and the oldes one, 92.

The time elapsed from the time of the mishap to observation in the emergency room was about 19 hours, but was as much as 96 hours in some cases.

The minimum time elapsed was about 30 min.

Forty-two patients presented with second degree burns (56.8%), whereas 32 came under medical observation because of abrasions of various kinds (43.2%).

The types of mishap are listed in Table 1.

Table I. Types of mishap

Typology	Frequency	%
Road accident	14	18.9
Sports activity	5	6.7
Electrical shock	3	4.0
Household work	19	25.7
Boiling liquid	26	35.1
Red-hot metal	4	5.4
Flame	1	1.4
Syncope	1	1.4
Chemical burn	1	1.4

The anamnestic picture of the patients observed revealed that 4 patients (5.4%) were hypertensive, undergoing antihypertensive drug treatment; 2 patients were diabetic (2.7%).

Table II - Pain points (mm) assigned to the observed patients

Check No.	Mean	Numerousness	Standard deviation	Minimum	Maximum
0	42.22	74.00	21.27	0.00	3.00
1	12.85	74.00	13.43	0.00	75.00
2	3.05	73.00	6.04	0.00	38.00
3	0.98	64.00	2.63	0.00	13.00
4	0.64	42.00	1.75	0.00	8.00
5	0.44	25.00	1.08	0.00	4.00

0-2: pain absent; 2.1-4: mild pain; 4.1-6: moderate pain; 6.1-8: intense pain; 8.1-10: unbearable pain.

Table III - Days for 50% cicatrization of wound

Days	Frequency	%
5	1	1.5
6	8	11.5
7	10	14.7
8	9	13.2
9	17	25.0
10	8	11.8
11	4	5.9
12	3	4.4
13	2	2.9
14	3	4.4
15	3	4.4

The larger diameter of the lesions was 58 mm on the average (minimum 8 mm, maximum 260 mm);the smaller diameter averaged 32 mm (minimum 3 mm, maximum 22 mm).

The degree of pain at the site of the lesion reported by the patient was, for the most part, of moderate degree at admission (check No. 0); cases were noted, however, in which pain was absent and cases in which the pain was unbearable.

At the last observation (check No. 5), pain was practically absent and only a few patients still presented mild pain (Table II).

Fifty per cent cicatrization of the wound had occurred within 10 days on the average: there were, however, patients who reached this result within 5 days and others, in 15 days (Table III).

Complete cicatrization occurred within an average of 15 days (with a minimum of 6 and a maximum of 43) (Table IV).

Table IV - Days for complete cicatrization

Days	Frequency	%
6	1	1.5
7	1	1.5
9	1	1.5
10	3	4.4
11	1	1.5
12	7	10.3
13	3	4.4
14	4	5.9
15	5	7.4
16	6	8.8
17	3	4.4
18	12	17.7
19	2	2.9
20	5	7.4
21	1	1.5
22	4	5.9
23	1	1.5
24	2	2.9
25	3	4.4
27	1	1.5
28	1	1.5
43	1	1.5

The quality of the cicatrization was judged to be good in 44 cases, excellent in 22, and in only 2 cases was the quality of the cicatrization poor.

In any case, the product was deemed to be very practical: in 65 cases, the practicality of using the product proved to be good or outright excellent.

Practicality turns out to be less good when the lesion is located in the proximity of the joints and in mobile areas; that reduces adhesion and facilitates premature detachment of the Bioprocess, requiring that it be replaced.

The judgments of the investigator and of the patients as to the efficacy of the treatment were always positive, with an ever increasing enthusiasm during successive checks.

In only 6 patients (8.1%) did an infection arise at the site of the lesion, with blood-cell secretion, and we then preferred to suspend the trial of the product and institute systemic antibiotic therapy with daily washing of the wound with the use of a physiological salt solution containing an antibiotic.

Even though the protocol anticipates 5 checks, the patient often (as can be seen from Table V) reached complete healing within much shorter periods of time.

Table V. - Number of checks at complete cicatrization

Check	Frequency	%
1	6	8.1
2	10	13.5
3	20	27.0
4	14	18.9
5	24	32.5

Conclusions

Among the numerous advantages observed in the course of the preliminary study on the use of Bioprocess, the most striking finding that appeared concerns the control of pain.

We were, in fact, able to observe, in agreement with other authors,[9,10] that the painful symptomatology can already be

brought under control (without the use of NSAIDs) within 24 hours (first check) after the application of Bioprocess.

This characteristic of Bioprocess, which attains really surprizing results in the case of burns, is in all probability due to the restoration of the physiologic microenvironment, one favorable to the nerve endings exposed to the external milieu as a result of the lesion.

The selective permeability of Bioprocess does, in fact, make it possible to control humidity, temperature, and oxygenation.

The patient himself, already surprised by and often enthusiastic about the pain control reached so rapidly, is now psychologically calm, and reassured, too, by the fact that it is not necessary to replace the film until it comes off by itself when healing has occurred.

In abrasions, pain control is less significant than in the case of burns.

That can probably be attributed to the contusive trauma to deep structures that is often associated with these lesions.

Obviously, Bioprocess cannot affect these structures favorably; nevertheless, another property of Bioprocess emerges in abrasions: its hemostatic effect.

This effect is probably due to the fact that Bioprocess, once it is hydrated, exhibits good adherence to the surfaces on which it is placed, affording a "plugging" effect on the lesion.

We note, moreover, facilitation of the formation of granulation tissue in poorly vascularized areas (like, for example, the lower third of the leg), even in elderly subjects with apparent reduction of complete healing time.

The quality of the cicatrization, to the extent that it is determined by the macroscopic method only, without biopsy and histologic examination of the newly formed tissue, is satisfactory, as we see from the photographs.

To summarize, Bioprocess exhibits the following features:

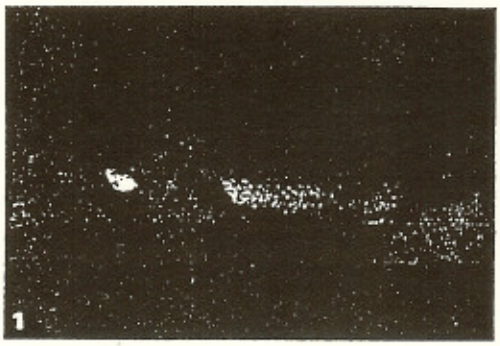
- good adhesion;
- selective permeability;
- duration over time;
- barrier effect
- hypoallergenicity; and
- hemostatic capacity;

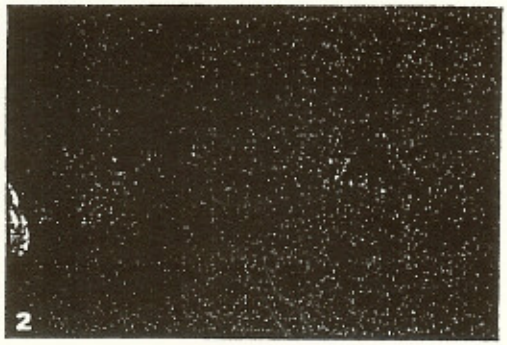
To the patient, it offers the following advantages:

- significant reduction of pain;
- reduction of risks of infection;
- rapid re-epithelialization of excellent quality;
- single application in the majority of cases;
- easy hygiene and good comfort; and
- rapid resumption of normal activity.

References

1. Tavis MJ. Current status of skin substitutes. Surg Clin North Am 1978; 58(6):1233-49.
2. Katz S, McGinley K. Semi permeable occlusive dressing. Arch Dermatol 1986; 140:58-62.
3. Alexander JW, Wheller LM, Rooney RC. Clinical evaluation ou epigard, a new synthetic for homograft and hetero graft skin. Trauma 1973; 13(4)374-83.
4. Neal DE, Whalley PC, Flours MW. The effects of an adherent polyuretane film and coventional absorbent dressing in patients with small partial thickness burns. Br J Clin Pract 1981:254-57.
5. Konberg I, Kajesjiab R. Ultra thin silicone polymer membrane. A new synthetic skin substitute. A preliminary study. Trans Am Soc Artif Int Organs 1972; 18:39-44.
6. Mancini S. La terapia delle ulcere venose degli arti inferiori. Sarzana: Casa Editrice Grafica Sturli, 1990.
7. Dati on File. Biofill-Products Biotecnologico. Curutiba Parana, Brasile.
8. Dati on File. Farmitalia-C. Erba, Milano.
9. Pitanguy I, Salgado F. Utilization of the cellulose pellicle as a biological dressing. Rev Bras Cir 1988; 78(5):317-26.
10. Peixoto R, Santos DLN. Use and clinical evaluation of a cellulose graft in cutaneous lesions. Rev Bras Cir 1988; 78(2):141-5.





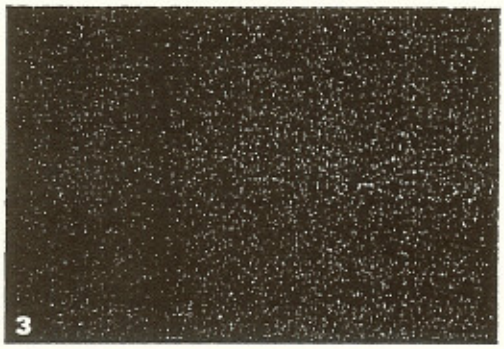


Fig. 1 - Second degree burn of right forearm. Time 0 (admission to Emergency Room). Injurious agent: boiling oil. Time elapsed after the incident: 48 hours.
Fig. 2 - Time 2 (second check). Characteristic appearance of Bioprocess after 8 days.
Fig. 3 - Complete cicatrization after 14 days with single application of Bioprocess.