METHOD OF TREATING HUMAN SKIN

Inventor: Norman Orentreich, 140 E. 72nd St., New York, N.Y. 10021

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References Cited

UNITED STATES PATENTS
2,040,599 5/1936 Davies 51/391
3,596,661 8/1971 Motz 128/355

OTHER PUBLICATIONS

Primary Examiner—Channing L. Pace
Attorney, Agent, or Firm—Nolte and Nolte

ABSTRACT

As a dermatologic treatment, human skin is abraded by rubbing with a soft, resilient, compressible buffing pad comprising a lofty non-woven web of hypoallergenic, hydrophobic plastic fibers, the fibers in the web being randomly intermingled and bonded together at randomly spaced points where they cross.

8 Claims, No Drawings
METHOD OF TREATING HUMAN SKIN

This invention relates to an improvement in the abrasive treating of human skin for cosmetic and therapeutic purposes. The improvement is the use of buffering pads more selectively abrasive and gentle than abrasive materials heretofore used for this purpose but which buffering pads are sufficiently abrasive to be effective without unduly time-consuming and tiring manual rubbing and which buffering pads are particularly good for skin treatment also because they are very easily maintained in hygienic condition.

There are many dermatologic and cosmetic skin conditions which are greatly improved by the judicious use of selective abrasion to remove the top-most layers of the skin (stratum disjunction of the epidermis), either in small localized sites or in large, generalized areas. The epidermis of the skin is constantly replacing itself in a process called epidermal turnover. New cells are constantly being formed in the basal (lowest) layer of the epidermis. As each new cell is formed it displaces its predecessor, pushing it upwards toward the skin surface. The entire epidermis turns over, in normal skin, in the course of 28 days, the time it takes for one cell to be born in the basal layer and to reach the skin surface where it is spontaneously shed or removed by washing or the abrasive action of clothing. During those 28 days, the cell changes dramatically. In the basal layer it is new, round, moist, succulent and closely conjoined with its neighbors. As soon as it is displaced from the basal layer (where it was in nourishing contact with the dermis), it starts to die. In its gradual death process, it changes considerably, going into a prickle cell stage, a granular cell stage and finally a keratin cell stage, at which time it is flattened, dried out and dead. Keratinized cells compose the keratin layer of the skin, the outermost part of the epidermis.

The keratin layer itself is divided into two important sub-layers: the stratum compactum, the lower, and the stratum disjunction, the actual skin surface. Although both the stratum compactum and the stratum disjunction are composed of dead, fully keratinized cells, there is a significant difference in these layers. In the stratum compactum the cells are densely compacted and cemented together to form multiple sheets of contiguous flat cells. By the time these cells have reached the stratum disjunction, they have become uncremented, discontinuous and appear loose and flaky under the microscope. The collection of several layers of dead, loose cells on the surface of the skin is frequently referred to as "scurf skin."

Routine washing with soap and water removes some of the scurf skin which is constantly being produced. Scrubbing with a washcloth or sponge removes more.

According to the present invention, abrasive treatment of the skin is effected by a soft, resilient, compressible buffering pad comprising a lofty non-woven web of plastic fibers.

Throughout the web the fibers are bonded together at randomly spaced points where they cross. The diameter or major cross sectional dimension (in the event the fibers are not circular in cross section) of the fibers is preferably no greater than about 0.03 inch and most preferably no greater than about 0.01 inch. The thickness of the web is preferably at least about one-eighth inch. Due to the random intermingling and bonding of the fibers and the web's having a substantial thickness, the web is spongileike. The fibers define, in effect, the walls of a large multiplicity of open cells and, hence, the web has a high void volume. The maximum thickness of the web is not critical. Economy and ease of handling by the user will generally dictate a thickness no greater than about 4 inches. It is generally convenient to use the web in the form of a pad of about one quarter inch to about 2 inches in thickness and about 2 to about 6 inches across.

The spongileike character of the web is useful for epidermabrasion. The web can be used in the same manner as a conventional sponge or wash cloth with water, soap and water or a liquid medication for the skin.

The plastic used in the web is hypo-allergenic and hydrophobic. The web's being hydrophobic means that the fibers themselves do not absorb water but water is absorbed, by capillarity, into the interstices or "open cells" between the fibers. Hence, the web rinses clean quickly and remains in a sanitary condition merely with such rinsing. Examples of suitable plastics are nylons, such as nylon-6 or nylon-6,6, polyesters, such as polyethylene terephthalate, polyolefins, such as polyethylene and propylene, and the like.

Manufacture of webs useful in the invention is conventional. For example, molten streams of the plastic extruded through orifices may be subjected to jets of compressed air or other gas and the resultant fibers may be directed by the gas jets and/or gravity onto a rotating drum or other collecting surface from which the resultant web is withdrawn. Fusion bonds the fibers together at randomly spaced points where they cross.

The fibers may be adhered together at randomly spaced points by means of a binder rather than by fusion. The binder may be filled with a mineral filler.

Actual clinical tests of the invention have been with buffering pads according to U.S. Pat. No. 3,537,121. The description of the buffering pads constituting the invention of said patent is hereby incorporated herein by reference. The buffering pads of U.S. Pat. No. 3,537,121 have proven to be sufficiently gentle in their abrasive action to permit routine use on the skin. Other pads within the scope of the present invention, as broadly defined, may not be sufficiently gentle for routine use or, at least, for long term routine use, but may be used for short-term or intermittent treatment.

More particularly, in the preferred embodiment the fibers of the mat are bonded together with a binder comprising a soft resin (e.g., Knoops hardness of no more than about 3). In addition to being soft, the resin in the binder is flexible, tough, resilient and somewhat elastomeric, a particularly preferred resin being a flexible polyurethane. The binder also contains, based on the total volume of binder, from about 10 to about 65% of a finely divided mineral filler which has a Knoops hardness of no more than about 150, and preferably considerably lower. Suitable fillers include calcite, carbonate, kaolin and talc. The Knoops hardness of 12 or less is the preferred filler. The filler preferably constitutes about one-sixteenth to one-half the volume of binder. The fibers preferably have a diameter of about 10 to about 50 microns and, most preferably, about 20 to about 40 microns. Preferably, the fibers are cramped.

In comparative testing the web used in the present invention most effectively produced a smooth and freshened skin by removing scurf skin in a controlled, efficient, selective manner.
One of the unique qualities of the web is its selective, abrasive, exfoliative action. When the web is used on areas which have multiple, individual hyperkeratotic elevations, the web concentrates its action on the raised areas. Grainy pastes or creams or keratolytic and exfoliative lotions are unselective, affecting the entire area rather than focusing on the specific anomalies requiring treatment.

Further, a given web offers a wide variety and range of therapeutic treatment by simply varying the amount of pressure, speed or duration of use, as well as the frequency of use. By appropriate adjustment of the variables, one can use the web safely and effectively for a wide variety of skin conditions and for all parts of the body from face to feet.

Further, the web may be used as an adjunct to other therapies and vice versa. The web enhances the action of topical preparations, by removing scurf skin and allowing better apposition of the topical preparation.

The web has been found, in clinical trials and by subjective evaluation, to be both safe and effective in the correction or improvement of several cosmetic and dermatologic skin conditions. These are detailed here-inbelow.

After several uses, the web becomes considerably flatter and less fluffy than it was originally. This compaction of the abrasive fibers is inevitable and in no way alters the effectiveness of the web since the minimal diminution of abrasive quality of the web itself can be compensated for by increasing pressure, speed, duration or frequency of use. With average normal use the web may last from three to six months without requiring replacement.

The web has been found extremely effective in the treatment of “muddy” or “dull” complexions. Such Complexions are frequently caused by an excessive build-up of scurf skin (stratum disjunctum). This build-up of scurf skin does not reflect and absorb light in the same flattering manner as do the cells of the stratum compactum, beneath the stratum disjunctum. Thorough removal of the scurf skin, once or twice daily, or less often, with the web can give a more fresh and translucent complexion because the skin which is now on the surface is the much smoother and more contiguous stratum compactum layer.

The cosmetic appearance of very superficial scarring and wrinkling has been found to be transiently improved with the use of the web. The web is transiently effective in the improvement of the appearance of superficial wrinkling and scarring because of its rubficant action. Modest selective abrasion of the involved areas increases local circulation in the treated area, making the tissues transiently more turgid. It is this very slight local “fullness” which may make superficial wrinkles and scars appear less obvious.

All acne lesions (all pimples) start in either open or closed comedones. An open comedo is frequently called a blackhead and is quite obvious. A closed comedo is not so obvious; usually the skin must be pulled taut to clearly show this slightly raised area. All comedones are the result of, among other factors, hyperkeratinization (or irregular keratinization) and sebaceous gland activity. Hyperkeratinization is simply an increased volume (number of layers) of the keratin layer of the epidermis, composed of both the stratum compactum and the stratum disjunctum. In acne, hyperkeratinization takes place at the opening and in the canal of the sebaceous follicle. This excessive or faulty keratinization blocks the passage of sebum (oil) from the gland. Blocked-up sebum, dead keratinized cells, bacteria and the accumulation of free fatty acids within the sebaceous follicle ultimately lead to the formation of an acne lesion or pustule.

Routine use of the web, once or twice daily, has been found to be effective in helping to reduce the accumulation of keratin at the sebaceous follicle orifices and thus it helps prevent the formation of comedones. Not only does the web have a preventive anti-comedo action by gently abrading away excessive keratinous cells, but it also, by selective abrasion of raised areas, helps remove some of the keratin at the sites of already formed comedones. The prevention or removal of comedones means the prevention of acne lesions. The web has been found effective in helping prevent and remove comedones by selective abrasion of slightly raised areas of the skin constituted by comedones.

Keratoses are usually tiny or small, localized raised areas, generally hypotrophic and constituted by an increased deposition of the keratin layer of the epidermis at the site. Some are caused by excessive sun exposure, in pre-disposed individuals, and are then called actinic keratoses. They may be flat or slightly to markedly raised. Routine daily use of the web has been found effective in the treatment of fully developed as well as incipient keratoses because of the web’s unique, selective abrasion of raised areas of the skin surface.

Abrasive action is focused on the involved small sites and appropriate pressure applied to gradually, over a period of days to weeks, reduce a raised site.

Keratosis pilaris is a condition which affects the majority of people but which is usually felt to be of only minor and cosmetic significance. It is characterized by hyperkeratinization at the opening of the hair follicle and in the follicular canal. This leads, ultimately, to the entrapment of the hair within the follicle and the development of a small raised papule at the site. The condition is usually limited to the outside surfaces of the upper arms and legs, giving the affected skin the feel similar to that of “goosebumps.” Many people live out their lives with a few or many of these papules; rarely is medical treatment sought. Treatment until now has been, for the most part, limited to painful pastes to be rubbed on the area to remove excessive keratinization, or to other exfoliative and keratolytic (keratin-dissolving) agents for topical application.

The web offers a major advance in the treatment of keratosis pilaris because of its unique selective abrasion. Whereas grainy pastes and topical exfoliative and keratolytic agents work unselectively on the entire skin surface, the web concentrates its action on the raised areas of the skin surface. Daily use of the web has been found effective in the gradual removal of already formed papules and continued use will help prevent the formation of new ones. Pressure must be moderately firm on the involved areas and the web must be regularly used if beneficial results are to be obtained and then maintained.

Occasionally, the trapped hairs of keratosis pilaris become the sites of secondary infection or inflammation, leading to pustule formation and possible scarring. Routine use of the web helps prevent the entrapment of hairs and the possibly ensuing events.

Almost all people are affected by hyperkeratosis on some part of their body, usually in the form of “thick
skin” on the elbows, knees, fingers, palms, heels, toes, etc. Emollient creams are most frequently used by people in an effort to cosmetically improve the appearance and/or feel of elbows and knees in particular. This treatment is temporary at best and is really a masking of the problem rather than a treatment. Occasionally, a pumice stone is employed, but, though effective in certain hyperkeratotic areas, is grainy and cosmetically inelegant. The web offers a cosmetically elegant, true treatment for all hyperkeratotic sites, gradually abrading away the hardened, tough, thickened skin.

It is a simple fact that intermittent pressure on a localized area produces callus, an increased deposition of the keratin layers of the skin. Our feet are constantly exposed to intermittent pressure and as a result they have a keratin layer more than five times as thick as the rest of the body, except for the palms of the hands which are also exposed to considerable intermittent pressure. Thickened keratin can obviously have a protective function, as, for example, on the soles. Poorly fitting shoes cause corns by the same process of intermittent pressure, and elbows get thickened skin by this mechanism, causing an undesirable cosmetic result.

In clinical testing, the web, used routinely and firmly, has been found to be a dramatically effective home treatment for toughened, thickened, callused skin resulting from intermittent pressure. Its action is further enhanced by pretreatment soaking of the affected areas to macerate (soften) the skin for easier, quicker removal with the web.

For skin care, the web is generally to be used in accordance with the following instructions to obtain beneficial results without unnecessary irritation:
1. Develop a good lather in the web with warm water and soap.
2. Moisten the area to be treated with warm water.
3. Gently and lightly and slowly move the lathered web over the skin to be treated. For the first few uses do this for no more than 5 seconds for any given area. The movement of the web may be circular or back and forth, whichever seems easiest and most appropriate.
4. Rinse with warm or cool water.
5. An emollient preparation may be applied to counteract dryness of skin which may develop in some individuals.

The first time you use the web you may find it quite scratchy and uncomfortable, even though you only move it gently, slowly and lightly over the skin for a few seconds. This is quite normal. As the days of use pass, you will find that you can gradually increase its abrasive action by increasing pressure, speed or duration of use according to the degree of abrasion your skin will tolerate without unnecessary irritation. Obviously, the degree of abrasive action should be varied according to the nature of the skin being treated; your heels, for example, can withstand much more abrasion than your face be-

cause the epidermis is much thicker; people with dry and/or sensitive skin should use the web less frequently and more mildly. All individuals should adjust the frequency of use to the season or climate. Use should be temporarily discontinued for skin irritated by such factors as sunburn, windburn or contact dermatitis.

Use the web either once or twice a day, or less, gradually increasing its abrasive action with each use until the desired improvement is obtained. At this point you may reduce your skin abrasion to a level at which you can maintain the improved condition, either using the web less often each week or less aggressively each time. After each use the web should be rinsed out thoroughly and the excess water squeezed out.

Some initial dryness may occur. If it persists in spite of use of an emollient preparation, then discontinue use of the web until skin normalizes and then restart the use of the web at a lower level of treatment (less frequent, less pressure, etc.) and continue using the emollient preparation after each use."

What is claimed is:
1. Method of treating human skin comprising manually rubbing the skin with a soft, resilient, compressible buffering pad comprising a web of hydrophobic fibers which are exposed at the surface of the pad, the web being of such abrasiveness that it can be used manually to remove the stratum disjunctum of the epidermis without significantly disturbing the stratum compactum of the epidermis, and continuing the manual rubbing until said removal of the stratum disjunctum without significantly disturbing the stratum compactum has been effected and, at this point, terminating the rubbing.
2. Method according to claim 1, including the step of rubbing the skin in facial areas affected by dull complexion.
3. Method according to claim 1, including the step of rubbing the skin in an area affected by superficial scarring and wrinkling.
4. Method according to claim 1, including the step of rubbing the skin in an area affected by acne.
5. Method according to claim 1, including the step of rubbing the skin in an area affected by keratoses.
6. Method according to claim 1, including the step of rubbing the skin in an area affected by hyperkeratosis.
7. Method according to claim 1, including the step of rubbing the skin in an area affected by keratosis pilaris.
8. Method according to claim 1, in which the fibers have a diameter of about 10 to about 50 microns and are bonded at randomly spaced points by a binder comprising a soft resin having a Knoop hardness of no more than about 3 and, based on the total volume of binder, about 10% to about 65% of a finely divided mineral filler having a Knoop hardness of no more than about 150.
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,910,284
DATED : October 7, 1975
INVENTOR(S) : Norman ORENTREICH

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet, Item 22, "January 22, 1972 is changed to -- January 22, 1973".

Column 1, line 62, change "0.03" to --0.003--.
line 63, change "0.01" to --0.001--.

Column 2, line 59, change "one-sixteenth" to
--one-sixth--.

Signed and Sealed this second Day of August 1977

[SEAL]

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks