Acne - An Ancient Affliction

The story of acne reaches back to the dawn of recorded history. In ancient Egypt, it is written that several pharaohs were acne sufferers. In Rome 2000 years ago, bathing in hot sulfur mineral waters was one of the few available acne treatments. Sulfur was a treatment throughout the 19th century, and still is with us. Salicylic acid is over 100 years old. Also, one hundred years ago, the poisons strychnine and arsenic were standard acne treatments in dermatology texts. Benzoyl peroxide was first used in the 1920s, Antibiotics in the 1950s, Retin A was found effective for acne in the 1970s, and Accutane in the 1980s.

Very few controlled, randomized studies have been performed comparing acne medications. In one such recent study, five different treatments were evaluated on 649 patients over 18 weeks. The conclusion states: "Residual acne was present in 95% of the participants at the end of the study." "Most people in the community with mild to moderate inflammatory acne of the face respond only partially to topical or systemic antimicrobial treatments."[28]

Simply Clear Acne Gel, with a unique combination of ingredients — the simple solution to a complicated disease.

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17 Proinflammatory describes release of chemicals that attract inflammatory white blood cells and other immune agents. At first the attraction is for lymphocytes and then polymorphonucleocytes. Later, macrophages and monocytes. White blood cells normally have the function of fighting infection and repairing tissue.

18 Chlorine dioxide is a comparatively recent disinfectant.

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21 PMN or Polymorphoneucleocytes are a type of neutrophil white blood cell. These ingest bacteria and release lysozyme which can digest protein and presumably, follicle wall.

22 Pilosebaceous gland is the common follicle on the face and back containing a hair and sebum producing glands

23 cytokines, hormones, enzymes, fatty acids

24 White blood cells (leukocytes), Complement, and Toll Like Receptors

25 MEDIATORS are intermediary released chemicals that attract other active molecules

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Simply Clear™ *contains:*

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Simply Clear™

Acne Gel

An advance in chemistry that more successfully combats the disease.

Technical Information

A new medication for acne.

How Simply Clear™ Acne Gel Works

The Science of Simply Clear™

The pathogenesis of acne disease involves a combination of mechanisms: hormonal, microbial, and immunological. ***Simply Clear*** Acne Gel addresses all three areas.

Opening the Pore

Acne disorder develops as a result of a blockage in hair follicles. Keratin, sebum, cellular debris, and bacteria are the materials forming the plug or comedone, and this obstruction is the earliest noticeable change in acne. The cause is a failure of cells lining the hair follicle to separate normally and flow to the surface of the skin. Instead, these cells, called keratinocytes, shed too frequently, stick together in clusters with the sebum, and form an obstruction. The cells have also transformed into inert bodies of keratin, called corneocytes, and the accumulated material is a ready nutrient source for bacteria. This process is called "cornification" or hardening, and is a common denominator of all acne disease.

The heightened flow of sebum at adolescence, combined with obstruction and ensuing enlargement of the follicle, eventually lead to lesions. The comedone plug furthers the inflammation process by cutting off exposure to oxygen in the follicle. *P. acnes* now will grow and multiply much faster here than it normally would on the surface of the skin.

All the components included in new ***Simply Clear*** Acne Gel act on the comedone to dissipate, soften or hydrolyze the hardened material. Since both comedone and corneocytes contain water as well as oil (sebum),[1,2] most of the ingredients in ***Simply Clear*** are both lipophilic (oil soluble), and hydrophilic (water soluble), so that they more easily infiltrate the pore and follicle. Included in the Acne Gel are: salicylic acid, dipropylene glycol, urea, glycerin, lactic acid, chlorine dioxide, and a tissue penetrating surfactant. These materials are combined for the purpose of breaking molecular bonds of keratin and corneocytes, or preventing connections from forming in the first place.

Chlorine dioxide is notable for its potential to disperse the comedone. It is a gas, a small molecule, non-ionic, highly tissue and oil-soluble — and therefore especially penetrating. The compound oxidizes what are known as "disulfide bonds"[3] found in the keratin strands (a process called keratolysis) which ordinarily link, binding the keratin together. Lactic acid, on the other hand, as an alpha hydroxy acid, interferes with the initial formation of "ionic bonds,"[4,5] thus preventing intercellular connecting of corneocytes. Urea disrupts "hydrogen bonds" as a keratolytic agent,[6] breaking connections that hold corneocytes together.

And finally, salicylic acid (after over 100 years of "curing" acne[7]) is speculated to solubilize "intercellular cement" between corneocytes. Of equal, or more importance, salicylic acid enhances the absorption of other agents into the complex follicle tissue, as does glycerin.

A high concentration of lactic acid, besides preventing corneocyte bonds, is claimed to reduce the abnormal keratinization of the follicle wall, the original acne defect.[4] Lactic acid and a few of the above ***Simply Clear*** ingredients are traditionally included in other acne medications, but none are combined with disinfection or oxidation as with ***Simply Clear***. This would normally require two or three separate steps. The specific pH of ***Simply Clear*** and a dual dispensing system permit the unique combination of chemical ingredients.

The ability to penetrate the comedone is as valuable as the cidal and neutralization properties of the constituents. Promoting drainage and inhibiting formation of new blockages would greatly limit the disease. Most inflamed lesions arise at this site[8,9] since the comedonal material entering the skin outside the follicle produces inflammation.[10] This toxic reaction should warn patients away from removing their own whiteheads and blackheads, where irritating compounds could slip into the dermis.

Scarring is possible by the body's inflammatory response to material in the plugged gland, and not necessarily produced by deeper injury at a later stage of the acne. Scarring may affect up to 90% of patients with acne, and the degree of scarring is not only related to the severity of the disease, but also to the time elapsed before adequate therapy is begun.[11]

Bacterial Inactivation

Although acne is not initially caused by bacteria, microorganisms, chiefly *P. acnes*, play an integral role in the disease. Without this anaerobic (oxygen free) bacteria multiplying under the skin, infection and inflammation would not occur. There is a good correlation between the severity of the inflammatory acne and the level of circulating antibodies to *P. acnes*.[12,13] Two other bacteria along with *P. acnes*, *Staphylococcus* and *M. furfur,* are found in the infected follicle and comedone. This comedone, or familiar blackhead and whitehead, blocks the follicle pore and adds to the inflammatory process. Frontier's ***Simply Clear*** Gel, a particularly fast antimicrobial, would deactivate infecting organisms on contact when penetrating the blocked follicle.

Many studies have shown that Frontier's chlorine dioxide gels will, in fact, kill all microorganisms within a minute, including spores. One of the above microbes, *M. furfur,* is a yeast, and its prevalence in the comedone is even greater than *P. acnes*.[14] The organism is not easily destroyed by present topical preparations or antibiotics,[15] but is susceptible to ***Simply Clear*** Acne Gel. Another group of micro-organisms sometimes associated with acne, called gram negative bacteria, are resistant to standard treatments, but not ***Simply Clear***.[16]

Besides removing bacteria, ***Simply Clear*** may neutralize inflammatory, or proinflammatory,[17] substances released by bacteria in the sebaceous follicle. This chemical action is due to the exceptional oxidation properties of chlorine dioxide, a constituent in Frontier's new formula.[18]

Stopping the Signal

The initial signal to activate the immune system, interestingly, is not from bacteria outside the follicle, or rupture of the follicle wall. It is due to the bacteria's release of molecules through the intact follicle,[19,20] and the passage probably aided by the distended tissue of the sebum-enlarged gland.[9] Inflammatory lesions become apparent when PMN white blood cells[21] infiltrate the follicle, initiated by "chemoattractants" from *P. acnes*. Since inflamed lesions are usually associated with distention of the pilosebaceous gland,[22] opening the follicle pore would prevent both the enlargement of the gland and the stretched walls, conceivably limiting the signal transfer.

With acne disorder, an array of active chemicals can be found in the infected follicle.[23] These are due to *P. acnes* bacteria, directly or indirectly. Bacteria in a follicle, usually in the comedone, can cause the body to send white blood cells to that follicle, and invite other parts of the immune system.[24] This in turn causes the area to become inflamed and painful. It would appear that killing the bacteria harbored in the blocked follicle would stop the immune response.

The first inflamed lesions noticed in acne are called papules, appearing as small red bumps. If the follicular wall around the comedone becomes inflamed, or is damaged, contents of the comedone may exude into the dermis or skin and initiate a further inflammatory reaction. The lesion is then clinically defined as a pustule, or commonly, a pimple. Pus is the hallmark of the second stage, pustule, and is composed of white blood cells combined with killed bacteria. Pustules often hurt before they can be seen.

Many mediators[25] can be oxidized and neutralized by chlorine dioxide, at least *in vitro*. The catalyst, lipase, released by *P. acnes*, attracts disruptive PMN neutrophil cells, and also acts on sebum to produce free fatty acids. Free fatty acids themselves irritate the follicle and the surrounding dermis after follicle rupture. These particular compounds are sometimes quantified by researchers as a measure of the severity of the acne disease. Several other catalysts contributing to tissue injury are involved in acne, as well as lipase, and these may be neutralized in theory, since catalysts are normally deactivated by oxidizing agents.

Finally, DHT, the most active hormone in the mix of several others, is oxidized naturally in the body,[26,27] and possibly here too, by chlorine dioxide. This chemistry is of particular interest since DHT, which is manufactured in the sebaceous gland, stimulates both the original fault in the follicle wall, and also sebum formation.