

Enhanced-Delivery Tetracycline for Cosmetic and Dermatological Conditions

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Summary

Vitastem™ is an over-the-counter (OTC) topical ointment with a patent pending dual carrier delivery system that greatly enhances product penetration – the ViaDerma Transdermal Carrier (VTC) system. VTC permits rapid penetration of active ingredients through the skin and into cells, making this not only one of the strongest antibiotics in the world, but also giving it intense healing properties unlike anything else available on the market today. VTC enables tetracycline to overcome the bacteria's efflux pumps, and rather *influx* the antibiotic – this means that Vitastem has both a chemical *and* physical kill mechanism, which we call Advanced Biological Coverage (ABC).

Introduction

Vitastem was developed by a team of scientists and physicians with a combined experience of 60 years in Biochemistry, Molecular Biology, and Wound Care. Our novel approach to overcome drug resistance of antibiotics is designed to sustain the effectiveness of Vitastem for many years. This gives Vitastem a longer useful lifetime and therefore more commercial value. In recent years, the dearth of new antibiotics has been largely due to the uncertain new-drug commercial lifetime which is diminished when bacteria develop immunity to that drug.

“Gram Positive” vs “Gram Negative” Bacteria

The terms Gram-positive and Gram-negative are used to quickly classify bacterial into two broad categories according to their different types of cell walls. It refers to their results in the Gram stain test – gram positive bacteria give a positive result in the Gram stain test, because they take up the crystal violet stain and then appear to be purple colored when seen through a microscope; gram negative bacteria appear purple or pink because they take up the counterstain in this test.

All Gram-positive bacteria are bound by a single-unit lipid membrane, and, in general, they contain a thick layer (20–80 nm) of peptidoglycan responsible for retaining the Gram stain. In contrast to Gram-positive bacteria, all archetypical Gram-negative bacteria are bounded by a cytoplasmic membrane and an outer cell membrane; they contain only a thin layer of peptidoglycan (2–3 nm) between these membranes. The presence of inner and outer cell membranes defines a new compartment in these cells: the periplasmic space or the periplasmic compartment.

Despite their thicker peptidoglycan layer, Gram-positive bacteria are more receptive to antibiotics than Gram-negative, due to the absence of the outer membrane.

Antibiotic Resistance

It is well known that bacteria evolve to develop resistance to the effects of antibiotics. There are many types of antibiotics. Chiefly, they have two types of mechanism of action: antibiotics either function as bacteriostatic or as bactericidal. As bacteriostatic they stop the bacterium from multiplying further by interfering with their DNA, but they do not kill the bacteria. As bactericidal, they kill the bacteria (eg, Penicillin is a bactericidal antibiotic).¹

A plasmid is a small, circular, double-stranded DNA molecule that is distinct from a cell's chromosomal DNA. Plasmids naturally exist in bacterial cells, and they also occur in some eukaryotes. Often, the genes carried in plasmids provide bacteria with genetic advantages, such as antibiotic resistance.²

It is relatively easy for bacteria to change their response to a chemical threat, but it takes numerous generations for bacteria to grow a new kind of cell wall structure to respond to a physical threat. This means that antibiotic products that utilize a physical mechanism of action show great potential for treating bacteria that develop resistance to standard antibiotics.

Active efflux is a mechanism responsible for extrusion of toxic substances and antibiotics outside the cell. This mechanism is important in medicine as it can contribute to bacterial antibiotic resistance - pathogens use an energy dependent mechanism (active transport) to pump antibiotics outside of their cell walls before the antibiotic is able to have an effect (kill the pathogen), rendering the antibiotic ineffective. Some efflux systems are drug-specific, whereas others may accommodate multiple drugs, and thus contribute to bacterial multidrug resistance (MDR). Efflux may be the most important evolutionary mechanism used by bacteria to develop resistance to antibiotics. Some of these efflux pumps exhibit an extremely wide specificity covering practically all antibiotics. It is disturbing to the medical community that the antibacterial agents of the most advanced type, which are unaffected by common resistance mechanisms, are the compounds whose use appears to select for multidrug-resistant mutants that overproduce these efflux pumps of wide specificity.³

Tetracycline

Tetracycline resistance is normally due to the acquisition of new genes often associated with either a mobile plasmid or transposon. Specific tetracycline resistance genes have been identified in 32 Gram-negative and 22 Gram-positive genera.⁴

As an antibiotic, tetracycline uses a *chemical* mechanism of action. Tetracycline antibiotics are protein synthesis inhibitors, inhibiting the binding of aminoacyl-tRNA to the mRNA-ribosome complex. They do so mainly by binding to the 30S ribosomal subunit in the mRNA translation complex.⁵ As an anti-inflammatory, tetracycline suppresses the up-regulation of matrix metalloproteinases and cathelicidins, which are hallmarks of chronic inflammation. This has led to extensive research on chemically-modified tetracyclines or CMTs (like incyclinide) for the treatment of rosacea, acne, and various types of neoplasms.

Vitastem and How it Works

Our tetracycline technology provides enhanced capabilities against antibiotic-resistant strains of pathogens.

Advanced Biological Coverage (ABC) technology

Single chemicals offer limited enhancements of skin permeability. Mixtures of chemicals can overcome this limitation owing to their synergistic interactions. Vitastem utilizes an enhanced transdermal drug delivery system to transport key ingredient molecules quickly and effectively through the skin and into cells. It is unique in that it utilizes both a physical and a chemical mechanism of kill to fight pathogens – we call this Advanced Biological Coverage (ABC). All known antibiotics (other than ours) primarily use only a chemical mechanism of kill. To overcome bacteria's tendency to evolve and become resistant to an antibiotic, Vitastem additionally incorporates a physical kill mechanism. This is the reason why Vitastem's tetracycline technology provides enhanced capabilities against antibiotic-resistant strains of pathogens.

ViaDerma Transdermal Carrier (VTC)

Vitastem's transdermal penetration system (VTC), is a proprietary patent-pending method of delivering key ingredients. Individually, each of the FDA approved inactive ingredients are single chemicals that offer limited enhancements to skin permeability. However, when these ingredients are mixed at specific concentrations, with specific temperature and time, the cocktail of chemicals act synergistically to form an enhanced transdermal carrier system with superior product penetration. Our patent pending transdermal formulation then carries the active ingredient, tetracycline, deep into the tissue and across cell walls. This means that tetracycline penetrates in much higher concentrations and with greater effectiveness than other products. Whereas conventional topical antibiotics require more time (usually prescribed for 5 to 7 days for best results), Vitastem usually produces desirable results in 24 hours (or less). VTC increases the mass transfer of tetracycline across cell membranes, penetrating any cell wall, and enabling it to get where most products can't.

Topical Vs Oral Antibiotics

Vitastem topical antibiotic has been shown to kill all harmful Gram positive and Gram negative bacteria that have been available for testing. We believe this is the world's strongest broad-spectrum topical antibiotic.

Liquid solutions are typically thought of as only being able to provide a limited dose, because they are applied as a thin topical application. However, a study showed that after just 60 seconds, 58% of the Vitastem had penetrated the skin as deep as 0.125cm, with only 42% of the initial dose left on the surface of the skin. After 24 hours, there was 92% product penetration as deep as 0.6cm.

Conditions and Case Studies

Acne

In 2015, acne was estimated to affect 633 million people globally, making it the 8th most common disease worldwide.⁶ Acne, also known as acne vulgaris, is a long-term skin disease that occurs when hair follicles are clogged with dead skin cells and oil from the skin.⁷ It is characterized by blackheads or whiteheads, pimples, oily skin, and possible scarring.⁸ It primarily affects areas of the skin with a relatively high number of oil glands, including the face, upper part of the chest, and back.⁹

Genetics is thought to be the primary cause of acne in 80% of cases.⁸ A frequent factor is excessive growth of the bacterium *Propionibacterium acnes*, which is normally present on the skin.¹⁰ Treatments applied directly to the affected skin, such as azelaic acid, benzoyl peroxide, and salicylic acid, are commonly used. Antibiotics and retinoids are available in formulations that are applied to the skin and taken by mouth for the treatment of acne.¹¹ However, resistance to antibiotics may develop as a result of antibiotic therapy.¹² Several types of birth control pills help against acne in women.¹¹ Isotretinoin pills are usually reserved for severe acne due to greater potential side effects. Early and aggressive treatment of acne is advocated by some in the medical community to decrease the overall long-term impact to individuals.¹³

Acne Case Studies

Acne Case Study 1:

A white, 36 year-old female with a 25 year history of acne. Claims that nothing had worked for her, including oral and topical prescriptions. Regimen: 3-4 drops in the morning, left on for 30 minutes then washed off. 3-4 drops at night, left on all night Result: Complete resolution with 2 weeks. Typical healing cycle: 4-6 weeks minimum, and sometimes daily use for up to two years with topicals.

Before



After 2 Weeks of Treatment



Psoriasis

Psoriasis is a chronic, autoimmune inflammatory skin disease that affects 2–3% of the population worldwide.¹⁴ Although the pathogenesis of psoriasis is not fully understood, it is thought to result from the immune system sending out faulty signals that speed up the growth cycle of skin cells.

Psoriasis is not contagious.¹⁵ It commonly causes red, scaly patches to appear on the skin.¹⁶ The scaly patches caused by psoriasis, called psoriatic plaques, are areas of inflammation and excessive skin production. Skin rapidly accumulates at these sites and is a silvery-white appearance. Plaques frequently occur on the skin of the elbows and knees, but can affect any area including the scalp, palms of hands and soles of feet, and genitals.¹⁷ In contrast to eczema, psoriasis is more likely to be found on the extensor aspect of the joint. The disorder is a chronic recurring condition.¹⁸

Psoriasis Case Studies

Psoriasis Case Study 1:

Male patient aged 38, has suffered from periodic, mild psoriasis for 10-12 years. Previous flare-ups were treated with hydrocortisone creams, Neosporin and various other lotions, with only limited/partial results. Flare-up typically occurred on arms just below elbow.

After a new, previously untreated flare-up, Vitastem was applied three times daily for two days.

Before



After 2 Days of Treatment

Patient applied Vitastem 3 times daily for 2 days. Note dramatic reduction in the appearance of swollen red patches of skin and a total reduction of the silvery flaky scales.



3 Week Follow-Up

Patient later reported that after the use of Vitastem his psoriasis outbreaks stopped being constant and recurrent.



Psoriasis Case Study 2:

67 year-old male, lifetime psoriasis sufferer, as was his father. Dry, flaky white patches of psoriasis on both elbows, running vertically for 2 - 3 inches as shown, and on both knees in quarter to half dollar size patches. No bleeding, excessive redness, itching or pain occurs, just recurrent and persistent dry white patches.

Comparison study was conducted where only the left arm was treated. After baseline photographs, treatment commenced with twice-daily Vitastem applications. Within one day, the whiteness of the patches was fading, although the subsurface "patchlets" were still there. After 4 days of treatment, these were significantly reduced. By the 8th day, the patchlets were almost dissipated, although the underlying redness and roughness of the skin had not disappeared yet. Comparison of treated and

untreated arms shows dramatic difference in the skin and almost total reduction of the dry psoriasis patches.

Before



Left Arm 10/12/10 Before Treatment

After

Patient's left arm shown after 1 day, 4 days, and 8 days of treatment vs right arm (no treatment).



Left Arm 10/13/10
1 Day of Treatment with Tetracycline ABC



Left Arm 10/16/10
4 Days of Treatment



Left Arm 10/20/10
8 Days of Treatment



Right Arm 10/20/10 with no treatment
(Same as Day 1 with no change)

Eczema & Atopic Dermatitis

Dermatitis, also known as eczema, is a group of diseases that results in inflammation of the skin. These diseases are characterized by itchy skin, red skin, and a rash. In cases of short duration there may be small blisters while in long-term cases the skin may become thickened. The area of skin involved can vary from small to the entire body.¹⁹

Treatment of atopic dermatitis is typically with moisturizers and steroid creams. Antibiotics may be required if there are signs of skin infection.²⁰ There is also a newer injectable therapy for moderate to severe eczema called Dupixent. Dupixent's active ingredient is an antibody (dupilumab) that binds to a protein [interleukin-4 (IL-4) receptor alpha subunit (IL-4R alpha)], that causes inflammation. By binding to this protein, Dupixent is able to inhibit the inflammatory response that plays a role in the development of atopic dermatitis.²¹

Atopic dermatitis (AD) is a common chronic inflammatory type of eczema. Several studies have shown initial epidermal barrier dysfunction with subsequent immune activation as the underlying mechanism. Animal studies, case reports, and randomized clinical trials have suggested that vitamin D, through various mechanisms including immunomodulation, may alleviate the symptoms of AD.²² The majority of these studies indicate an inverse relationship between the severity of atopic dermatitis and vitamin D levels.²³

Eczema & Atopic Dermatitis Case Studies

Eczema & Atopic Dermatitis Case Study 1:

Male, 41 years old, Good health. **Eczema**, 10-year history with nothing working for him to date. Applied 2-drops, 2-time per day, No cover. Completely healed in 10 days vs. typical healing time 4-6 weeks.

Before



After 10 Days of Treatment



Additional Benefits for the Skin

In addition to carrying tetracycline in high concentrations across cell membranes, Vitastem also contains Dimethyl sulfoxide (DMSO), Cholecalciferol (Vitamin D3) and Ascorbic Acid (Vitamin C) which are known

to have profound skin healing and regenerative effects. These ingredients are similarly carried across cell membranes by VTC technology, leading to enhanced penetration and concentration.

Dimethyl sulfoxide (DMSO)

DMSO improves blood flow and increases skin hydration by attracting water molecules. It increases tissue perfusion (the passage of fluid through tissue).²⁴ Despite the product containing DMSO, there is no concern for those with a Sulfa allergy due to the low concentration and non-systemic effect.²⁵

Vitamin D

Vitamin D plays a crucial role in skin immunity, skin barrier function, wound healing, tissue repair, and other cellular functions in the sebaceous glands and hair follicle. Vitamin D has been shown to repair skin damage, prevent infections after skin injuries, and rejuvenate the skin. It contains strong anti-inflammatory properties that make it effective for treating burns, skin injuries and skin damage.²⁶

Vitamin D is a fat-soluble prohormone steroid that has endocrine, paracrine and autocrine functions. These potential effects include inhibition of cell proliferation, promotion of cell differentiation, and apoptosis which may in turn have roles in cancer, immunity, and many organ systems. There are only three sources of Vitamin D – sunlight, diet and vitamin D supplements. Once in the circulation, vitamin D is converted by a hepatic hydroxylase into 25-hydroxyvitamin D (25(OH)D; calcidiol). The circulating 25(OH)D level is an indicator of the vitamin D status. Studies suggest that a 25-(OH)D level as high as 75 nmol/L or higher is needed to cover all physiological functions of vitamin D and should therefore be considered optimal.²⁷

Vitamin D has critical roles in regulating the skin differentiation process while inhibiting proliferation; regulating skin barrier formation which is crucial for defending the skin; inducing the innate immune response in skin as well as activating receptors that result in the killing of invasive organisms; and directing antibacterial responses by modulating gene expression. Vitamin D receptors are involved in numerous cytokine and immune responses (eg. B cells, T helper cells, Regulatory T cells aka Tregs). The ability to mount an appropriate response to infection is therefore highly dependent on the availability of Vitamin D.²⁸

Studies have also demonstrated that Vitamin D plays a vital role in the maintenance of the hair follicle and cellular functions in sebaceous glands, as well as having a photoprotective effect against the damage caused by UV light - which leads to DNA damage, inflammatory responses, skin cell apoptosis (programmed cell death), skin aging and skin cancer.²³

Vitamin C

Vitamin C (ascorbic acid) has numerous skin benefits. It promotes collagen synthesis, accelerates skin healing, reduces skin discoloration, evens skin tone, improves hydration, and reduces inflammation. As an antioxidant, it protects skin from sun damage and effects of pollution.²⁹

Promotes Collagen Production

The bane of any woman's existence are fine lines and wrinkles. But rather than give into the abyss of aging, the regular use of vitamin C products can combat their very appearance because of their concentrated levels of antioxidant-rich vitamin C, which helps boost collagen production, filling in fine

lines and wrinkles. As a result, you may find that you have more youthful looking skin without the need for any expensive and potentially risky cosmetic work.³⁰

Protects Skin From Sun Damage

In addition to its anti-aging benefits, topical vitamin C is also great for protecting your skin from damage—especially from the sun's UVA and UVB rays. That's because vitamin C is an antioxidant, so it naturally helps to strengthen your skin and repel things that could damage it. Of course, topical vitamin C should not be considered an alternative to wearing sunscreen, but when combined with regular sunscreen application, it can really work wonders for your skin. Reduces Under-Eye Circles Vitamin C has also been found to help even out skin tone and reduce the appearance of under-eye circles. This is great for those who are tired of trying to conceal the dark circles under their eyes and want to enjoy a more youthful, bright, and vibrant appearance.²⁷

Speeds up Healing

Studies have also found that high levels of Vitamin C can help to speed up the body's natural healing processes. This makes it ideal for use on the face and other areas of skin, as it can help to heal small cuts, acne scars, and other blemishes more quickly and effectively. Reduces Skin Discoloration If you suffer from skin redness or other discoloration of the skin, then a quality vitamin C serum may also be able to help you achieve a more uniform skin tone and better complexion. Specifically, vitamin C is great for reducing embarrassing redness. With just a few uses, you may find that you have a more even skin tone.³⁰

Keeps Skin Looking Younger

No matter what your age, it's always a good idea to be preemptive about avoiding wrinkles, sagging skin, fine lines, and other signs of aging. Vitamin C can help your skin look younger for longer, not only by stimulating collagen production, but by evening out your skin tone and brightening your complexion as well.³⁰

Improves Hydration and Moisture

If you suffer from dry skin, vitamin C is a must. This is especially true if you have tried using moisturizers and creams in the past, only to find that your skin is still dry and flaky. With topical vitamin C products, you can enjoy the high concentration of vitamins that your body truly needs to improve moisture content and overall hydration.³⁰

Creates Brighter, Healthier Skin

In addition to improving your skin's overall complexion, vitamin C can brighten otherwise dull skin, allowing it to look healthier and more vibrant. Strong concentrations of this vitamin leave the skin looking and feeling replenished and revitalized. Reduces Inflammation It has also been found that vitamin C, in high enough concentrations, has inflammation-reducing qualities. This is ideal for people who tend to wake up in the morning with unsightly puffiness around the eyes or other areas of the skin/face. A little bit of vitamin C serum can go a long way here.³¹

Speeds Up Healing of Sunburns

Finally, in addition to protecting your skin from sun damage, vitamin C can also be effective in helping to speed up healing of sunburns. Apply some after you have been sun burned, and the vitamins will help to promote faster healing so you can get rid of redness and find relief from itching, burning, and other symptoms associated with sunburn.²⁷

Conclusion

Vitastem is an FDA registered* OTC drug and includes one of the world's strongest topical antibiotics, tetracycline. Each gram contains the active ingredient Tetracycline Hydrochloride 30mg, methylparaben, sodium hydroxide, sorbic acid, steric acid, water.

Vitastem kills all harmful bacteria that have been available for testing and that associated with conditions such as: eczema, psoriasis, acne, wounds, cuts, scrapes, and others. All known antibiotics (other than Vitastem) primarily use what's called a chemical "mechanism of kill" whereby the antibiotic attempts to kill the bacteria slowly by applying (if topical), or absorbing (if oral) more and more of the medicine over a period of time as it is taken as prescribed. While this can be somewhat effective, it takes much longer. Unfortunately, this also allows for bacteria to evolve and develop resistance to the medicine.

Vitastem uses both a chemical and a PHYSICAL mechanism to kill and fight pathogens. The physical mechanism of kill is a key feature of Vitastem's strength. Vitastem's patent-pending, specialized combination of ingredients has hacked the delivery formula that enables medicine to be transported at 10x the strength and depth of other products in the marketplace today. This formula stimulates the cell wall such that it is up to 10x more permeable than normal, allowing for substantially more medicine to enter into the cell, overwhelming and killing the bacteria so quickly that it does not have time to adapt and develop resistance. This highly concentrated and rapid delivery of medicine to the site of need is what has Vitastem many patients seeing results in 24 hours versus 5 to 7 days (as is the case with other products that treat the same conditions).

Vitastem also contains DMSO, Vitamin C, and Vitamin D, critical for healing of skin after an infection, cut, scrape or burn. Due to the effectiveness of the patent-pending delivery system, Vitastem delivers highly concentrated amounts of this Vitamin C and Vitamin D directly to the skin cells, allowing healing to take place much faster. Skin is left treated, and rejuvenated.

* Disclaimer: Most OTC drugs are not reviewed and approved by FDA, however they may be marketed if they comply with applicable regulations and policies. FDA has not evaluated whether this product complies.

Where to Buy

Our specialized, innovative combinations are available to you OTC directly from our laboratory. In this manner, we are able to monitor for the highest standards of quality. It can be purchased online at: <https://www.vitastem.net/products/vitastem>.

Storage and Longevity of Vitastem

Keep product refrigerated to preserve its effectiveness and color. A 15 ml bottle of Vitastem contains approximately 500 drops. Depending on the skin condition, frequency of application and the amount of the surface area covered, a 15ml bottle of Vitastem generally lasts approximately 6 months to a year. Vitastem has a shelf life of TWO years, so one bottle goes a very long way.

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