THE OXYGENSOLUTION
for Natural Pain Relief

TECHNICAL REVIEW

Oxygen Innovations INTERNATIONAL, LLC

MADE IN U.S.A.

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OTHER PATENTS PENDING

Forward

G.I. GEL VET is a topical gel infused with pure oxygen. Oxygen has been shown to have purifying characteristics and accelerate the healing process. While antibiotics and fungicides have their place, G.I. GEL VET gel may be applied to a wide range of skin and paw ailments. It is an effective alternative for combating bacterial and fungal infections, without the potentially dangerous side effects. In addition, it may provide steroid-free inflammation treatment through the analgesic property of nitrous oxide.

In my estimation, every vet should explore the potential of G.I. GEL VET healing gel, and all animal owners should have G.I. GEL VET gel in their "Animal First Aid Kit."

– Dr. Michael Hutchinson, D.V.M

A leading stem cell expert and practitioner, Dr. Hutchinson, D.V.M., is a highly sought after speaker at national and international veterinary conferences on the uses of animal stem cells. He has performed more than 1500 Adipose-Derived Stem Cell procedures on dogs, cats, horses, camels and a bird. As a result, Dr. Hutchinson is one of the most experienced veterinarians in the U.S. in the use of adipose SVF.

Dr. Hutchinson owns and practices at Animal General of Cranberry Township, located just north of Pittsburgh, Pennsylvania.

The efficacy of the healing properties of oxygen is well-proven – hyperbaric oxygenation therapy provides a prime example. Our proprietary system allows for the infusion of pure molecular oxygen into a topical gel designed to deliver similar restoration opportunity directly to the surface of the skin. This provides for a high concentration of oxygen to be made available to the cells, prompting and accelerating the therapeutic process.

Two other major factors must be noted: in addition to oxygen, the cleansing (through oxidation) and pain reduction characteristics of nitrous oxide may be realized. Lastly, a protective barrier of water-emulsified silicone helps keep the afflicted site clean.

– Dr. C. Edward Eckert, Ph.D.
G.I. GEL VET Creator
Oxygenation Therapy Specialist

Dr. C. Edward Eckert has an extensive backgound in chemical engineering with a Ph. D in Materials Science. He has in excess of 150 patents in materials processing and oxygenation therapy technologies, and currently specializes in aqueous oxygenation therapy and delivering the benefits of dermal absorption of oxygen.

In light of the increasing use of hyperbaric oxygen therapy by athletes to help heal bruises and sprains, Dr. Eckert has developed an oxygen-rich gel that anyone could apply to their skin seeking to aid in pain relief and encourage healing. He has formulated *G.I. GEL VET* with 5x the oxygen level found in ordinary water, creating a metastable oxygen suspension within an absorbable solution.

Animal Care Challenges

Veterinarians encounter a wide variety of animal ailments that may not respond to standard treatments.

There are three main concerns with topical medications routinely used by veterinarians:

1. There are an increasing number of "superbug" bacteria resulting in a growing resistance to standard antibiotics.
2. Just as in topical products for humans, there are many undesirable substances in products for animals, particularly in shampoos.
3. Steroids are a conventional treatment for inflammation with often overlooked negative impact.

Dr. Michael Hutchinson, D.V.M., is a well-known Western PA vet practicing at Animal General in the Greater Pittsburgh area. He states, *"In over 30 years of clinical practice, I have come across a great deal of abrasions, sores and cysts – specifically cysts located between the toes – that have not responded to traditional medication. In addition to often being ineffective for these conditions, therapies such as antibiotics can lead to highly resistant strains of bacteria."*

The most common yeast infection seen on the skin of animals is caused by *Malassezia.* Animals may be infected by other fungal strains, and numerous types of bacteria. Such strains include *Streptococcus, Staphylococcus, E. Coli, Proteus, Pseudomonas,* and a particular bacterial strain called *methicillin-resistant staphylococcuspseudointermedius* or MRSP. These usually infect through skin wounds, surgical sites and ears — and are difficult to treat.

Common animal dermal issues include:

- Allergic Dermatitis
- Yeast Infection
- Folliculitis
- Impetigo
- Seborrhea
- Ringworm
- Mange
- Dry, Flaky Skin
- Acral Lick Granuloma
- Hot Spots
- Interdigital cysts
- Flea-induced scratching damage

As mentioned earlier, the challenge becomes how to effectively treat while minimizing risk of resistant bacteria development and exposure to undesirable substances.

Treatments

Treatment of skin infections caused by yeast and fungus require treatment with an anti-fungal medication. Commonly used medications include ketoconazole, miconazole, itraconazole, griseofulvin and other anti-fungals.

Treatment of bacterial skin infections generally relies on antibiotics, often based on the results of the skin cytology and/or cultures. Common antibiotics include cephalexin, amoxicillin/clavulanic acid, trimethoprim/sulfa and others.

Panolog and **Animax** Ointments (along with others) combine nystatin, neomycin sulfate, thiostrepton and triamcinolone acetonide in a polyethylene and mineral oil gel base.

- Triamcinolone Acetonide (corticosteroid) provides quick symptomatic relief when applied topically.
- Nystatin (antifungal antibiotic) helps with the treatment of skin infections caused by Candida albicans.
- Neomycin sulfate (antimicrobial agent) works against both gram-negative and gram-positive bacteria.
- Thiostrepton (antibiotic) can fight against gram-positive organisms, including most that are resistant to other antibiotics.

When combined, these ingredients typically help to prevent bacterial infections caused by certain organisms.

Chlorhexidine and **ketoconazole** are used to treat fungal and bacterial diseases of the skin (for dogs, cats and horses). They usually require a prescription from a veterinarian, often for a shampoo formulation. Some fungi such as Candida albicans, have shown resistance to ketoconazole.

Other undesirable ingredients that may be found in the shampoo treatment include: Cocamidopropyl Betaine, Hydroxypropyl Methyl Cellulose, Acrylate c10-30 Alkyl Acrylate Crosspolymer, Methylchloroisothiazolinone, Propylene Glycol, Triethanolamine, Phenoxyethanol and Sodium Hydroxide (lye).

Topical creams and **ointments** are available for sore muscle and joints. Pain-reducing medications can have a variety of ingredients ranging from all natural to questionable. Vets often advise their customers to against using topical products designed for humans on animals, especially those containing flurbiprofen or other analgesics. Animals can become ill or even die if certain ingredients are applied or ingested.

For inflammation and pain management, **corticosteroids** are often prescribed as pills, topical medications or injections. Options include prednisone, prednisolone, triamcinolone, and dexamethasone and methylprednisolone.

Steroids come with potential side effects, including increase in thirst and/or appetite, weakened immune system, weight gain, ulcers and gastrointestinal concerns, blood clots, and diabetes. For external conditions, it is always prudent to have available effective non-steroidal alternatives to prevent overuse of potentially harmful options.

Corticosteroids may treat inflammation, but do nothing to help heal the underlying cause. In many cases, oxygen therapy may provide a better foundation for healing.

Summary

Treatment for animal skin and muscle conditions does not have to be so complicated or potentially unhealthy.

Antibiotics and antifungals have their place, but there is a growing resistance to standard antibiotics due to an increasing number of “superbugs.”

G.I. GEL VET **provides vets with an option made from non-toxic ingredients that does not promote resistance.**

The Oxygen Solution for Animal Care

G.I. GEL VET is a patented, odor-free, non-toxic, translucent gel containing molecular oxygen and nitrous oxide as active ingredients. It applies to skin cleanly, without a greasy residual. Dissolved oxygen and nitrous oxide absorb into the skin and may help relieve joint and muscle pain, as well as quicken the healing of skin irritations. A water-emulsified silicone blend helps to soothe and protect.

The gel does not contain perfumes, dyes, alcohols, free radicals, phthalates, parabens, cleansers, acids, oils, toxins, odors, or "iffy" chemicals. It's safe, antibiotic-free and effective, and supersaturated with molecular oxygen.

It contains no steroids or harmful chemicals, so there is no need to wear gloves when applying to an animal's skin or paws. It may eliminate the risk of contributing to resistant bacteria and other organisms – a welcome advantage in this day of "superbug" issues.

G.I. GEL VET gel can be used for muscle pain and skin irritations across a wide range of military and working animals. For a minor sprain or strain, a simple treatment is to rub the area with *G.I. GEL VET* 3x daily. The high concentration of oxygen may assist muscles to relax faster and become more flexible, reducing pain naturally.

In addition to dogs and larger animals such as horses, all may benefit from the muscle relief provided by *G.I. GEL VET* oxygenated gel.

"G.I. GEL VET provides almost immediate relief from local pain and itchiness, giving it a myriad of other uses – For instance, I have seen very favorable results utilizing it on suture lines for post-operative care.

Beyond question, G.I. GEL VET has become an invaluable tool in my arsenal, and I am confident that anyone who uses it to treat one of the aforementioned problems will feel exactly the same way."

– Dr. Michael Hutchinson

While name brand topical animal products generally rely on hydrocortisone and other steroids, or contain alcohol, *G.I. GEL VET* works differently. It brings a reservoir of oxygen into contact with the animal's skin and delivers analgesic nitrous oxide to enhance the effects of the molecular oxygen.

Additionally, the silicone may help protect affected areas against further contamination.

The Foundation

"Oxygen is critical for cellular growth, disinfection, tissue renewal, and promotion of collagen for healing. Wounds need oxygen to heal properly, and exposing a wound to 100 percent oxygen can, in many cases, speed the healing process."

– John Hopkins Medicine Health Library: *Hyperbaric Oxygen Therapy for Wound Healing*

"There appears to be a significant advantage to delivering oxygen topically in its dissolved form, as it is biologically available immediately upon administration."

– Daniel Ladizinsky, MD and David Roe, PHD

"Your body's tissues need an adequate supply of oxygen to function. When tissue is injured, it requires even more oxygen to survive. Hyperbaric oxygen therapy increases the amount of oxygen your blood can carry. An increase in blood oxygen temporarily restores normal levels of blood gases and tissue function to promote healing and fight infection."

– The Mayo Clinic: Tests and Procedures - *Hyperbaric Oxygen Therapy*

Our specialized process allows us to *hypersaturate* our gel with molecular oxygen – the result is unlike any other topical product. The skin is exposed to levels of oxygen that otherwise could only be experienced in a hyperbaric chamber.

In addition to the benefits of molecular oxygen and nitrous oxide, *G.I. GEL VET* is created with a viscosity level designed to get beyond fur to the skin.

Components

The order of the ingredients never changes, but the relative strength of each can be adjusted depending on the goal of the formulation.

- Pure distilled water
- Laponite® XLG (a clay-based cosmetic gelling agent)
- Silicone (non-toxic cosmetic grade)
- Epsom salts (for magnesium)
- Oxygen
- Nitrous Oxide
- Tetrasodium Pyrophosphate (TSPP – a food-grade thickener)

Distilled Water

Water is used as the solvent for two of the other major ingredients (Laponite®XLG, silicone) and acts as the carrier for the remaining ingredients.

There are four basic considerations for using water; it is:

- Ubiquitous
- Non-toxic
- Easily purified
- Part of our physical constitution

Water has the good solvency characteristics we need for oxygen and nitrous oxide, and is very adaptable for our purposes. Pure water avoids any negative aspects of other solvents such as menthol, which is toxic and flammable.

Tap water has too many impurities, including chlorine, minerals and other chemicals that result in increased levels of ions that interfere with the gel making process. Chlorine in water causes undesirable byproducts. The ionic content of water must be controlled in order to maintain the right viscosity levels for gel production.

Distillation is the preferred method. Distilled water intended for internal consumption is purchased directly from our supplier and meets our standards. Distilled water is 100% pure, so it fulfills the critical requirement of maintaining the proper ionic content level.

Laponite® XLG

Water has no order or viscosity, consisting of molecules that are not ordinarily attracted to one another. For our purposes they must be encouraged to do so. This is where Laponite® XLG comes in.

It is personal care-grade compound featuring high purity, and provides an almost synergistic effect when it comes to gel formation.

As the gel we create needs to stay intact while remaining highly viscous, the problem of spreading vs not spreading must be addressed.

Laponite® is a registered trademark of BYK Additives Limited.

Laponite® XLG is a layered silicate cosmetic clay compound created from naturally occurring inorganic mineral sources.

For the sake of readability, from this point forward Laponite®, Laponite® XLG and clay or cosmetic clay are used synonymously.

Example

A small amount of molasses poured on a table would start thick, but spread pretty thin over time. Nothing prevents these molecules from slipping over each other, so it spreads.

Conversely, toothpaste has a network of molecules that are attracted to one another – *bonding* – and these bondings have to be overcome for spreading to occur. Generally the bondings are overcome through pressure, such as being spread with a knife or using your finger.

Our gel suspends micro-bubbles that additional forces are needed to separate. On top of that, the bubbles need to be held in place beyond the apparent viscosity level. This requires a gelling agent, but one that does not deteriorate too quickly. While a carbon-based chain network would cause gelling, it is not long-lasting – too much oxidation too fast occurs. An alternative is needed.

The answer is found in using a compound that was already oxidized - Laponite® fits the bill. It is part of a class of hydratable clays with a 2D “deck of cards” array. Once hydrated, the molecular layers can slide around on each other, like a fresh deck of playing cards. When you tie them together you create a gel. This cosmetic clay also provides increased viscosity characteristics and improves the skin-feel of our gels.

Laponite® is a completely innocuous compound – there is nothing toxic or in any way undesirable that would preclude its use in our gel. In fact, it already has a great history of being used as a gelling agent in many cosmetic products, having already gone through rigorous testing and study.

Silicone

Silicone is a compound derived from sand and also contains oxygen. It is a safe, non-toxic softening and lubricating agent widely used in cosmetics. A very thin layer of silicone can act as a two-way barrier. It prevents the loss of natural skin moisture moving outward, while preventing the capture of dirt and grease by pores of the skin while it is ground inward. Studies have shown that silicone has helped to reduce scarring and is commonly used by plastic surgeons.

Silicone is a very long chain molecule – the longer the chain, the more viscous it is.

However, pure silicone is viscous and sticky. Since it does not mix with water – *and we need it to* – we created a unique phase contactor (specialized ultra-high speed sheer mixer) that will cause silicone and water to mix. This equipment adds so much energy that it overcomes the molecular barriers and allows mixing with water with silicone to create an emulsion (extremely fine particles of silicone in water). The emulsion remains stable even after vigorous shaking, similar to homogenized milk.

Our proprietary blending process adds silicone in such a unique way that it *does not clog skin pores*.

Surface Energetics

Silicone has a high contact angle (greater than 90°) and low wetting coefficient; it spreads well and does not get wet when contacted by a liquid. On the skin it functions similar to car wax: it forms a barrier and a film of protection.

Cosmetics that contain silicone will protect the skin, reduce the impact of dirt, and make the skin easier to clean. The structure of silicone results in the molecules being strongly attracted to each other, resulting in a highly impermeable barrier.

Silicone's intermolecular attraction forces are extremely high – it has a much higher affinity for surface molecules than it does for itself – and it becomes an extreme "non-wetting" agent. When silicone spreads, it precludes other liquids from spreading on IT; as a result other liquids will bead up (like fresh wax on a car). Water has a higher affinity for its own molecules, so it beads up on the silicone.

Synergy

Plastic surgeons like silicone because it facilitates production of collagen instead of scar tissue and facilitates healing.

The ingredients of *G.I. GEL VET* work together to provide a benefit greater than each could provide separately. When applied to the skin, the nitrous oxide may act as an analgesic to reduce pain and a skin exfoliator. The oxygen oxidizes and removes undesirable oils in the pores, filling the pores with oxygenated water. This results in a super clean skin surface.

The silicone then forms a protective barrier over the clean skin, and through capillary counter pressure keeps bad stuff from flowing back into the pores. It prevents the loss of natural skin moisture moving outward, while preventing the capture of dirt and grease by pores of the skin while it is ground inward.

Through this technology, your skin will be exposed to a level of oxygen previously not available anywhere for topical skin care.

Epsom salts (for Magnesium)

Magnesium (Mg) is added. In order to trap the oxygen between the Laponite® clay lathes (or layers), we have to “nail” them together (crosslinking). Mg is the catalyst for the gelling process.

To accomplish the crosslinking, a cation with a valence of +2 is required – it will provide the capability of bonding the lathes (having a charge of -1) together. Magnesium provides this capability in an inexpensive, innocuous way. As these lathes are bonded, the gel begins to form.

Our source of magnesium is Epsom salts (magnesium sulfate – $MgSO_4$). Epsom salts work well, are economical and medicinally acceptable, having been proven safe over the centuries.

The sulfate portion of the Epsom salts is incidental, present as a negative ion. It could provide additional value as ionic forms of sulfur such as sulfate balance the acid-base levels in the blood and help detoxify certain drugs in the body. However, it is doubtful that the minimal trace amounts that may be left not oxidized by the process have any impact.

Oxygen

Oxygen is known to enhance cellular metabolism, promote the repair of damaged tissue, and minimize scar formation. The oxygen dissolved in the gel interacts with the epidermal and dermal layers of the skin, and is drawn into deeper tissue.

While the gel contains exceptional levels of concentrated molecular oxygen, unlike other “oxygen-containing” topical products on the market, our gel does not contain peroxides or ozone that forms free radicals.

During the production process, skin-nourishing oxygen is both dissolved and adsorbed in the liquid portion of the gel. It is also visibly present as a dispersion of large (macro) and small (micro) bubbles.

- Dissolved = in water; mechanically inseparable (solution aspect)
- Adsorbed = microbubbles and macrobubbles

Microbubbles

Microbubbles smaller than one millimeter but larger than one micrometer in diameter are formed, captured and suspended in the gel without losing integrity. They help provide a good feel and form a layer of pure oxygen on the surface of the skin. This is due to the Laponite® providing an alternative surface for the oxygen to adhere to, instead of adhering to the water.

For example, water within a sponge is really just stuck in the sponge. You can wring it out and get the water back. The cosmetic clay takes on oxygen in a similar way, but during application the oxygen is “wrung out” of the Laponite®.

This follows the Langmuir adsorption model and applies to the nitrous oxide in the same manner:

- Laponate® = adsorbent
- Oxygen & Nitrous Oxide = adsorbates

Macrobubbles

Macrobubbles (larger than one millimeter in diameter) are also produced. These oxygen bubbles help to create the visual translucent characteristics of the gel, providing an affirmation of the gel's effectiveness – if the oxygen is gone, the gel is transparent.

Together these bubbles form a layer of pure gaseous oxygen as the gel is spread on the skin.

The Silicone Barrier

Question: *Why doesn't the oxygen and nitrous oxide simply just float away?*

Answer: *Silicone.*

In order for a gaseous loss to occur, a concentration gradient driving force is needed. Gases will flow from higher pressure to lower pressure (path of least resistance). Since the air around us already has its required oxygen concentration, the oxygen flows the opposite direction (into the skin) where the concentration is lower than the air. Not only does the silicone provide a smooth tactile sensation, it creates a barrier to prevent the nitrous oxide from floating away. This also helps the skin adsorb the nitrous oxide as it is drawn in with the oxygen.

Overall, molecular oxygen may enhance the healing process of tissue, nitrous oxide may act as both an analgesic and secondary oxidizer, and the gel provides the conduit.

The epidermis is a general shield designed to maintain proper balance/exposure to everything the skin might need. The dermis sublayer contains more water. Once the epidermis is cleaned, the dermis is much more encouraged to act as a draw, pulling the oxygen from the microbubbles into it. This also draws the analgesic nitrous oxide into the skin as well.

The speed at which oxygen is drawn into the dermal layers has not been determined, and could vary from person to person, depending on the level of dermal hydration present.

Finally, the oxygen used in production is completely clean. To provide high quality while keeping costs down, we maintain and clean our own cylinders so we know our standards are met with each production run.

Nitrous Oxide

Nitrous oxide (N_2O) is dissolved and adsorbed in the liquid portion of the gel. A portion of the visible macro and micro bubbles contain this gas.

Historically known for its gas-based analgesic and anesthetic properties, our process allows nitrous oxide to be delivered as a topical analgesic. It also has oxidizing properties that help clean the skin. Due to this effect, it also may result in smoother skin – without acids or abrasives.

As a topical agent, N_2O may “sedate” pain as it is drawn into and through the skin with the molecular oxygen.

There are equal portions of nitrous oxide and oxygen bubbles throughout the gel. However, without extreme care, N_2O will replace oxygen to the point of equilibrium. Our specialized blending process overcomes this tendency.

Tetrasodium Pyrophosphate

Tetrasodium pyrophosphate (TSPP) is a food-grade compound typically used in the food industry as a thickener and pH buffering agent. TSPP is a very rich sodium source – one molecule of TSPP provides four atoms of sodium.

TSPP disassociates easily, providing abundant sodium while discarding the phosphate. Leftover phosphates or sodium become inactive ingredients in inconsequential amounts. For our application, it is used as an efficient source of sodium molecules, becoming a *viscosity regulator*.

After adding magnesium to cause gelling, the process must be strongly controlled. If excessive viscosity occurs, the gel will begin to crosslink too early. The sodium (Na +1) from TSPP prevents gelling from occurring before we want it to by inhibiting the action of the magnesium (Mg +2).

The adjustable combination of Na and Mg is used as a viscosity regulator: thin to thick, or thick to thin.

Ingredient Function Summary

- Distilled Water – dissolving medium
- Laponite® XLG – a clay-based gelling agent made from naturally occurring inorganic mineral sources; provides the material to capture and hold the oxygen
- Silicone – safe, non-toxic cosmetic lubricating agent blends and holds everything together; provides protective barrier without clogging pores
- Epsom Salts – magnesium “nails” the Laponite® XLG layers (lathes) together (oxygen “sandwiches”)
- Oxygen – may promote healing and enhances cellular metabolism
- Nitrous oxide – may provide analgesic as well as additional oxidation
- Tetrasodium Pyrophosphate (TSPP) – a food-grade thickening agent with highly available sodium

Application

G.I. GEL VET topical healing gel may be used for:

- Allergic Dermatitis, Impetigo, Dry, Flaky Skin
- Yeast Infections, Folliculitis, Seborrhea
- Ringworm, Mange sores, Flea-induced scratching damage
- Acral Lick Granuloma, Hot Spots, Interdigital cysts

In addition, it may be used on any scrapes, wounds that must heal without sutures, acne, burns, and skin-fold pyodermas often seen on Bulldogs, Pugs, and dogs with a lot of extra skin.

G.I. GEL VET healing gel provides an alternative to topical antibiotic and antifungal creams on the market, such as Animax, Panalog, Chlorhexiderm, Ketoconazole and Neosporin.

"Discovering G.I. GEL VET has truly been a blessing to my practice.

It has given my associates and me a novel, safe (in over a year of use I have seen zero reactions) and incredibly effective way to heal abrasions, sores and cysts that have not responded to other treatments. G.I. GEL VET does this by creating oxygen-rich environment that is detrimental to harmful bacteria, viruses and yeast."

– Dr. Michael Hutchinson

PRIMARY GOAL	SECONDARY GOAL	FEATURE	BENEFITS
Healing	**Pain Reduction**	**Low viscosity**	**Superior coat & interdigital permeation**

The gel can be used for any condition where oxygen can enhance the healing process.

As a general rule, apply *G.I. GEL VET* 3 times daily until issue is resolved (or as needed). Use enough to cover the area – you cannot use too much. Rub it in gently for wounds and thoroughly for muscle and joint pain. The more severe the condition, the more you may need.

Unlike other topical gels, *G.I. GEL VET* has no restrictions regarding how much or how often it is applied.

However, animal owners should not apply it to infected areas if advised by a veterinarian not to use topical gels and lotions until he or she has approved the ingredients.

As with any topical, you should avoid contact with the animal's eyes. *G.I. GEL VET* is intended for external use only.

G.I. GEL VET **comes with an expiration date, but we have yet to see a bottle expire. This is the nature of the gel – the bubbles make it cloudy. If it's cloudy, the oxygen and nitrous oxide are still viable and effective.**