DMSO is a Miraculous Therapy for Chronic Pain and Musculoskeletal Injuries

The decades of evidence DMSO remembers the practice of medicine

A MEMENTOMORI DOCTOR
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Story at a Glance:

•The standard approach for treating pain and musculoskeletal injuries typically involves giving NSAIDs (e.g., Ibuprofen), and in more severe cases, opioids. Unfortunately, these drugs are extremely dangerous (e.g., each one kills tens of thousands of people each year), but nonetheless have remained the standard of care for decades.

•DMSO is a remarkably effective pain-killing agent, in many cases allowing individuals who'd been disabled for years by their pain (e.g., a failed spine surgery or severe arthritis—DMSO's most popular use) to get their lives back. Furthermore, it can treat many types of pain other therapies do not work on (e.g., complex regional pain syndrome).

•DMSO is a highly effective therapy for healing wounds and creating healthy scars, making it particularly helpful for recovering from surgery.

•DMSO is incredibly effective for healing a wide range of acute and chronic musculoskeletal injuries (e.g., arthritis, headaches, neck and back strains, restless leg syndrome, sprained ankles, trigeminal neuralgia and numerous traumatic injuries). It typically has an 80-90% success rate and often has an instant and dramatic effect. This are very particularly popular with professional athletes, as it allowed many of them to quickly return to the field rather than be out for the rest of the season.

•In this article, I will review the scientific literature that explains how DMSO provides pain relief and healing, the vast body of evidence (comprising of thousands of patients) showing it indeed does, and our preferred DMSO home treatment protocols for pain, arthritis, and musculoskeletal injury (along with the best sources for procuring DMSO).

One of the curious facets of Western Medicine is that while money is always spent on "research," whenever the occasional miracle drug comes out that works too well with a wide range of applications, it is inevitably consigned to the dustbin of history regardless of the data put forward for it.

In the first part of this series which provides important context for this article, I listed the decades of evidence that demonstrates the simple (naturally occurring) chemical Dimethyl Sulfoxide (DMSO) is a remarkably safe drug that completely transforms the care of many fundamentally and insurmountable illnesses (e.g., strokes, severe head trauma, spinal cord injuries, amyloidosis, Down's Syndrome and dementia).

Note: after publishing the first article, I received many correspondences from readers who said DMSO was life saving when they had a stroke, many more testimonials on Twitter, and a few stories where it was used to treat a pet's stroke (e.g., this reader's dog).

However, while each of these applications, particularly DMSO's utility in strokes, would completely change medicine and how those lifelong illnesses affect our society (and were what drove many doctors to spend decades researching DMSO), none of that accounts for why DMSO took America by storm and companies were launched that members of Congress eventually joined to overturn the FDA's embargo on DMSO.

Rather, it was because DMSO solved three of the most common problems in medicine:

•It quickly heals a wide variety of musculoskeletal injuries (e.g., those routinely experienced by professional athletes or a chronic back injury leading to partial disability).

•It effectively treats a variety of joint disorders (e.g., rheumatoid arthritis).

•It's an extremely effective and very safe painkiller.

Because of this, it was miraculous for many with chronic pain and disability (e.g., from osteoarthritis or a failed spinal surgery), particularly since all other pain-killing medications have significant (and frequently lethal) side effects and worse still—often don't even work.

Note: a key theme to consider throughout this article is the immense difference in toxicity between DMSO and its conventional alternatives (such as corticosteroids and gabapentin). For example, NSAIDS and opioids each kill tens of thousands of Americans each year, whereas in over 60 years of use by millions of people, DMSO has not been linked to a single death. Likewise, NSAIDS are the leading cause of drug induced hospital admissions (because they are toxic to the heart and small intestine and particularly toxic to kidneys and stomach), whereas a systematic review of all published DMSO studies found the side effects associated with DMSO (e.g., typically skin irritation or a garlic-like odor and occasionally nausea, vomiting or diarrhea) were minor and transient. Likewise, it's very easy to overdose on an NSAID or Opioid, whereas a meticulous human study found taking 90 days of DMSO at 3-30 times the standard dosage did not cause any toxicity and was well tolerated by the research subjects (whereas almost any other drug would be extremely dangerous at doses that high).

This program about DMSO ran 60 Minutes, for example, provides a context to how impactful it was for many Americans:

Additionally, shortly after this segment aired, a March 24, 1980, congressional hearing was held on the merits of DMSO, which grilled the FDA on its decades of stonewalling DMSO (leading to the FDA promising to treat DMSO fairly at the hearing).

1980 DMSO Hearing Transcript
23 MB • PDF file
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Sadly, despite the incredibly compelling testimony presented at the hearing, a subsequent Senate subcommittee hearing held over the drug's use in Alabama with the FDA on July 31, 1980, the former governor of Alabama being treated with it and a champion of DMSO, Department of Health and Human Services in 1985, the FDA never relented, and DMSO remains a forgotten side of medicine.

Note: the transcript of the Congressional hearing will be cited throughout this article.

In short, if DMSO were to become the standard of care due to its remarkably high success rate in treating a variety of common conditions, it would completely change the practice of medicine in the United States and likely knock many existing approaches out of business.

To illustrate, after I published the first article in this series, I received many emails like this:

> Thank you for your email on DMSO. I had severe pain in my piriformis for over 2 months and couldn't walk, and tried everything without success. I work in orthopedics, and have tried multiple injections, etc. When I read your article, I remembered using DMSO in the past for athletic injuries. I found an old bottle of DMSO 99% pure that I bought at a "Feed and Seed" store, for horses, about 25 years ago, but never threw it out. I immediately applied it to the painful areas, and it really worked! — Harriet

Likewise, to show how versatile and frequent the uses of DMSO are, since publishing the first article, in addition to treating a few cases of knee osteoarthritis (an area where DMSO excels), I had a relative in another state recently deliver a child at home who 12 hours later was in significant pain and could barely go to the bathroom (even with assistance). I told her to take DMSO (which she had at home since I encourage all my relatives to keep it on hand in case someone has a stroke). Within minutes, she had regained her mobility, her painful abdomen began normalizing, and she was able to quickly get through what would have otherwise been harrowing but medical history a challenging recovery. Furthermore, I also had a friend in another state contact me about complications from a hernia surgery a few days before (which DMSO also addressed).

Note: unless you're birthed a child, it's quite difficult to truly appreciate just how challenging both childbirth and the recovery process can be. After I started working with chronic pain patients, I realized many of them were in an analogous situation as many of the people they interacted with simply did not have the context to grasp how just difficult every moment of their life was.

It is understandably a bit hard to believe that DMSO can actually do that, so I have put a lot of work into presenting the evidence that it indeed does (which is essentially why I have been publishing less new content recently).

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Note: one of the most prominent concerns with DMSO is to not have a toxic chemical on the skin (e.g., a pesticide, nicotine or mercury) which it can draw into the body once DMSO is applied there (hence why it's generally advised to wash the skin beforehand). Additionally, there are some unresolved questions about using DMSO while pregnant that will be discussed in an upcoming article.

How DMSO Works

In the first part of this series, I provided a wealth of evidence that demonstrates a few key properties of DMSO, such as:

•It rapidly spreading throughout the body once it contacts the skin (or is ingested), and if mixed with anything, brings that into the body as well.

•It protecting cells from a variety of otherwise lethal stressors (e.g., burns, being frozen, losing their blood supply, radiation, and sonic shockwaves). This amongst other things allows it to be a miraculous therapeutic for otherwise crippling injuries of the central nervous system (e.g., strokes and spinal cord injuries).

•It is incredibly safe (with the primary side effects being a temporary concentration dependent irritation when it's applied to the skin and in certain individuals, an unpleasant garlic like odor that lasts for a few hours, while the primary severe side effect is a 12000 chance of an allergic reaction.).

•It significantly increases blood circulation throughout the body and simultaneously removes edema and excess fluid from where it does not belong. This is particularly important for the joints, as their structure predisposes them to having a limited blood supply especially when they are damaged and need that blood to heal.

These help explain how DMSO is almost universally applicable to a wide range of conditions—but simultaneously are only some of its remarkable properties. For instance, I believe its ability to rapidly heal injuries and eliminate pain results from being highly anti-inflammatory, restoring critical blood flow, being an effective muscle relaxant, protecting cells from death, and blocking the conduction of problematic pain signals.

If you take a step back for a moment, it's extraordinary a single substance can do all of that at the same time—particularly since the drugs we have that only do one or two of those (e.g., NSAIDs, steroids, or opioids) are often quite dangerous.

Note: in addition to these mechanisms, I believe that DMSO's other properties may also explain its analgesic effects. For example, pain is often due to a tight muscle or injured tissue, and since DMSO treats each of these, it can eliminate the "root cause" of pain.

However, I believe DMSO's least appreciated effect arises from its ability to eliminate blood stasis in the body, as in many cases, chronic pain is due to insufficient blood reaching an area (e.g., DMSO has been recognized to address the pain associated with blood clots). This builds on an observation from Chinese Medicine that blood stasis can cause severe pain throughout the body (e.g., sharp piercing pains are often associated with blood stasis) and my observation that blood stasis is a key disease of the modern age (in large part due to vaccines altering the electrical dispersion within the body and creating micro clots throughout it).

How DMSO Treats Pain

Note: I harbor strong ethical issues with animal experimentation (discussed further here) but am nonetheless citing animal studies because it is important for this information to be known.

A few mechanisms have been identified to explain how DMSO treats pain (many of which also likely account for DMSO's remarkable ability to heal musculoskeletal injuries).

Conduction Blocking

Many different nerves exist in the body. One group, known as the "small fibers" are responsible for transmitting specific sensations and particularly pain. Small fibers are frequently linked to debilitating chronic pain syndromes (e.g., small fiber neuropathy), is characterized by sensations of pins-and-needles, pricks, tingling, and numbness alongside burning pain and electrical shocks.

Note: the first most common symptoms of COVID vaccine injuries, in order, are fatigue, post-exertional malaise, brain fog (discussed further here), small fiber neuropathy, and dysautonomia.

DMSO selectively blocks the conductions of these smaller fibers, thereby stopping the pain without causing significant damage to the rest of the body or the body developing a tolerance to it (rather DMSO typically becomes more effective with time).

Note: alpha-delta (Aδ) fibers are responsible for sensing shallow, quick and sharp pain, whereas C fibers (especially when repeatedly triggered) mediate stronger somatic signals involving temperature, unusual touch, and muscle and joint pain—in essence competing many common facets of chronic pain.

This is supported by the following data:

•Dose study evaluated rural nerves within cats and found that 5% DMSO slowed the conduction and decreased the amplitude of nerve impulses within the C fibers, while higher doses (9% blocked it with the block being instantaneous at 15%, and that these effects disappeared once DMSO was washed off. Another rural nerve study found that at lower concentrations, DMSO blocked the conduction of small nerve fibers (first C and then Aδ), while at high concentrations, it blocked the conduction of larger fibers (alpha-beta [Aβ] and alpha-gamma [Aγ])

Note: this blockade is thought to be in part due to DMSO decreasing the resting membrane potential by changing its permeability to chloride and potassium (e.g., by blocking the leak channels).

•Another study found 5-10% DMSO blocked the afferdischarges of C-fibers to process associated with painful stimuli.

•DMSO has been observed to suppress NMDA and AMPA induced ion fluxes in neurons, each of which are receptors linked to chronic pain (e.g., NMDA is linked to central pain sensitization).

Note: I believe this property may in part account for why DMSO treats complex regional pain syndrome. Likewise, it has been proposed to explain its utility in treating cancer pain.

•DMSO has also been observed to block sodium and calcium ions' entry into cells (likewise, many local anesthetics work by blocking sodium ion entry). This effect has also been proposed to explain how DMSO can help cancer pain.

Note: DMSO has also been reported to significantly enhance the potency of local anesthetics (which in turn has been demonstrated in this study and this study).

•In a human study, 50% DMSO was found to produce partial anesthesia (numbness) to pinpricking sensation, while a quantitative sensation occurred with 20%, and no effect was observed with 10% DMSO.

•Isolated frog sciatic nerves immersed in 6% DMSO for 30 to 120 minutes developed a 40% decrease in conduction velocity. Normal conduction velocity returned after the nerves were washed for one hour in Ringer's solution.

Superficial radial nerves were isolated from adult cats and immersed in 75% DMSO for 60 minutes. Nerve conduction was totally abolished in the smaller nerve fibers (thought to be important in pain perception), but was reversible. If DMSO was washed off immediately once nerve conduction disruption began. Another author found that immersion in 5% to 50% DMSO completely blocked conduction in small peripheral nerve fibers from cats.

Note: DMSO temporarily blocking neurologic transmission may also treat pain by resetting pain circuits (as other methods that do this are highly effective for many of the challenging conditions DMSO also treats).

Choline Esterase Inhibition

The body has a variety of regulatory processes which in tandem allow it to maintain a steady internal state despite being exposed to numerous external stressors. One of them is to eliminate the neurotransmitters it produces so they do not excessively stimulate nerves. In turn, certain drugs (e.g., SSRI antidepressants) work by preventing this elimination, thereby raising the levels of a target neurotransmitter.

One of the key neurotransmitters in the body is acetylcholine, which serves a variety of functions such as being the primary neurotransmitter of the parasympathetic (rest and relax) branch of the autonomic nervous system. Acetylcholinesterase inhibitors raise acetylcholine within the body by preventing its breakdown enzyme from eliminating it. These drugs in turn have a variety of functions, such as increasing parasympathetic activity or improving memory, but likewise if used excessively can cause a dangerous overdose known as "cholinergic syndrome".

Note: years ago I tried nootropic nasal sprays for studying and found the most effective one was a natural acetylcholine esterase inhibitor (which also had the side effect of creating vivid and lucid dreams).

Decades of research (e.g., this 1966 study, this 1966 study, this 1973 study, this 1983 study, this 1991 study, and this recent 2012 study) have shown that DMSO is an acetylcholine esterase inhibitor (and that it increases the pre-synaptic release of acetylcholine). That property in turn is believed to account for DMSO lowering the threshold for muscle nerve excitation and DMSO's powerful ability to increase parasympathetic function in the body (e.g., DMSO increases the response of the smooth muscle of the stomach to both muscle and nerve stimulation and also to help with improved memory and concentration (although that could also simply be from improved cerebral circulation).

However, unlike other acetylcholine esterase inhibitors, at high doses it hasn't been observed to cause a cholinergic syndrome (which may be because while under 1% DMSO is an acetylcholine esterase inhibitor, over 10% blocks acetylcholine esterase, or because it is a competitive acetylcholine esterase inhibitor, or as the

previously cited studies show, because its inhibition is significantly weaker than the pharmacutical drugs used as acetylcholine esterase inhibitors).

Note: one of the few adverse effects of IV DMSO is certain individuals experiencing a partial reduction of the heart rate, which is likely due to DMSO's effects on the autonomic nervous system.

Furthermore, in addition to enhancing parasympathetic function, DMSO also blocks the inhibitory effects of the sympathetic nervous system, which (which counteract the sympathetic symptomatology commonly seen in autonomic disorders.

Note: this property may also contribute to DMSO's pain-relieving effects or existing research shows acetylcholine esterase inhibitors reduce chronic pain.

Anti-inflammatory:

Many of my colleagues who used DMSO in practice primarily used it for inflammation. It was incredibly effective in this regard, and unlike the other dangerous options (e.g., steroids or NSAIDs), DMSO is very safe. Since inflammation is a key component of both pain and musculoskeletal injury (e.g., "chronic inflammatory pain" is well recognized), this property likely is key to DMSO's utility in those conditions.

In the first part of this series, to help illustrate how DMSO can protect injured tissue from death (and allow non-healing brain or spinal cord tissue to heal), I provided the evidence (like this study) showing DMSO:

•Reduces pathologic inflammatory responses to tissue injury
•Reduces inflammatory cytokines.
•Reduces the production of inflammatory prostaglandins and increases the production of anti-inflammatory prostaglandins.
•Neutralizes (scavenges) free radicals, which are both a cause and result of chronic inflammation and a common cause of tissue injury, degenerative illness, and chronic pain.

In turn, numerous animal studies have shown shown DMSO prevents inflammatory stimuli from creating inflammation and tissue damage:

•In guinea pigs, locally applied DMSO was effective in inhibiting both the development of DNCD (an irritating chemical) induced contact dermatitis and local swelling.

•In rats, pressure necrosis was prevented by pretreatment of the skin with 70% DMSO. Carrageenin induced edema in their paws was reduced by topical but not oral administration of DMSO (as was zymosan-induced edema). DMSO prevented adjuvant-induced arthritis (and in another study) streptococcal adjuvant induced arthritis), topical DMSO inhibited traumatic edema induced by intraperitoneal injection of autologous blood in the leg of a rat, and DMSO prevented the formation of granulomas pouches. DMSO (70%) also prevented contact dermatitis, allergic eczema, and calcification of the skin.

•In rabbits, DMSO counteracted the Shwartzman phenomenon by suppressing inflammation if administered prior to injecting an inflammatory bacterial lipopolysaccharide and reduced inflammation when injected into joints with cotton oil induced synovitis.

•In horses, topical DMSO prevented the severe inflammatory reaction they typically experience from small doses of purified human gamma globulin (they have been sensitized to which leads to areas becoming so inflamed and edematous that the horses will not move their necks and frequently become necrotic).

Six horses with LPS induced synovitis in their mid-carpal joints received topical 90% DMSO gel, and compared to controls were found to have a decrease in joint inflammation (e.g., less neutrophils present). Additionally, DMSO was found within both the joints and serum.

A rabbit study found that in rabbits with fractured hind legs, the daily application of DMSO reduced the eventual stiffness in their ankles by 45%.

Additionally, as shown later in this article, numerous studies show DMSO prevents tissue injury from chemotherapy drugs, which is likely due to its anti-inflammatory properties. Likewise, as I will also show later in the article, DMSO is highly effective at healing naturally occurring injuries in animals with an inflammatory component.

Note: a study which evaluated ultraviolet light's ability to produce an inflammatory response that killed melanocytes in the skin found that DMSO caused an increased density of melanocytes, which again suggests DMSO facilitates a better recovery of the inflammatory response.

Muscle Relaxation

DMSO tends to relax skeletal muscle while simultaneously enhancing the contraction of other muscles (e.g., 5-4% DMSO enhanced the contraction of the heart and stomach).

DMSO applied topically to the skin of patients produces electromyographic evidence of muscle relaxation 1 hour after application, while another study found 50% DMSO prevented the contraction of frog skeletal muscles.

In 1964, study found that (as shown by electromyography) muscles in spasm will relax within 60 minutes of topical application. It also found that this relaxation could be used to treat headaches associated with cervical disease and complex regional pain syndrome.

As muscle tension is a frequent cause of pain and musculoskeletal disorders, this property likely accounts for some of its efficacy for these conditions.

Treating Pain with DMSO

As opioids are seen as the gold standard for pain control, there is very little awareness research has shown a comparable analgesic exists. To illustrate:

•A 1983 study using a common research metric (how mice respond to heat and tail flicks) found that DMSO produced an analgesic effect comparable in strength to morphine. However, this effect was assessed to be due to a different mechanism as an opioid receptor blocker (naloxone) did not affect DMSO's ability to eliminate pain, DMSO did not produce any of the side effects seen with opioids, and DMSO's effect lasted for longer (4-6 hours and in some cases over 24 hours—whereas in contrast morphine typically lasted less than 2 hours).
Note: another mouse study using similar tests also found that DMSO blocks pain.

However, unlike other analgesics (pain killers), DMSO has a variety of unique properties. These include:

•It treats a very wide range of pain conditions, including ones other analgesics can't address. For example, case reports exist of DMSO treating phantom pain (pain outside the body where an amputated limb had previously existed).

•Rather than the body developing a resistance to it (which is what commonly happens with opioids), DMSO often becomes more effective at eliminating pain with subsequent doses, and in many cases, is needed less and less frequently (or not at all because the condition is resolved). Because of this, while acute pain rapidly responds to DMSO, chronic pain conditions often take 4-7 days of applications for DMSO to begin taking effect and 6-8 weeks for lasting relief to occur (e.g., to quote one patient "after twenty-four DMSO injections, I was completely pain-free").

•In many cases, as is seen with other applications of DMSO, the effect is systemic (e.g., one study found 65% of patients experienced pain relief if DMSO was applied at the site of pain, whereas 61.7% experienced comparable relief when DMSO was applied somewhere farther away in the body).

Additionally:

•DMSO (especially topical DMSO) tends to be more effective in treating pain above the waist, and is less likely to help the larger joints (e.g., the hips been the smallest response to DMSO). In turn, the pioneer of DMSO would typically use injections rather than topical applications for the hips and knees (although we've found the knees frequently respond to topical DMSO).

•In acute cases (e.g., an ankle sprain), DMSO is often applied every 2-3 hours, and in many cases, the broader an area that is covered with DMSO (and the more DMSO is used), the more effectively DMSO relieves pain.

•In chronic pain patients who do not respond to topical DMSO, a lower concentration of injectable DMSO often helps.

•Shingles (which will be discussed in a later part of this series) consistently has an excellent response to DMSO.

Cancer Pain

Many cancer patients experience severe pain (which increases as the cancer becomes terminal), and up to 20-28% of cases, it does not respond to standard opioid management. In many cases however, it does to DMSO. For example:

•A study gave two older patients with cancer pain DMSO, one of whom had an excellent response to treatment and one who had a good response.

•Another study found that of 7 patients with metastatic cancer pain, DMSO gave 2 a full remission and 2 a partial remission.

•One of the most well known examples was Otis Bowen MD (a popular second term Indiana governor) who "illegally" used topical DMSO to treat his wife's pain from terminal multiple myeloma and then publicly demonstrated the FDA's absurd enforcement on it at the AMA's 1981 meeting. Remarkably, a few years later, Bowen became Reagan's Secretary of Health and Human Services, but even then, with this highly ethical doctor at the helm of the HSS, DMSO was unable to overcome the FDA's prohibition of it.

Headaches

Tension headaches (e.g., those caused by muscular tension of the neck) and sinus headaches tend to respond to DMSO with relief typically lasting 4-6 hours), whereas migraine and cluster headaches are less responsive to DMSO. For example, in addition to the previously mentioned study where DMSO was found to both relax the cervical musculature and alleviate tension headaches, these results were reported by two doctors:

> *Note: many headaches are incorrectly categorized as migraine headaches. Additionally, migraine headaches typically only respond to DMSO if it's applied during the early stages of the headache.*

Many other headaches also respond to DMSO. For example, Stanley Jacob reported on 59 patients with headaches from a variety of causes, of whom over 75% responded to DMSO. This included 13 out of 17 patients with years of chronic neck pain from cervical arthritis that triggered headaches, (who then required a gradually decreasing DMSO dose), 4 out of 5 patients with sinus headaches improved from DMSO, 2 out out of 2 patients with temporal arteritis (causing severe head pain which was fully recovered after DMSO and 26 out of 35 patients who'd had trigeminal neuralgia for more than a year with numerous failed treatments (11 of whom then had a full recovery).

Likewise, another study of 35 patients with headaches from a variety of causes—the majority being frontal) found DMSO significantly helped all 10 including in those who had had a headache for more than a day).

Finally, a study of 15 patients with tinnitus (another condition which responds to DMSO) included 11 who had concurrent headaches. For those 11, DMSO resulted in 7 having a complete recovery, 1 having less intense headaches, 2 only having occasional headaches and 1 having no response.

Note: there are numerous testimonials of individuals with years of headaches who experienced life-changing results from DMSO.

Fibromyalgia

Over the years, I have heard of quite a few cases of individuals with fibromyalgia having a massive improvement in their quality of life from DMSO (e.g., one can be found here) but simultaneously, I've also seen quite a few cases where it needed to *done slowly* for a sensitive patient (as otherwise the initial detoxification response was too much for the individual).

Note: this principle is also important to keep in mind when working with other "sensitive" patients which is discussed further here.

While no formal literature has been published in this area, the leading pioneer of DMSO therapy (who I consider to be extremely honest) stressed:

> Over the last few years, we have been treating patients with fibromyalgia. Seventy percent of the patients have experienced benefit. No serious side effects have been encountered.
>
> The properties of our regime contributing to benefit included free-radical scavenging, analgesia, anti-inflammation, softening of scar tissue, reduction of muscle spasm, and stimulation of healing.

Spinal Pain:

Many of the most profound benefits from DMSO are found in patients with spinal issues (e.g., spinal stenosis, a failed back surgery, surgical scars, severe arthritis, previous spinal cord injuries, or bulging discs), and numerous testimonies (e.g., many can be found in the Congressional hearing) exist of individuals who had been in years of crippling pain suddenly getting their lives back because of how effectively DMSO treated their pain and restored their mobility.

However, while I frequently read case reports of this, I have only located one which specifically evaluated this. In this 1984 study, 38 patients with lumbar and cervical disc problems received conventional (non-surgical) treatments and half also received DMSO—which was found to have the treatment time they required.

Note: topically applied DMSO is often extremely helpful for herniated discs (and much safer than systemic steroids). Additionally, a few people found injecting DMSO into and lidocaine into the vertebral musculature was quite helpful for spinal pain.

Since studies are lacking in this area, I will instead share a few testimonies (most of which can be found within the previously mentioned Congressional Hearing).

> Point blank, I myself am one of the individuals who I treated with DMSO for a slipped disc, and I can tell you point blank that it works better than anything else I have ever tried before or since DMSO therapy.
>
> At 46, I was a deformed arthritic mass of pain from a childhood injury which shortened my left leg by healing with a short bend. Physicians thought I had been born with one leg shorter than the other; and this caused a severe curvature of the spine and, with age, arthritis.
>
> Two hours after my first DMSO treatment, I felt a buzzing in my knee and my leg straightened—after 34 years. I then had treatments on my back. My spine is still curved, but nothing like it was. I am straight, my hips and shoulders lateral, not forward with an enlarged hip, and the lump of muscle doesn't show. I no longer have osteoarthritis in my knee and, at 51, I can drive a car long distances and teach a class in college. Before DMSO, I couldn't walk a block or ride 30 minutes in a car.
>
> I, myself, have realized almost complete freedom from pain since being injected with DMSO by Dr. Stanley Jacob. My pain was due to scar tissue formed around the sciatic nerve as a result of two lumbar disc surgeries and would drop me by surprise to the ground—thus causing a constant need for pain medication and the use of a cane, for walking. After two (2) shots of DMSO I was able to quit using the cane, and after about six (6) shots of DMSO by Dr. Jacob I was able to stop using the pain medication. I now feel better than I have since before I got hurt, and owe it all to Dr. Jacob and DMSO.
>
> Would you please use your influence to legalize DMSO? Our daughter broke her neck in an auto accident and for the first time in years pain free because of using DMSO.
>
> I am writing regarding DMSO. I am 75 years old, veteran and an R.N. I have a service connected back, 3 operations, plus 2 after my discharge on my back. I feel that after my spinal fusion in 1950, that I had excellent results, but in the last few years have had arthritis through my entire spine.
>
> My doctor finally told me that there was just nothing left for him to do, to try DMSO. He did not tell me how or where I could get it. Tried veterinarians but had no dog, yes, I had no dog, so I couldn't get it. Finally found a kind gentleman who told me where I could get it.
>
> Thanks to the Foundation in Portland, I was able to get it, and needless to say, I'm thankful. I won't say that it has cured any of my aching joints, but I've been able to stay on my feet, instead of in a wheelchair.

Note: I suspect a key reason DMSO is so effective for spinal pain is that spinal joints are relatively small, and DMSO has the most positive effects on smaller joints (e.g., the fingers).

Additionally, there are also many stories of quadriplegics who initially took DMSO to alleviate their chronic pain and then gradually regained some function as a "side effect" of DMSO. In turn, there are many cases (listed here) of individuals overcoming lifelong paraplegia (including "hopeless" cases where their "miraculous" improvement could be traced to DMSO as it stopped once DMSO was withdrawn. This for example was a testimony of a mother whose child was cured from a lifetime of paralysis by DMSO.

> During the last six months, have spent many hours in Dr. Jacob's clinic with his beautiful and caring staff, watching miracle after miracle happen right in front of my eyes. I have seen people who have been totally paralyzed for twenty years or more being created and starting to move. The wonder in their eyes indeed a sight to behold.

Complex Regional Pain Syndrome

Complex regional pain syndrome (CRPS), is a chronic pain condition that is characterized by also having autonomic and inflammatory involvement. Other than it frequently following a trauma (e.g., a surgery) and being linked to small fiber neuropathy, the causes of CRPS are still not well understood and management of this challenging condition typically consists of a plethora of pharmaceutical drugs targeting each symptom.

This is a shame as there are few unorthodox therapies which effectively treat CRPS, one of which is DMSO (which as mentioned before blocks pain from the small fibers). Sadly however (like the other CRPS treatments options) there is very little knowledge of DMSO's unique applicability in this condition.

Note: complex regional pain syndrome was an adverse event associated with the HPV vaccine.

The supporting evidence is as follows:

•A 1985 study demonstrated that 50% DMSO reduced the inflammation associated

with CRPS and improved symptoms associated with the condition.

•A 1994 study treated 13 CRPS patients (within 3 months of diagnosis) with 50% DMSO and found they had a significantly better recovery than the comparative treatment.

•A 1996 study of 32 patients with acute CRPS (e.g., heat, redness, pain, swelling, reduced range of motion) gave them 50% DMSO or placebo for 2 months, and a significant improvement was seen in the DMSO group.

•A 2003 study randomized 64 patients with CRPS to receive topical 50% DMSO and 67 patients to receive n-acetyl-cysteine (NAC) for 17 weeks to a year. This study found that DMSO was a cost effective therapy that produced good to excellent results for the patients, especially when their CRPS was associated with inflammatory symptoms and when it was done earlier in the illness.

•Another 2003 study of 146 patients also comparing 50% DMSO to NAC (over 24 months) found DMSO was effective, particularly for hot (inflammatory) CRPS.

•A 2012 study gave 29 patients (who had had CRPS for less than a year) 50% topical DMSO and found DMSO significantly reduced their pain (with results approaching a complete absence of pain), brought back the functionality of the affected limb and improved their quality of life.

•A 2012 study used a combination of treatments including 50% DMSO for CRPS and found this combination was effective for treating the condition.

•Finally, a 2005 review of the existing therapies for CRPS concluded 50% DMSO had evidence of efficacy and compared to the other treatment options, was the least likely to cause harm.

Additionally, to highlight that these benefits extend to neuropathic conditions besides CRPS, another study found that of 9 patients with peripheral neuritis segmental neuralgia, DMSO gave 6 a full remission and 2 a partial remission.

Surgical Pain

Since DMSO both accelerates wound healing and reduces pain, it is uniquely suited to post operative pain. Numerous studies support this. For example:

•A rat study found administering DMSO into a wound before closing it significantly reduced the subsequent pain and guarding the rats had, suggesting this approach could address a common complication of surgery.

•A 1967 study found that DMSO applied to the incision sites of thoracotomy (open chest surgery) patients in concentrations of 60% to 80% resulted in significant pain relief, and reduction of the opioids needed (which in turn led to fewer gastrointestinal complications). These patients as a group were able to cough more effectively, move more easily both in and out of bed, resume early motion of the arm and shoulder, and in general enjoy a more rapid and less complicated postoperative course.

•Another study gave 90% DMSO to 64 postpartum women with episiotomy pain and found that over half had pain relief and a reduction in swelling and that there was a significant improvement in mobility (with some patients who had left the hospital then requesting to resume DMSO to alleviate subsequent pain). The investigators ultimately concluded the risks (e.g., a burning sensation from the DMSO) did not outweigh the benefits of the therapy—something I suspect may in part have been due to them using too high a concentration of DMSO on a sensitive region of the body.

•Another study treated 37 post-surgical patients with chronic intractable pain syndromes and noted excellent relief in 32 of them.

Wound Healing

Due to its properties, DMSO tends to accelerate wound healing, prevent wounds getting infected, eliminate pain, heal chronically non-healing wounds and prevent the formation of scar tissue or dissolve it once present (a property which may relate to its remarkable ability to eliminate amyloid aggregates throughout the body). Because of this, there are many accounts of individuals saying they've benefitted greatly from applying it immediately after wounds (typically around the wound rather than inside it).

Note: a reader who did his PhD in physical and organic chemistry shared that his research had shown DMSO could change the molecular bonding of atoms in its vicinity, which allows it to greatly accelerate biochemical reactions. Assuming this is true, it might help to explain why DMSO accelerates healing.

Ulcers

Note: as shown in the previous article (and for instance in this commenter's experience), varicose veins and ulcers have an excellent response to DMSO.

A large study of chronic skin wounds (which in many cases had remained untreatable for years or were infected) found 95.04% had a complete recovery (e.g., no burn scars) following DMSO that was often quite rapid. The conditions treated were as follows:

Note: the investigators reported that certain patients with deep wounds experienced some pain at the time of DMSO application. However, this pain only lasted a short time and did not prevent DMSO treatment. Most patients received immediate relief after DMSO, and in some cases, the pain completely stopped after the first treatment.

A systematic review examined the efficacy of topical DMSO on wound healing and noted that decubitus ulcers were the most frequently studied condition. Overall, the review found that DMSO was beneficial for wound healing and analgesia (and had low toxicity).

Note: this analysis included a 1985 study where 20 older diabetic patients with chronic (treatment resistant) perforating ulcers received DMSO and 14 had a complete recovery in 4-15 weeks of treatment (whereas in contrast only 2 of the 20 controls who received conventional treatment did), a double blind trial where DMSO was used as an adjunctive therapy for refractory duodenal ulcers and was found to increase the cure rate from 60% to 100%, and an unpublished trial where 39 elderly patients with first stage pressure ulcers received 5% DMSO for 36 months and had a very positive response to the treatment.

Additionally, since chemotherapy drugs are cytotoxic, a variety of common injuries occur with them, with one of the most common (an extravasation injury) occurring when the drug leaks out of blood vessels and injures the surrounding tissue (and skin). Extravasation injuries affect approximately 1% of chemotherapy patients (estimates range from 0.1%-6.0%), and create significant issues for patients. DMSO in turn, has successfully treated a variety of common chemotherapy injuries, particularly extravasations and ulcers (e.g., see this rat study, this rat study, this rat and pig study, this pig study, and this guinea pig study).

In humans, case reports exist of DMSO treating these injuries (e.g., see this report, this report of two cases, this report and this report), alongside larger datasets (e.g., here 4 out of 4 chemotherapy injuries responded to DMSO, here 8 out of 8 did, and here 74 out of 75 did). Finally, prospective clinical trials have also corroborated this (e.g., in this study 20 out of 20 patients responded to DMSO, while in this study 16 out of 20 did).

Finally, when used on open wounds in horses, DMSO was found to rapidly stimulate healthy granulation tissue, decrease excessive granulation tissue, and both eliminate existing infections in the wounds and prevent new infections.

Tissue Regeneration

DMSO has the unique property of accelerating the speed at which newts regenerate lost limbs by approximately 2-3 days (see this paper and this dissertation). *Note: newts are one of the only advanced organisms which can regenerate a lost limb.*

Additionally, authors of a 1998 Russian paper stated that they are routinely applying DMSO into surgical wounds as it accelerates healing and provides general infection control. This in turn is congruent with the pain studies mentioned earlier in this article that show DMSO improves the healing of surgical wounds.

Scar Tissue and Adhesions

DMSO is often used to treat scars. This may be in part due to DMSO being observed to disrupt the links between collagen fibers

Note: Matrix metalloproteinases degrade the proteins that surround cells. While their function is essential, when excessive, they (especially MMP-9) are linked to a variety of disease states (e.g., organ fibrosis, cardiovascular disease, cancer, and rheumatoid arthritis) due to the healing process becoming disordered. DMSO in turn has been shown to attenuate excessive MMP-9 activity.

In rats, DMSO decreased experimentally induced intestinal adhesions (a common complication of abdominal surgeries) by 80%. Additionally, another study found DMSO inhibits fibroblastic proliferation in vitro.

Note: it has been observed that DMSO is much more likely to prevent adhesions if administered prior to surgery rather than after it.

In rabbits, when 70% DMSO was administered next to a wound incision (but not the incision site itself), 70% DMSO appeared to increase the development of wound tensile strength—which is important since a major issue in surgery is the incision sites dehiscing (ripping open) and because an early improvement of a scar's tensile strength suggests the scar that ultimately forms will be stronger and healthier.

Another rabbit study applied DMSO immediately after surgically wounding their backs and found that after 7 days, their scar tissue was significantly stronger than that of untreated controls. Finally, a third rabbit study administered DMSO 4 weeks after an injury to their ears and found that DMSO prevented hypertrophic (excessive) scar formation.

Note: surgical scars take about 6 weeks to develop, and in most cases are around 80% as strong as the original tissue that preceded them. This again suggests that using DMSO would significantly improve longterm surgical outcomes.

Finally, DMSO is also sometimes used to repair keloid scars. For example, in one study of ten people with keloids, applying 50-80% DMSO a couple of times a day induced scar flattening with loosening of the collagen surrounding the fibrous bundles. Similarly, another study found DMSO eliminated subcutaneous fibrosis induced by radiation (through a gradual softening and reduction of it).

Skin Flaps and Grafts

Surgically created skin flaps are at an increased risk of dying due to poor blood perfusion. Numerous studies (e.g., this one, this one, this one, and this one) have shown DMSO protects vulnerable skin flaps (including in a rat model of smokers), which makes it a shame its not used in fields that could greatly benefit from this innovation (e.g., plastic surgery).

Likewise, skin grafts, even from the same person, often fail. Fortunately, DMSO happens to address the common causes of skin graft failures. To illustrate, a Ukrainian plastic surgeon documented that in over 500 transplants that dressings moistened with 30% DMSO solution for 3-5 days enabled grafts to take and survive in badly burned patients and victims of elephantiasis (e.g., there was no skin necrosis, no inflammatory changes, no keloids, and no hypertrophic scars). Similarly, a study of 120 rabbits demonstrated the DMSO significantly improved the viability of a skin or cartilage graft.

Note: in rabbits, DMSO was shown to reduce tissue carbon dioxide levels, and when mixed with hydrogen peroxide, increase oxygen levels, but this effect was not seen in rats or pigs.

DMSO and Musculoskeletal Injuries

While DMSO is a remarkably effective painkiller and wound healing agent, by far its number one use was the treatment of musculoskeletal conditions, particularly those which created a functional immobility. In turn, many of the early adopters of DMSO went from skeptics to believers because of the rapid and dramatic improvements they saw from it (e.g., as they had patients with a debilitating bursitis in the shoulder recovering within minutes of receiving DMSO).

Due to its safety and dramatically better performance than the existing treatment options, DMSO rapidly took off around the country. Numerous pharmaceutical companies clamored for it (and invested millions in bringing it to market), and before long, many doctors were using it on thousands of patients with unbelievable results—results that were particularly unbelievable given how poorly the existing therapies worked.

Sadly however, as both the public and professional interest in DMSO was skyrocketing, the FDA decided it was unacceptable a drug they could not control was taking off around the country, and on November 10, 1965, issued a global research ban on it, causing almost every doctor who had been using it to stop out of fear of prosecution. This immediately created an underground market for DMSO, a flurry of complaints to and by elected officials over it (which eventually resulted in Congressional hearings) and an end to almost all DMSO research.

Note: the reason for the ban was completely unjustified as the existing evidence showed the FDA's safety concern did not exist, and later was conclusively disproven by a large human toxicology study.

As a result, very little knowledge now exists of DMSO's use in human musculoskeletal injuries other than it existing in a few products where it was combined with another agent (e.g., there are numerous FDA approved topical DMSO-Diclofenac [an NSAID] preparations), and it having the sole approval for treating interstitial cystitis (which will be discussed later in this series). Remarkably however, it is fully permitted in veterinary medicine (which led to a lot of Americans using DMSO that was "meant for horses") where it is acknowledged to create the same benefits that were observed in humans.

Being fully aware something like that ban was being considered by the FDA, DMSO's advocates decided a research symposium under the auspices of a prestigious organization needed to be held to head it off and throughout 1965, despite immense pressure from the FDA not to host it, the scientific community rallied behind them. The program gradually came together (in a manner far different from our modern scientific community):

> The March 14, 15, and 16, 1966, symposium under the auspices of the New York Academy of Sciences was held in a large hall of New York's Waldorf Astoria Hotel. More than a thousand researchers came from all parts of the United States and from overseas. After the FDA had cracked down on DMSO, Jacob had written to every person who had submitted an abstract, he said that now that DMSO had been branded toxic and dangerous by the FDA the paper could be withdrawn. No one canceled.

Note: 82 papers were presented at this meeting which was attended by over 1000 researchers from across the world.

This timeline in turn explains how a wealth of compelling data emerged over a very brief period of time—and then just as suddenly stopped. Likewise, much of the research at this time was in the initial stages (e.g., it was produced by doctors who had switched to reviewing all of their charts from when DMSO had been used since they could no longer give it to patients) most of these studies were comprised of a wide range of musculoskeletal issues (those that their patients presented with) rather than being restricted to a single complaint. For this reason, I felt it was best to present most of them by sharing the key data tables of each study. Doing so in turn makes it clear DMSO consistently had an 80-90% success rate in treating thousands of musculoskeletal issues—something dramatically better than any of the options which existed then or that exist now.....60 years later.

Note: what I am alleging here is understandably difficult to believe. That was why I began this series by providing the wealth of evidence DMSO effectively treats "untreatable" brain and spinal cord injuries (e.g., strokes) and justifying the contention that millions could have been spared a lifetime of disability or paralysis if the FDA had not suppressed it (along with making a similar case for other incurable conditions DMSO treats like Down Syndrome and amyloidosis). Likewise, there are many other important facets to the DMSO story (e.g., exactly why the FDA did this or how DMSO treats other challenging disorders like tinnitus, macular degeneration, and scleroderma) I felt should not be presented until a clear and unambiguous case was made to how unconscionable the FDA's conduct was in these first two articles

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Human Musculoskeletal DMSO Studies

One of the first studies was published in 1965 and conducted by the researcher who courageously pioneered the adoption of DMSO throughout the United States:

This in turn was followed by numerous 1967 studies. The largest of which found:

Some of those disorders included:

Note: this study also included x-ray images of painful calcifications at the enchanteric bursa, supraspinatus attachment and greater tuberosity disappearing from DMSO. However, while DMSO has often been observed to eliminate calcifications, other therapies (e.g. neural therapy) are sometimes also required to accomplish this.

In that study, many of the results were immediate and dramatic. For example, this was one bursitis patient:

Rapid improvement of subcoracoid bursitis is frequently reported after DMSO.

Note: in another 1964 study, 57 out of 25 patients with subacromial bursitis experienced a rapid improvement within 30 minutes of DMSO, while in chronic cases 32 of 40 patients improved, but in many cases 3 months of treatment were required for improvement. Additionally, in some patients, a reduction in calcium deposits was also noted.

Another 1962 study found:

Note: a key point these researchers emphasized was 25.6% of their patients, particularly the chronic ones, had a delayed response to DMSO (which is important to recognize as in chronic conditions DMSO can initially appear to not be doing anything). These researchers hypothesized this may have been due to them giving DMSO 1-2 times a week rather than 1-2 times a day.

• Another 1962 study also had similar results:

• A 1962 blinded study for acute musculoskeletal disorders, using 10% DMSO gel as a "placebo" found:

In that study, its author is former president of the Aerospace Medical Association) remarked:

> I am convinced that topical application of DMSO in the treatment of acute musculoskeletal conditions is a striking and significant therapeutic contribution. During the period of time I conducted clinical investigation with this medication, I practically discarded physical therapy as treatment for musculoskeletal problems because the rehabilitation of my patients was so prompt with DMSO. There was little or no necessity to prescribe narcotics and tranquilizers since pain was promptly mitigated following topical application of DMSO.

He then conducted a follow-up double-blind study (using either 80% or 10% DMSO gel) on patients with sprains, strains, bursitis, or tendinitis. The study found that the active treatment had significantly better results than the placebo and significantly reduced the time patients lost from work..

Note: a 1969 study treated rheumatoid arthritis with 10% DMSO and found no benefit from that dose.

• Another 1962 study found:

Note: to save space, I listed the miscellaneous conditions treated in this study by DMSO (e.g., 19 cases of sciatica, 6 cases of coccydynia, and 2 cases of lupus) here:

• Another 1962 study found:

Condition	Total	Improved
Degenerative arthritis (osteoarthritis)	61	34 (lasted several days)
Rheumatoid arthritis	27	23 (temporary)
Periarthritis (frozen shoulder)	7	7 (temporary)
Fibrositis (myofascial bursitis	5	5 (temporary)
Psychosomatic pain	5	0 (cause of pain indeterminable)
Acute trauma (Buffalo Bills Football Team Athletes)	8	8 (halved recovery time)
Epicondylitis	4	3 (one stopped DMSO)
Diabetic neuritis	1	1
Postsurgical pain following removal palmar fascia (for Dupuytren contracture)	1	1 (no other treatment worked)
Tendinitis of pain	1	?
Dejqervains syndrome	1	?
Peripheral vascular disease	1	?
	103	

The "?" were not described in the study.

Note: another study gave PT and 70% DMSO to 7 people with frozen shoulders, 4 of whom had excellent pain relief and improved motion. Other investigators also found that frozen shoulders respond to DMSO but can require anywhere from 3 to 24 applications (and sometimes more).

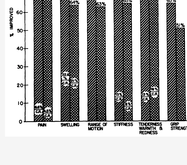
• A 1994 blinded study gave 157 patients with acute tendinopathies (e.g., tennis elbow) 10% DMSO gel or a placebo ointment three times a day for 14 days within 3 days of symptoms starting. Pain of movement under loading and the mobility of the joints were significantly improved after, respectively, 3 and 7 days of treatment with DMSO, as compared with placebo. After 14 days on DMSO, a further improvement was observed, and 44% of the patients were pain-free (placebo 9%).

Note: DMSO has also been found to be effective for carpal tunnel syndrome (and other hand issues like trigger fingers), but while I know many people who've observed this (such as this author) to my knowledge no formal studies have been conducted on this application. For those struggling with carpal tunnel syndrome, I discussed our approaches to the disorder here.

• Finally, a 1962 analysis of 76 studies using topically applied (90%) DMSO for musculoskeletal conditions found 72% improved. Specifically:

TABLE 4
INVESTIGATOR'S EVALUATION OF OVERALL THERAPEUTIC RESULT

Therapeutic Result	Percent of Total Patients: Acute	Chronic
Excellent	45,4	24,2
Good	26,0	37,8
Fair	12,2	16,0
Poor	14,9	21,7
Blank*	0,5	0,5
Total	100,0	100,0
Total Patients	1,068	848



The review also included 107 Trauma (contusion, fracture, etc.), 29 Tonsyncentis, 27 of Neuritis, 20 of Muscle spasms, 20 unspecified types of arthritis, and 220 miscellaneous issues (e.g., Fibrositis, epicondylitis, sciatica, calcific tendinitis

To quote the authors:

> It is difficult to declare that a drug has efficacy on the basis of uncontrolled studies in a heterogeneous group of diseases. However, from these data and from discussions with many of our investigators, we feel that DMSO is a unique and effective agent for the treatment of many acute musculoskeletal disorders. Beneficial results are unpredictable, but they occur frequently and are sometimes dramatic, particularly in acute conditions, which require low doses and short treatment periods. In chronic conditions, improvement occurs at a lower rate and is less dramatic. The usual dose was only 0.1-0.2 ml kg/day.

Finally, at a symposium on DMSO, data on 9,521 patients were presented which showed DMSO was effective therapy in a wide variety of acute traumatic conditions, in acute and chronic subacromial bursitis, osteoarthritis, gouty arthritis, and in some patients with rheumatoid arthritis (along with other conditions such as early Dupuytren's contracture).

Note: in addition to two of the previously mentioned studies showing the majority of patients with gout responded to DMSO, a later 1981 study also found DMSO was superior to colchicine in treating gout.

indomethacin in the treatment of gout.

Rheumatoid Arthritis Studies

In the above results, one of the conditions which consistently improved was rheumatoid arthritis (RA). Since RA remains a common but challenging condition and a significant area of research, studies were conducted that focused on RA, all of which found significant benefit from DMSO. They are as follows:

•A 1983 study of 70 adults with RA and 35 children with juvenile arthritis:

Additionally, 20 patients with flexion contractures received topical DMSO mixed with hydrocortisone, and after 5-6 applications, the range of joint motion increased by 15-20 degrees, and after 10-12, 95% had it increased by 20-30 degrees (with no relapses a month later).

•A 1965 study of 150 patients with RA treated for 10 months several times daily with 60% to 90% DMSO found diminished pain and increased range of motion were noted in 75% of milder cases and 44% of more severe cases.

•A 1967 study of 318 patients with RA who received 90% topical DMSO, 50% topical DMSO, or placebo found that DMSO had a much greater benefit that placebo. Depending on the dose, the following occurred in the 248 who were available for analysis:

With the following specific improvements being observed:

Note: grip strength was found to have a 13.60—14.72mmHg improvement.

•A 1967 study which included 177 patients with early RA found DMSO caused a complete remission in 74, a partial remission in 68, and 35 did not respond to treatment.

•A 1968 study gave 85% DMSO alone or in combination with hydrocortisone, procaine, or "edan" to 76 patients with rheumatic diseases, inflammation of the nerve roots or spinal disc problems (whereas controls received 1% DMSO). DMSO was observed to improve symptoms as early as an hour after treatment (with the greatest improvement happening after 3 hours) and in some cases the pain disappeared completely. In all cases, DMSO was superior to conventional therapy and was more efficacious when combined with the other therapies. Finally, within 1 week of treatment, improvement was seen in 5 out of 8 rheumatoid patients, 17 of 20 patients with inflamed nerve roots and 8 out of 10 with disc pain.

•A 1979 study treated 343 arthritic patients (320 with RA and 23 with deforming arthritis). Of them, 145 received 50-70% DMSO (applied topically to site of joint inflammation), 85 received DMSO plus an unspecified "analgin" (pain killer), 50 received DMSO plus heparin, and 25 received DMSO plus sodium salicylate (a compound similar to aspirin), and additionally, some of the more challenging cases also received cortisone injections. In the DMSO only group, 64% had significant improvement, 19% had insignificant improvement, 15% had no benefit and 2% worsened. When DMSO was used in combination with the other therapies, it enhanced their efficacy and lowered their required dose. No issues arose from combining it with the other therapies and only 3.2% of the 343 patients had adverse effects (which were primarily skin irritation).

•Finally, this book discussed a Brazilian study (I could not locate) where 15 RA patients and 15 OA patients received an IVs of DMSO (5ml), a B-complex, vitamin C and magnesium sulfate 2 times a week for 5 weeks and then once a month for 18 months. This caused an immediate 66% decrease in free radical production (and a longterm 52% reduction), and created a lasting clinical improvement in over 85% of the patients with osteoarthritis and 77% of the patients with rheumatoid arthritis.

To put this into context, consider the story of Patricia McClenathan, a 39-year old New Yorker who had been receiving treatment for the last six years from rheumatologists for spondylitis (inflammation of the spinal joints) that left her with deep pain, a loss of mobility, and a variety of severe side effects from the drugs and procedures she had received that could only reduce her pain. As time went on, her condition continued to worsen (e.g., her discs ruptured) she become bed bound and fell into a deep depression. A relative then suggested DMSO (as DMSO had recently been legalized in Florida) and having no other options, she flew to Florida for daily IV DMSO sessions, and by the third day experienced a profound improvement (and a complete improvement on day 5).

> Since taking DMSO, I am now a functioning person where previously I had not been, spending much of the time in bed accomplishing nothing. I can do most normal things now by relying on DMSO. At this time [January 7, 1981], I take no painkillers or muscle relaxants [both used quite heavily before] and find for this reason I can cope with everything very well. I am finally physically, mentally, and emotionally much better and attribute this to DMSO. I feel that the problems the DMSO has caused are by far outweighed by the new life it has given me—a life other than just surviving in constant pain. Again, I thank you.

Likewise, consider Ruth Lewis:

> When I entered the doctor's office for DMSO treatment, I was unable to put both feet on the ground. After two-and-a-half weeks of IV DMSO treatment I walked out of that office without any help whatsoever—no cane—no support at all. I had not been able to close my right hand completely for over a year. It even kept me awake at night with severe pain. But after the IV, topical, and oral DMSO treatment, I can now close my hand tightly. The arthritis has not returned.
>
> I cannot put into words what this drug has done for me. I highly recommend it. I saw many people come and go during my clinic stay; all walked out well.

Or this testimony sent to the Congressional Committee from a woman who shocked her Orthopedist after DMSO regenerated a "rotted" femur (which had previously caused the orthopedist to believe there was nothing that could be done for her as it made a hip replacement surgery impossible):

> I was one of the people who was suffering needlessly and spending large sums of money on useless medical treatment when I was introduced to DMSO 16 years ago. I had severe bursitis in my right shoulder, painful arthritis in my right knee from an old injury, and a degenerative left hip joint. Sleep and rest were something I had not known for many weeks when a friend who had been an arthritic invalid, gave me about 2 tablespoons of DMSO. I applied this to my shoulder twice one evening and fell into a 12 hour restful sleep. I awakened cured!

Countless stories like this exist (which, due to length considerations I did not list), and in many cases encapsulate the "excellent" responses to DMSO many of the previous researchers listed (and discussed in their articles). That in short is why there was so much public and professional pushback against the FDA's prohibition of DMSO.

> I can actually swear and take an oath that relieved all my pains through my legs and has helped me maintain my job. am a waitress and all my work depends on my feet feeling good. This drug should be available. I can't understand why people have to suffer, when we all can live and work a normal life with this drug available. It's not fair for parts of Europe and Greece, etc., to have it only. The average person can't take the time or expense to travel where its legal to get DMSO. Please help get the FDA to legalize it.

Lastly, many patients find taking DMSO allows them to significantly lower the doses of their existing arthritis medicines (which is often quite helpful as their toxicity worsens with increasing doses).

Note: many patients with arthritis also experience positive results from MSM (DMSO's primary breakdown product in the body) or soaking in sulfur containing hot springs.

Sports Injuries

> What I like about DMSO is that you don't have to interrupt your training every time you get a minor pull or sprain. It doesn't pump you up like certain pills. It's simply a very useful thing to use for simple athletic injuries. Some people have told me that you shouldn't use it because it might mask the pain of a serious injury, but a good athlete knows his body well. Even when I'm using DMSO, I know when I can push and when I can't. —Al Oerter, a discus thrower and the first American to win 4 consecutive Olympic gold medals.

One of the greatest challenges professional athletes face are sports injuries which prevent them from returning to the field, particularly since many sports injuries are a product of micro-injuries building up until a critical point is passed (e.g., from adhesions and scars in the soft tissue). In turn, since DMSO both heals micro-injuries and rapidly treats traumatic injury (returning them to full functionality), DMSO was rapidly adopted by professional athletes once they realized what it could do for their careers (and being off the field was often devastating to their careers). In turn, due to the voice their position afforded them, a few professional athletes (e.g., Atlanta Falcons Quarterback June Jones—who now is a coach) became some of the most impactful advocates for DMSO (e.g., Jones stated in Congressional testimony that "veterinary" DMSO was widely used but athletes were afraid of publicly discussing it).

Likewise, in 2013, a Dallas Cowboys Lineman stated:

> You get it [from] the veterinarian and it goes right to the bloodstream. It's an ointment that's like anti-inflammatory. You put it on your skin and you put it on a muscle, and I guarantee you, in about 30 minutes you'd feel it. It wasn't on the list [of banned substances]...we used DMSO and people knew it. Everyone knew about it.

Furthermore, in his riveting testimony, Jones provided cases that left the Congressmen in disbelief, such as a teammate with a bone chip and a torn ligament (which would require months of recovery and hence end their season) taking DMSO immediately after the injury and 7 or 8 days later returning to the field (with the bone chip remaining but no longer causing issues).

Likewise, at that Congressional hearing, the former team physician for the Oakland Raiders testified that he'd used 70% topical DMSO on a careful and controlled basis for his players 20-30 times a year for 5 years. From this, he observed that DMSO was the most beneficial when given in the first 3 to 4 days of an acute injury where a muscle or joint had severe swelling, particularly of the extremities, especially the ankle, elbow, hands, or wrist. Overall, he stated that DMSO provided good to excellent results 70-80% of the time (e.g., through reduced pain and swelling) and the players felt they were able to return to play 50-75% faster than they had from similar injuries in the past. Conversely, they did not find DMSO was helpful for chronic injuries, but this may have been due to it not being used long enough for the effects to kick in.

Note: he also emphasized that DMSO would transform the field of occupational medicine. I fully agree with his assessment, especially given just how frequently Worker's Comp fails to help its patients.

Similarly, podiatrist Lowell Scott Weil (who was the physician for both the Chicago Bears and the United States Olympic gymnastics team) uses DMSO on a regular basis (particularly injured gymnasts). After 12 years of using it, he shared, he'd seen it rapidly heal injuries (e.g., he had a gymnast who suffered an ankle sprain expected to end her season, but instead her rapid recovery allowed her to make the US Olympic team, and a Football player who tore his hamstring but was able to rapidly return to the field). Overall, he had a 60% treatment success rate and saw the best response to DMSO for tendinitis, myositis, and post-injury situations such as muscle pulls, ankle sprains, strains, and tears of the soft tissue (and conversely the only side effects he had were skin irritation). Additionally, he also used it for arthritic patients (especially rheumatoid arthritis) with many having dramatic relief.

Many other compelling anecdotes exist. For example, this book discusses the experience of an Oregon State track coach and early adopter of DMSO who had many amazing stories of DMSO treating hamstring and achilles tendon injuries such as an athlete being able to return to the field at full capacity 3 days after a normally disqualifying hamstring injury and the story of a **blind** long distance runner who was able to run due to DMSO fixing musculoskeletal injuries and (according to the author) then played a pivotal role in opening the sport to women.

Note: a major problem in certain sports like football is repeated concussions (which are now recognized to put them at risk for cognitive impairment and dementia later in life). As discussed in the first part of this series, DMSO is immensely helpful for mitigating the effects of concussions.

In addition to these anecdotes and studies of DMSO's utility in other musculoskeletal injuries, research also directly corroborates its value in sports medicine.

•A 1965 study treated 47 injured athletes from a wide range of sports (e.g., tennis, diving, or wrestling) by applying 90% DMSO applied to the injured areas 3 times a day initially and then after 2 days, twice a day. The group was comprised of 30 acute injuries (e.g., sprains, strains, dislocations, serious cuts) 7 syndromes that follow long immobilization for broken bones, and 10 chronic conditions (e.g., tennis elbow) resulting from repetitive "microtraumas." The acute traumas were observed to rapidly resolve, sometimes "so spectacularly as to compel us to urge our patients to observe greatest caution in order to avoid further damage to a joint," while the chronic conditions and syndromes also responded rapidly and those athletes were often able to quickly return to the field. These results and the lack of observed adverse events led the investigators to argue DMSO urgently needed to become the standard of care in sports medicine.

•A 1967 paper discussed 8 players of the Buffalo Bills Football Team who were treated with DMSO for injuries during the 1964 season and in each case, the player returned to full duty 50% sooner than he would with other forms of therapy. These injuries included severe muscular contraction of the adduction thigh muscles, acutely strained sternomastoid muscle, acute sprain of sternoclavicular joint and another with acute sprain of medial collateral ligaments of the knee.

•A study of 78 patients (mostly athletes) with overstrained tendons received Dolobene gel (15% DMSO, dexpanthenol and heparin) for 2-3 weeks, with over 50% having a significant improvement of symptoms and those improvements including a 94% improvement in pain, a 55% improvement of swelling, 95% improvement of redness and 92% improvement of warmth.

•A study gave Dolobene gel to 30 athletes with soft tissue injuries of the upper and lower extremities twice daily for 4 weeks. There were 4 athletes with contusion of the shoulder, 8 with distortion and contusion of the knee joint, 8 with muscle, tendon and ligament lesions, and 10 with distortion of the ankle joint. Following DMSO, 10 had an excellent response (improvement), 5 had a excellent to good response, 10 had a good response and 5 had a moderate response. Specifically, pain, inflammation, swelling, reabsorption of hematomas, tenderness and recovery time were assessed.

•A study gave Dolobene gel and ultrasound to 15 subjects who had received a blunt tissue trauma (without fracture) to the lower extremity within the last 24 hours. Compared to 15 placebos, the treatment resulted in a faster relief of pain, reduction of edema, and recovery of mobility.

•A 1966 study of 28 professional baseball players found that giving them DMSO after injuries caused their downtime be one third of what was observed by the treating physician in the previous year with 42 players.

Note: While not quite the same as getting tackled, I've also come across cases of individuals taking DMSO immediately after getting hit by a car while crossing the street (which caused injuries but no fractures) and immediately fully recovering.

Horse Studies

As DMSO is widely used in veterinary medicine, a wealth of research shows it treats musculoskeletal conditions (and likewise it is approved to treat those conditions). As there are too many too list, in the spirit of the FDA's war against ivermectin, I wanted to share a few horse ones:

In horses, after over 50 cases of bursitis or synovitis were treated with DMSO, in almost 90% of cases, there was at least "some improvement" and often a "complete return to normal," in 65 cases of osteoarthritis and periostitis, 60% had a clinical improvement, in 20 cases of metacarpal periostitis ("bucked shin"), 90% had a "quick relief," and in 22 cases of tendinitis (bowed tendon), there was a therapeutic response superior to any existing therapy.

Likewise, another team of researchers found 90% of horses with bursitis or synovitis (totaling 50 horses) improved from DMSO (with many fully recovering), out of 65 horses with osteoarthritis and periostitis (involving the carpus and the fetlock joints), 60% improved with DMSO (many of whom had not responded to other treatments for months), including quick relief 90% of those with bucked shin (an otherwise challenging condition) that was sustained if followed by a period of rest. Additionally, 22 cases of tendonitis (bowed tendon) improved with DMSO, and 14 traumatic injuries (involving subcutaneous edema and hemorrhage) had a remarkable response to treatment.

Thirteen herbs had two of their vibrational joints injected with LP5 to induce inflammation in them and DMSO (unlike the other interventions trial) was found to reduce the inflammation in their joints.

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Other Datasets

The following datasets also deserve mention:

1. On September 8, Merck Sharp & Dohme Laboratories sent out to all investigators under their auspices an advisory memorandum on the emerging role of DMSO in experimental medicine. It stated based on their data from 4000 patients (who had taken DMSO for up to a month) that DMSO was safe and had shown merit for many of ailments including many of the conditions discussed here. For those conditions listed here, it stated:

•Acute Inflammatory or Traumatic Situations—Some pain relief usually occurs within one hour. At 2 hours the pain is usually reduced by at least 50%. Continue for 3 or 7 days to assure that the condition does not recur.

•Chronic Conditions—Response has usually been slower and the pain relief from a single or a few applications may be transient. A significant response may not be obtained until after 4 to 12 weeks of daily administration.

•Acute bursitis—Merck's largest clinical trials were for this and in the majority of patients, decreased pain and increased range of motion was observed in about 30 to 60 minutes, lasts for lasts 2 to 6 hours, and typically is less severe once in returns.

•Acute low back strains—In the majority of patients decreased pain and increased range of motion has been observed in 30-60 minutes and in some cases a spectacular improvement in pain is observed.

•Acute injuries (e.g., sprains, sprains, contusions, athletic injuries, industrial injuries and other traumatic situations—These typically responded quite dramatically to DMSO. However, since DMSO has masked a few fractures, x-ray diagnosis was advised in most cases.

•Acute neck strains (whiplash)—Wide area of application has been observed.

•Osteoarthritis—DMSO applied to osteoarthritis of the knees has produced a favorable response after 4 to 6 weeks of daily administration. Transient relief may occur before this time. Increased mobility and general ability to walk and perform tasks without pain has been remarkable in some cases.

•Rheumatoid arthritis—DMSO seems less effective here than in certain other diseases. Grades 3 and 4 responded only partially after prolonged administration.

•Neuralgias and pain syndromes—A wide variety of pain syndromes have responded to DMSO. In its dosiburosa or trigeminal neuralgia, some but not all patients have obtained benefit. Treatment must be long-term. The pain relief may not be permanent. Herpes Zoster has responded most favorably.

•Gout—There have been a few cases of dramatic relief of pain and general improvement.

•Surgery—After thoracotomies, cholecystectomies and hemorrhoidectomies, 5 to 15 cc. dose 3-4 timesday, results have been very good.

2. Podiatrist Morton Walker was selected as a clinical investigator for Merck and using an innovative technique to drive topically applied DMSO into the target treatment area (which to my knowledge no one else has utilized and found DMSO):

•Was highly effective for acute hutions (and the bursitis they caused) but not effective for the chronic buttons which followed the acute stage.

•Temporarily typically few a few days eliminated the pain from hammertoes, ingrown toenails, hard corns and soft corns.

•Eliminated the pain while followed the removal of many foot skin conditions (e.g., after a shaving).

•Is very helpful in the management of overgrown ichki toenails. For example, applying DMSO mixed with olive oil or castor oil makes it much easier to remove them and prevent them from regrowing.

Note: DMSO when combined in low doses with 5-fluorouracil has been found to be highly effective for treating psoriatic nails (onychodystrophy), which otherwise is a challenging condition to treat.

•Was excellent for arthritis of the foot and ankle, particularly the toes.

•Is often very helpful for Morton's neuromas, dancer's foot (sesamoiditis) and heel spurs.

•Could help in the treatment of flat feet by removing inflammation and helping to heal damaged ligaments and muscles).

•When combined with an antifungal agent (which DMSO brings into the skin) is very helpful for fungal infections of the foot and toe nails.

Note: research has subsequently confirmed Walker's discovery. However it is important to remember that nails are one of the only tissues DMSO cannot effectively penetrate so DMSO must also be applied to the surrounding skin.

•Is very helpful for sprain ankles.

Note: this is one of the most common things DMSO is used for (or is used). Because of how rapidly it removes pain and inflammation, many worry the individual no longer guarding the ankle will predispose it to further injury (and hence strongly urge the patient to remain cautious with how walk after the treatment). but in real life, a re-injury occurring is not reported to be an issue.

•Soaking in 50% DMSO effectively eliminates foot odor—however this is not always helpful since taking DMSO can cause its characteristic side effects garlic odor.

Sadly however, after Morton Walker had tested DMSO on 124 people with excellent results, the FDA banned all research into DMSO and Merck immediately confiscated his records (which were subsequently never published).

Note: another author reported he finds 60-75% DMSO is very helpful for blisters and callouses as it both softens the skin and dries the blisters out and 75% topical DMSO will gradually shrink Baker's cysts (which form in the knee).

3. Clinical studies done by System Laboratories in the early 1960s by Dr. Arthur Steinberg showed that chronic arthritis patients given topical DMSO applications four times daily experienced pain relief in about 84 percent of cases, and also demonstrated increased mobility and decreased swelling in the inflamed joint. Steinberg found that when DMSO therapy was discontinued, the swelling returned. His study also showed that rheumatoid arthritis patients experienced subjective pain relief from DMSO about 77 percent of the time, and, like Drs. John and Lauaiden, he reported that several patients got relief from a combination of DMSO with a reduced dosage of their normal medication.

4. Since the FDA had essentially ended DMSO research in the country with their 1965 ban, the 1980 House Select Committee decide to conduct more "research" by sending a survey to 250 randomly selected American Veterinarian, another 250 Rheumatologists and 110 physicians of professional athletic teams.

Of the 134 veterinarians who responded (54% of those surveyed), 96 (70%) said they had used DMSO in practice and of them 85 (90%) believed it to be effective in reducing inflammation, pain or other arthritic symptoms in animals while 75 (80%) believed from their experience in animals that DMSO would be safe and effective for humans.

Some of the main cases for which the veterinarians used DMSO were: tendonitis, lameness, bursitis, arthritic joints, acute inflammation and swelling, chronic inflammation in ear canal, edema, sprains, strains, mastitus, laminitus, splints and other leg injuries in horses, cattle and dogs, intravenously for head injuries in dogs, to relieve spinal pressure due to ruptured intervertebral discs and as a carrier for other medications.

Of the rheumatologists, 169 (68%) responded and of them, the majority felt more carefully controlled studies of DMSO were warranted, 33 (20%) had used or prescribed DMSO in their practice and of those 33, 49% felt the drug was effective in reducing inflammation, pain or other arthritic symptoms (along with about 25 who felt the same but had no direct experience with the drug) and 12 (36%) felt the drug should be legalized.

Those who had used DMSO in their practices reported using it for the following conditions: arthritis (including osteoarthritis, rheumatoid arthritis and degenerative arthritis of the spine), bursitis, scleroderma, tendonitis, fibrositis, gout, sprains, skin ulcers, painful muscles, cervical syndrome and episcinditis.

Of the 39 team physicians who responded, 7 had used DMSO for conditions such as inflammation of joints, sprains, swelling, tendonitis, bursitis, muscle bruises and contusions, and gout, and 5 more (who did not use DMSO themselves) had seen it used in sports medicine. Of those 12, 10 found DMSO effective in reducing inflammation, pain or other arthritic symptoms. Additionally, most of the 39 believed further study on DMSO was warranted.

While I can't list all of the correspondences they received, I did want to quote this one:

> DEAR CONGRESSMAN PEPPER: I have had considerable clinical experience with DMSO utilized as an external liniment to various painful joints and other areas of the body. In the past, I have treated over two hundred patients with DMSO products made by System Laboratories.
>
> Most of these patients were benefitted. None of the patients experienced any serious injury to their health. One man did break one with a cold water pus which resembled impetigo, but this cleared promptly when the liniment was stopped.
>
> I would strongly recommend that this drug be made available to the medical profession, at least in liniment form, because of its effectiveness in relieving muscular and joint pains.
>
> Sincerely yours,
>
> ALBERT A. Wilson, M.D., P.A.

Note: my essential goal with this series (and why I've put so much time into it) has been to provide a public record everyone else can use as a reference to advance the use of DMSO (much in the same way I've done with other critical forgotten-takes of medicine like adrenalin-blood resuitation). In turn, while I've done my best to compile the pertinent data, it's certain I missed quite a bit of it, so if you know of any (especially if you have copies of the actual studies I only provided citations for), please send them my way so I can incorporate them into this.

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Dosing and Topically Applying DMSO

My hope is that this article and the previous one make a strong case for how miraculous DMSO is and how egregious it is that the FDA kept it from America for decades, and why I felt it was so important to bring awareness to the subject.

In the final part of this article, I will discuss the established protocols for applying topical DMSO for many of the conditions here (including our preferred methods), key precautions to be aware of, tricks we've found for using it, and our preferred sources for obtaining it.

Note: internal and intravenous use of DMSO was discussed in the first part of this series and hence will not be discussed here. In many of these conditions (especially when they are more severe or widespread) through the body, internal applications of DMSO are beneficial and sometimes necessarily. Additionally, in many cases, topical DMSO is mixed with another agent which DMSO also brings into the body. That topic will be discussed in a later article.

Sourcing:

Due to DMSO occurring in nature and it hence being classified as a dietary supplement, it is covered by the 1994 DSHEA act. As a result, unlike the previous decades, it is easily obtainable.

Typically, when getting DMSO, there are four options.

•A pure liquid.
•A pure gel.
•A mixed gel typically mixed with aloe vera).
•A roller.

The primary advantages of the gels is that they are easier to apply, less likely to create a mess, and able to provide a sustained effect over a prolonged period (so people often prefer them) while the primary disadvantages are that the gels are more likely to cause irritation (at least according to some authors), their absorption is much slower (which for instance makes them terrible for conditions like strokes where DMSO needs to get into the body as quickly as possible) some of gel will not get absorbed, and most importantly, the gels are less potent than the liquids:

Note: when applying gels, they should be rubbed once the skin with a hand until a thin film results.

Generally, I prefer to use the liquids unless I know the patient will have difficulty applying them. As a result, I am significantly less familiar with and experienced with the gels. However, many of the studies cited in this article used a topical DMSO gel and were able to demonstrate a clear benefit from it, so the gels can be used as well.

Note: homemade gels can also be created by mixing liquid DMSO with pure (at least 99.7%) aloe vera gel.

Additionally, the DMSO refiers to a this agent seems like an excellent compromise between the two in that they make it possible to easily apply DMSO to the target area but I do not have as much experience with them, and I have encountered instances where they seemed to do less than the liquid.

When purchasing DMSO, there are two major considerations.

•Purity—ideally you want the highest purity possible. Fortunately, unlike the days of DMSO "prohibition" (where people were forced to get industrial products with almost certainly bad contaminants—although I am surprisingly not aware of any significant health issues arising from poor quality DMSO), it is now possible to easily get high purity brands.

•Containers—ideally you want DMSO to come in a container which DMSO will not leach from. In turn, while "DMSO resistant" plastics exist (discussed further in the previous article) rather than try to figure out if that is indeed the case for each product, I just buy DMSO that is in glass containers. This is less of an issue with gels (since most of the DMSO won't mix with the plastic edges of the container). *Note: It's important to remember that some glass containers will inevitably be dropped and broken and that you can still have unwanted absorbance into DMSO if the bottle's cap is not made of a DMSO safe material.*

In turn, three "ideal" brands exist.

•Jacob Lab is gels, this gel or this liquid—which is 99.98% pure.
•Nature's Gift is gels, this gel or this liquid—which is 99.9% pure.
•The DMSO store is gels, this gel or this liquid—which is 99.995% pure.

Briefly my thoughts on the brands are as follows:

I primarily used Nature's Gift for years and only began using the DMSO's store version when it popped onto Amazon a few years ago.

If you are concerned about purity and authenticity, the Jacob's lab DMSO is the best product (and the one Stanley Jacob recommended). Unfortunately, it is the most expensive. Given how long Nature's Gift has been around (and the fact that their product works), I've *assumed* that it contains what's advertised. The newest one (the DMSO store) likely has the highest purity because they have access to a newer manufacturing process (by this company), but I don't know much about the company. Nonetheless, I use their products, they work and I have not had any issues.

Note: it is generally advised to store DMSO in an area free of sunlight (e.g., a fridge) because UV can gradually damage DMSO over time (although I've never been able to determine in what degree this happens). With nature's gift, since DMSO is stored in amber colored bottles, sunlight exposure is much less of an issue.

Safety:

Prior to using DMSO, there are essentially two things you need to figure out. The first is if you are one of the 1 in 2,000 people who have an allergy to it. Typically, the recommended approach is to do a small test prior to consuming a larger amount and see if you have signs of an allergic reaction (e.g., raised skin). This essentially sums up how to do it:

So, What is Patch Testing?
Patch testing is a method used to determine how the application reacts to a product. It's a smart way to test a small area first before applying the product to larger areas, which helps to identify any adverse reactions.

How to Patch Test:

•**Select a Small Area:** Choose a discreet spot.
•**Apply a Tiny Amount:** Use a small quantity of the product.
•**Wait and Observe:** Leave it on for 24 hours unless you notice irritation sooner.
•**Proceed if All's Good:** If there's no reaction, feel confident to use the product as intended!

**If in contact with the skin:* Some experience itching and tingling sensation, this is normal. If there's any redness or swelling, wash the area immediately and discontinue use.

Additionally, if you feel any tightening or swelling in your throat (which is incredibly unlikely to happen with a patch test even if you are allergic to DMSO, do not use DMSO again, and if an antihistamine (e.g., Benadryl) is available, take it as well.

Secondly, anything mixed with DMSO can absorb into the skin. Since bacteria are too large for DMSO take in (e.g., many pathogenic bacteria exist in the mouth, but and DMSO has never been shown to pull them into the body), the primary concern are chemicals that are present being drawn into the body. Of them, the biggest concern seems to exist with pesticides, and I have a board of a few instances where someone had a pesticide on their skin (e.g., due to having recently sprayed), and then DMSO was applied to their skin before it was washed off and the individual got somewhat ill (but nothing where they were in danger of a serious complication).

Additionally caution is also urged with:

•Synthetic clothing fibers (as you do not want to pull their contents into the skin). *Note: I wrote more about the importance of healthy clothing materials here.*

•Jewelry (as DMSO will react with metals such as aluminum, copper, iron, nickel or tin but not gold or silver. Since most jewelry contains those metals, it's best to not have metals contact the area and to wash skin they'd been on.

•Sunscreen (as it often contains toxic chemicals you don't want to enhance the absorption of).

•Chlorinate pools or hot tubs (due to all the chemicals that can form in them). For this

•Chlorinated Pools or hot tubs (due to all the chemicals that can form in them). For this

•Gasoline (which can get on your hands when you fill up your vehicle).

In theory, this issue also exists with other common chemicals (e.g., cosmetics), but I haven't come across it. That said, it's generally wise to wash the area you plan to apply with DMSO beforehand and, if you do, to ensure there aren't any chemical soaps left on the skin.

Fortunately, once DMSO has dried (which takes about 20 minutes) it is much less able to pull anything into the body.

Finally, it's important to remember that DMSO (especially the liquid) can be washed off the skin with water (or a wet cloth), so if you have a reaction to it, do that.

Topically Applying DMSO:

A lot of different approaches exist for applying liquid DMSO (e.g., an (ideally organic) cotton swab or certain ball has long been a popular method of application, while others like using a spray bottle [made of materials DMSO won't dissolve]—particularly for sensitive areas). Typically, I prefer using a paintbrush, and if nothing is available, I often end up using my fingers (which does work). If you do the brush, it is important to get one that is made out of natural fibers (e.g., horse hair) rather than synthetic ones (which are more common) as these fibers can be absorbed by DMSO and then brought into your body.

When applying DMSO with a brush, you have two options—dabbing it on or painting it on. The big advantage to the dabbing option is that it's less likely to cause skin irritation (so I always suggest it to people who are having trouble tolerating topical DMSO—for example, this made patients much more open to using it from arthritis in the knees), while the major disadvantage is that not quite as much gets absorbed into the body. Regardless of which one you, assuming a liquid has been applied, you then want to give DMSO time to try which can take 20 minutes before putting anything on the skin above it (e.g., clothes or any type of chemical containing product).

In addition to dabbing on DMSO, the "trick" I've found for topically applying DMSO include:

•Having gravity pull it into the body. While this is not essential, in some cases doing this (e.g., applying it to the back while lying face down) seems to help.

•Using ultrasound to direct DMSO into the body. I got this idea from Morton Walker, who would use DMSO as the coupling agent between the probe and the body, and then aim the ultrasound probe towards the target tissue in the body (e.g., a heel spur) while simultaneously watching how the sound waves to DMSO permeated the tissue—all of which he reported excellent results from. Unfortunately, I have not had anywhere near as much time as I'd like to try this approach out, so I still am immensely curious about it.

•Apply DMSO on top of artery which directly blood flow your target (e.g., you can apply it on the back over the pulmonary arteries while someone is lying face down to help bring it into the lungs or onto the carotid (neck) arteries while someone is lying on their back to bring DMSO into the brain (which is helpful when a stroke is occurring).

•Start with small areas (DMSO is applied to before putting in onto larger areas, as doing this will give you a good sense of how much DMSO is appropriate for someone, and not overdose it. Simultaneously however, some conditions only respond if a large area of skin is painted with DMSO.

Additionally, with small regions of the body (e.g., arthritic fingers) some people will just dip them directly in a DMSO solution.

Dosing DMSO

> There's a certain art to administering DMSO, you have to figure out the best way to use the substance individually with each patient you work with. Some people will respond to 70 percent DMSO solution but may develop a slight rash, so you have to weaken the concentration a little. In more serious conditions, you might elect to strengthen the solution. Sometimes topical application isn't the answer. One has to use injections— or maybe mix DMSO with another drug.
>
> With some patients, the topical DMSO works fairly well—as long as it's strong enough strength—70 percent being what seems to be the ideal. But other patients do better on shots under the skin in the beginning, with the topical administration as a back-up. In any event, what we've found here at the clinic is that you achieve the best results from DMSO when you use a lot of it and apply it not just to the inflamed area but to a wide ret of the surrounding area as well.
>
> In an acute pain situation, like a bad sprain or a burn, we'll apply DMSO as frequently as every two or three hours.—Stanley Jacob MD.

Note: I often use muscle testing to determine the optimal dose and route of administration for DMSO.

In turn, it's generally advised to start at a low concentration and area and then work your way up. However, DMSO is generally non-toxic, and I know a lot of people who just, without thinking, took 90-100% DMSO (which had been stored for a long time in a plastic container) and put a lot of it on their body, after which they felt great and had no reactions to it. Similarly, it's best to start with a small area, and then if you don't get the desired response, paint a larger area with DMSO.

Note: in addition to people being more tolerant to DMSO overtime, they often need less of it to get the desired effect as a treatment progresses.

As best as I've been able to gather, these are the key points about each DMSO concentration.

•10%—this often does not work or does very little. However in some cases, it does create a bit of improvement (which was shown in the trials).

•50%—this is often the dose used in many clinical trials and which seems to be effective.

•60%—this dose is sometimes advised by DMSO authors, but less frequently than higher or lower ones.

•70%—this was deemed to be the lowest concentration, which is still able to be quickly absorbed by the body and thus significantly improves the likelihood of a critical positive outcome (e.g., a stroke). Many authors in the DMSO field now advise never using more than 70% DMSO (and for this reason many vendors sell 70% liquid DMSO).

•90%—this is the dose at which people start to be more likely to have skin reactions. However, since it offers minimal benefit over 80%, it gradually got phased out as the risk benefit reward of the slightly lower concentrations was deemed to be much better.

•100%—even though this is advised against, this is often the dose I use on myself, and I've not had any issues with it (as I am not "sensitive" to DMSO).

Many of the DMSO products on the market have 70% strength formulations. In turn, if you plan to do topical DMSO, you either do the same or start with 100% and very carefully dilute to the amount you need. Additionally, while most people can tolerate 70%, to make sure you are not a particularly sensitive person, I would start with a 20% dilution, make sure that is fine for the body, then gradually raise its concentration (e.g., 20%, 40%, 50%, 60%, 70%) and if at 70% it doesn't seem like anything happened, try slowly raising it to 90%.

Additionally, certain factors tend to influence exactly what concentration is appropriate for someone:

•Some individuals are more sensitive to DMSO and hence require a lower concentration of DMSO (e.g., someone with chemical sensitivities). A repeated observation in the DMSO field is that fair-skinned people and those with red hair tend to be more sensitive to higher concentrations of DMSO and thus require lower doses (e.g., if 70% was the typically tolerated dose, they would require 50%).

•The body becomes more sensitive as you go up it. Because of this higher concentrations are typically used below the waist (e.g., 60-80%), lower ones in the upper body (e.g., 40-70%), and the lowest on the head and particularly the face (e.g., 30-50% and never going above 70%). Additionally the folds of the body (e.g., the armpits or the front of the neck) tend to be a bit more sensitive than the surrounding tissues, and 30-60% is generally advised when working with an open wound.

•Estrogen levels can change one's sensitivity to DMSO, so if you can't understand why different doses work at different time, see if it correlates to your menstrual cycle.

Finally, in chronic conditions DMSO tends to work better if its not taken every day and there are periodic breaks (e.g., only use it during the week but pause on weekends).

Note: while DMSO is generally safe, topical DMSO is safer than oral DMSO, so it generally advised to start with topical DMSO and only transition to oral if it is advised by a healthcare practitioner (e.g., because it's not possible to get enough DMSO into body just through the skin to treat certain chronic conditions like arthritis or the user understands how to do it safely (e.g., they do not have an allergy to DMSO and it is always kept below 20% when swallowed).

Diluting DMSO

Since DMSO weighs slightly more than water (1 ml of DMSO is 1.1 g whereas 1 ml of water is 1.0 g), there is a bit of math involved in getting the exact concentration with it (e.g., if you wanted 10ml of 50% DMSO, starting with 100% DMSO, you would mix 4.55ml of it with 5.45ml of water). This equation becomes even more complicated when you aren't diluting pure DMSO (e.g., if you wanted 10ml of 50% DMSO, starting with 70% DMSO, you would mix 4.67ml of it with 5.33ml of water).

However, it doesn't actually need to be that complicated because:

•The purpose of finding the dose is what you best tolerate, not an exact number.
•There is a much wider room of acceptable doses for what can be done with the skin than intravenously (the focus of the previous article).

Because of this, my view is to just treat DMSO as having the same weight as water and then dilute off that basis (e.g., if you want 50% DMSO, take 100% DMSO and dilute it with equal parts of water) until you find the dose that works best for you. In many cases, this will mean just getting 70% DMSO, then mixing it with two parts water and seeing how you respond to that, then mixing it with one part water, seeing how you respond to that, and then if that is still tolerable, using 70% without diluting it (which is what most people end up using without issue).

Note: mixing DMSO with water will generate heat (and this should not be of concern). Additionally, my advice would be to use the same DMSO concentration when trying to determine the correct dose for yourself as it may otherwise get confusion to keep track of correcting converting the other concentrations to your preferred dose.

Skin Reactions

The primary issue with DMSO is that some people get irritated skin (e.g., redness, itching, or burning). This is normally temporary and passes (and often becomes less likely with subsequent doses of DMSO), but higher concentrations of DMSO are more prone to cause skin cream reactions than other ones. Similarly, a small number of patients find the skin reactions intolerable which is why each of the trials I listed here had a few people withdraw, but this is typically seen with 90% rather than 70%.

If this happens, the best remedy is typically to use a lower concentration and apply it possible apply it to a different area—but in most cases this won't be applicable at 70%. Simultaneously, however, DMSO will create sensations in the skin (e.g., warmth, a bit of numbness, a pulsation or a prickling). As a result, its important to distinguish the normal DMSO feel from the skin being irritated (much in the same way you want to distinguish the normal reaction from the 12000 allergic one). With a bit of practice, these both become quite self-evident, so all of this is mostly to give you an initial idea of what you are looking for.

Note: I believe some of the sensations people temporarily experience from topical DMSO arise from it temporarily blocking the conduction within the small nerve fibers.

DMSO Applications for Specific Conditions

Note: many of the doses and protocols I am citing in here are a bit different from what we use since we tend to err on the side of lower doses, whereas without muscle testing it's often difficult to determine the lower dose that will work for someone, especially if they are in severe pain and do not want to wait for you to try a few different doses. If you have the bandwidth to do so (either for yourself or for your patients) I would advise first becoming familiar with the effects of the lower doses before transitioning to the higher ones.

Acute bursitis—a wider region (e.g., going from just below the ear to halfway down the arm and also the front of the chest down to the nipple and on the back over the shoulder blade) often gets better results.

Acute back and neck strains—in both cases, these also respond to a wide area being covered (e.g., for the lower back go from the bottom of the ribs to 5[illegible] and the bottom of the sacrum, while with the neck go from the base of the skull to the shoulders while also including the sternocleidomastoids).

Acute Injuries—the dosing for these is no different from other applications. However, in more severe cases, in addition to directly applying DMSO to the affected area, it's often more effective to also apply DMSO to a wide region in the rest of the injury (e.g., for an ankle sprain, cover the entire foot and go halfway up the leg).

Arthritis—the exact protocol for arthritis can vary depending on the patient (e.g., injections—or oral administrations are sometimes used in patients with a greater need for treatment, and in the worst cases, where a higher dose is required, IV administrations are utilized). Typically, the rules given here apply, and a single daily topical application suffices (or 2-3 in more severe cases or after a flare). Additionally:

•Some patients (especially those with arthritis) find that they do well when MSM (DMSO's breakdown product, which is known to be helpful for the joints) or glucosamine sulfate is taken concurrently with DMSO.

•Osteoarthritis in the knees sometimes responds better to a wider application (e.g., inches above the top of the patella and 6 inches below the bottom of the patella).

•Rheumatoid arthritis in the hands—typically applying DMSO over the entire hand all the way up to elbow or soaking the hand directly in DMSO (in which case a lower concentration is typically needed).

•DMSO protocols normally can make it possible to lower the doses of existing arthritis medicines, and typically better results are gotten from DMSO when the doses are lowered.

Blisters—these tend to respond best to 60-75% DMSO.

Eczema (atopic dermatitis)—this can sometimes quickly be soothed using a 40-65% DMSO solution.

Gout—DMSO (at 75-80%) tends to work better for acute than chronic gout (bringing rapid relief in those instances) but can also help with chronic cases.

Migraine Headaches—DMSO works best if applied at the first signs of a migraine headache the problematic, at which point 50% DMSO should be applied to the head and neck (e.g., one author advises placing it on the temples, between the eyes at the forehead, on the back of the neck, on the throat, and over the liver area and applying about a 1 teaspoon amount every hour for a maximum of three hours).

Note: typically with migraines, we find that doing something to improve cerebral circulation (e.g., drinking one aid) during the prodrome phase works.

Restless leg syndrome—In many cases, applying topical DMSO to large areas of (clean) skin on the legs at night (typically 40-80% with a break on open sores) relieves restless leg syndrome. Additionally, some find applying topical magnesium oil helpful.

Scars—Regularly dabbing the scars with 60-75% DMSO once a day can often gradually soften and remove them.

Spine Issues—since DMSO can penetrate the fibrous coating of a vertebral disc, it can often be quite helpful for healing the discs. Issues here tend to respond to 70% DMSO being applied directly over the affected part of the spine each day (along with any existing scars). In more severe cases, intrathecal DMSO can also be added in to augment the healing process. Additionally, some doctors (e.g., Stanley Jacob) will also directly inject DMSO into the vicinity of the affected areas.

Sunburns—these respond best to being sprayed finely with 30-40% DMSO solution (and sometimes sprayed again 3-5 hours later).

Trigeminal Neuralgia—ideally, start with with a local application around the region of pain. Still in many cases, the best results are obtained by applying it to the entire side of the head and neck (of the affected side of the body).

Conclusion

I've wanted to write about DMSO for a long time, but given its complexity, I put it off for well over a year because I didn't feel I would be able to do it justice or honor the incredible work everyone who fought for decades to bring the public's attention to it.

In turn, I sincerely thank you for your support and making it possible for endeavors like this to be done. It is my sincere hope that we are now entering a political climate where many of these Forgotten Sides of Medicine can have their particle's awareness (which based on what my colleagues have told me I believe is a real possibility if Twitter remains uncensored and RFK Jr. can have an influential role in the next Administration).

Incredibly, we live in an era this is possible (e.g., the first part of this series has now been viewed by almost half a million people—whereas in contrast I don't think that many people in the past knew what DMSO could do for strokes, spinal cord injuries or Down Syndrome). As for me, I will continue to do my best to fulfill the unique responsibility I've taken on (I've already spent hundreds of hours on this series, and I'm not even halfway done). It's truly reprehensible that therapies with the potential to help so many have been kept from the public. However, I genuinely believe we're on the verge of this changing. Please share with others if you found this article useful.

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Great article. Very useful. Actually reading this is making me interested in returning to doing more research and observation on a surgical table. I'm from the time since retired from surgery a few years ago—but I am now interested to watch wound healing / skin graft taking/ skin healing with DMSO help. That being said, since you introduced your last article I have been using it with neurologically damaged patients , chronic pain, and patients with autoimmune diseases and at very first response the responses have been very encouraging. I'm not a surgeon anymore. As I have explained the data you introduced me to patients and

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given them the option they are showing intense interest. I am excited to follow these outcomes!

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37 replies by A Midwestern Doctor and others

MNI7 MNI7 Sep 29

Liked by A Midwestern Doctor

Thank you so much for all the time and effort that go into your posts. The level of information you share is staggering, I can't even imagine how many days/hours go into each one. And the info you're bringing to the masses is astounding! Life-changing and life-saving even. You are a light and a blessing - wishing you endless blessing in return 🙏❤️

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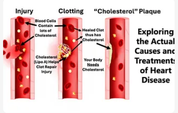

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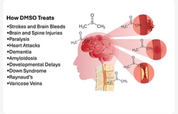

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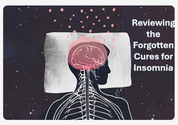

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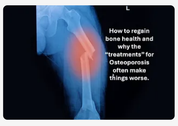

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