How DMSO Protects and Heals the Internal Organs

The evidence behind DMSO's utility for a myriad of challenging diseases

Story at a Glance:

•The therapeutic actions of DMSO make it well suited to treat challenging conditions throughout the body, including many of the internal organs.

•In this article, we will examine how DMSO protects organs from injury (e.g., poisoning or blood loss) and some of the specific diseases DMSO has been proven to treat.

•These include: heart attacks, liver cirrhosis, gallstones, ARDS, lung damage from inhaling smoke, pulmonary fibrosis, pancreatitis, diabetes, nephritis, kidney stones, polycystic kidney disease, cystitis, epididymitis, genital pain, prostatitis, urethral syndrome, enlarged prostates, tubal infertility, endometrial inflammation, and fibrosis.

•This article will review DMSO treatment protocols for those conditions (along with non-DMSO approaches we utilize for them) and provide general DMSO information for those looking to use DMSO for their own health.

Dimethyl sulfoxide (DMSO) is a remarkably safe compound that can treat a variety of challenging conditions. Since DMSO is remarkably effective for treating chronic pain, arthritis, and injuries like sprains or burns (discussed further here), it quickly spread across America as a miracle drug. Thousands of studies were conducted to confirm its value, and before long, hundreds of thousands of people considered it to be the most important therapeutic ever discovered.

Unfortunately, due to various negative political factors, the FDA went from embracing DMSO to going to war against it, and eventually, the pharmaceutical industry reluctantly followed suit. Sadder still, the FDA refused to relent even once:

•DMSO was shown to effectively treat strokes, traumatic brain injuries, spinal cord injuries, and many circulatory disorders (discussed here).

•DMSO was shown to cure a variety of "incurable" autoimmune and connective tissue disorders (discussed here).

•DMSO was shown to treat a variety of challenging (and often incurable) eye, ear, sinus, and dental conditions such as tinnitus and blindness (discussed here).

Since publishing those articles, I've received roughly a thousand reports from people of the remarkable effects DMSO has had on them (which can be read here), which while unbelievable, **are almost identical** to what people experienced in the 1960s before the FDA erased DMSO from the public's memory.

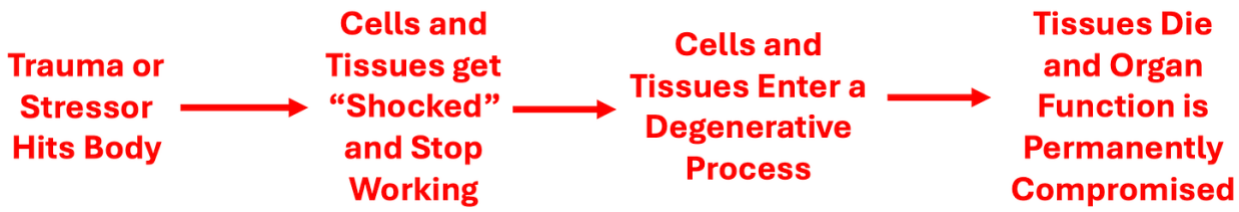
Likewise, I've received almost as many questions (which is why I am trying to make these articles as thorough as possible). One of the most common questions I've received is if DMSO can help with various disorders of the internal organs. After realizing I did not have enough data to answer some of them within my drafts for this series, I spent a few weeks going through search engines combining each permutation of DMSO (e.g., dimethylsulfoxide) and each organ or the common diseases of them so I could identify the pertinent studies to share here. Despite my best efforts, I likely missed some, so if you are aware of any that should be added, please send them my way.

As you review these studies, you will notice a few patterns.

First, many were animal studies (something that always makes me sad), which used research protocols existing at the time to induce common diseases and then see if DMSO could prevent them. For example, cutting off the blood supply to

tissues in the body will injure them, particularly when the blood flow comes back, so this can be modeled by clamping an artery that feeds the organ (typically for around an hour) and then unclamping it, creating what is known as an ischemia-reperfusion injury.

Second, DMSO has many benefits for other parts of the body (e.g., reducing autoimmunity, increasing blood circulation, and healing injured tissues). One disease process (which I haven't discussed for over a year) is particularly important to understand since, like poor circulation, it underlies many illnesses:



There are a few key points about this model:

•Typically, more potent stressors make it progress faster (e.g., strokes rapidly kill brain cells). In contrast, weaker and more chronic stressors make it progress slower (e.g., I previously discussed how the cell danger response underlies many "inexplicable" chronic diseases).

•The further down this progression a tissue is, the harder it is to reverse (but with the correct therapy it can almost always be done).

•Many regenerative therapies essentially work by getting "shocked" cells to come back to life and start working again, which in many cases is critical for overall health since those tissues not working can disrupt the entire body.

•DMSO can reverse this process (discussed further in the first part of this series), but it is typically more helpful for the rapidly progressing instances coming from a significant stressor (e.g., a stroke or a severe injury or ingesting a poison). This in turn, explains why DMSO can sometimes give motor function

back to people who were paralyzed by strokes years ago, but it is dramatically more effective if given shortly after a stroke, traumatic head impact or spinal cord injury, and likewise why individuals on DMSO suddenly "notice" things in their body that had stopped working come back.

•For slower and more chronic versions of this process which have already progressed, one typically needs a systemic regenerative therapy (discussed further here).

Let's now look at what DMSO does for each organ.

Heart

Most of the studies discussing DMSO's interactions with the heart regard its ability to protect it from permanent ischemia-reperfusion injuries (e.g., heart attacks):

•In a 2012 study, rat hearts had their blood supply cut off for 30 minutes and then were reperfused for 120 minutes. DMSO being given beforehand was found to reduce the resulting tissue necrosis (death) significantly and left ventricular dysfunction, particularly if it was given for a few days beforehand, rather than just immediately preceding the blood supply being cut off. Similar results were reported in 2010 and in 1981 when a heart attack was simulated. Additionally, a 1987 study found that DMSO increased the heart's cardiac output during a heart attack (and how much blood was able to get to the brain).

•A rabbit study found that if hydrogen peroxide (H_2O_2) was given concurrently with DMSO immediately after cutting off the blood supply to the heart, the damage the heart experienced was further reduced, presumably due to H_2O_2 providing oxygen to the heart tissue.

•When ischemic hearts are reperfused with a calcium ion containing solution, significant damage occurs. A rat study found that if DMSO was given in conjunction with the calcium solution, that damage was significantly reduced. A

related rat studyfound DMSO prevented ischemia-reperfusion injuries from causing severe contractures in heart cells and the formation of contraction bands, and that this seemed to be linked to DMSO reducing the oxygen induced creatine kinase release from cells.

•One mechanism to explain the damage that occurs in heart cells after a shock or stressful conditions (e.g., heart failure) is that the t-tubules within the heart cells will seal and remodel. In one study, 1% DMSO (but not 10% DMSO) was found to prevent this from occurring and this process was hence hypothesized to at least in part explain DMSO's ability to protect heart cells from significant stressors.

Additionally:

•In patients who survive heart attacks (and are brought back to life) they frequently have a variety of complications. In one study of 42 severely ill patients who had septic complications of postresuscitation disease, IV DMSO was an effective therapy, even in cases where sepsis came from antibiotic resistant bacteria.

•Isoproterenol can cause heart damage similar to that seen after a heart attack. Giving rats DMSO after giving the isoproterenol was found to reduce the resulting myocardial fiber necrosis, prevent ventricular aneurysms and cardiac rupture, and result in a smaller residual area of myocardial fibrosis.

•A key component of regenerative medicine is using stem cells (which have the potential to differentiate into many different cells) to replace damaged tissues (particularly those within critical organs). DMSO (especially with another medication) was shown to cause stem cells to differentiate into heart cells.

•When heart cells were exposed to low concentrations of DMSO (less than 0.5%), their respiratory control ratio and cellular viability relative to the control cells were enhanced (whereas at 3.7%, DMSO became harmful to them).

•DMSO was found to prevent heart damage caused by dietary copper deficiency.

•DMSO can also increase or decrease the force of heart contractions (e.g., a 70 mM DMSO concentration or less has a positive inotropic effect, while a higher one can do the opposite or create a mild hyperpolarization that prolongs the action potential) in a manner independent of beta-adrenergic receptors, and does not alter cardiac rhythm.

Intestines and Stomach

Most of the research I know that has been done in the gastrointestinal tract was for using DMSO to heal irritation, inflammation, and bleeding of the gastrointestinal tract (with the only exception I know of being a study that showed DMSO increased the stomach's sensitivity to vagal stimulation).

For example, in a previous article, I mentioned that my colleagues use DMSO for irritable bowel syndrome and cited a 1968 patent that stated DMSO had helped a significant number of people with acute or chronic gastritis, peptic ulcers, enterocolitis, and mucomembranous colitis). The other gastrointestinal studies are as follows:

•A double-blind, randomized study evaluated patients with recurrent attacks of proctosigmoidal ulcerative colitis that were not being prevented by their prophylactic medical regimen, three different combinations of standard therapies, or a standard therapy with DMSO (46) or allopurinol (45). After two weeks, 51% recovered from a standard regimen (sulfasalazine or prednisolone), while 84% of those using DMSO or allopurinol recovered. Over the next year, those treatments were continued and it was observed that the standard treatment (sulfasalazine) had a 25% relapse rate, whereas that rate was only 5% of those taking DMSO or allopurinol.

•A study evaluated hospitalized patients with pelvic fractures or hypovolemic shock who were at risk for a stress induced gastric ulcer. Of the 58 controls,

22% developed one, whereas of the 57 receiving DMSO, only 4% did (along with 3% of 62 who received allopurinol). Additionally, none of those receiving DMSO deteriorated or required emergency surgery, whereas 8 controls and 1 allopurinol recipient did (of whom 3 then died).

•A study randomized 302 consecutive patients with previous symptomatic duodenal ulceration that was shown to have healed, and who were smokers and social drinkers, to receive four different treatments. Of the 220 available for evaluation, 65% who received a placebo had a recurrence of the ulcer, 30% of those who received cimetidine, 12% of those who received allopurinol, and 13% of those who received oral DMSO.

•A randomized double-blind study of 363 consecutive patients whose duodenal ulcers that did not heal despite 3 months of treatment with cimetidine (and who were cigarette smokers or social drinkers), were given either cimetidine twice a day alone or with DMSO or allopurinol. In 315 patients who were evaluable for analysis, at 8 weeks, 60% of those who had cimetidine recovered, whereas 100% of those who received DMSO or allopurinol recovered. Additionally, the one year relapse rate was 29% for cimetidine alone, 8% for those who took allopurinol, and 7% in those who took DMSO.
Note: this study also discussed the use of DMSO to treat peptic and duodenal ulcers.

•A randomized double-blind study took 238 patients with symptomatic acute duodenal ulceration who were smokers and social drinkers were randomized to receive for 8 weeks cimetidine or 8 weeks of a half dose of cimetidine plus oral DMSO (400mg two times a day) or allopurinol. After 8 weeks, 69 of the 87 (79%) who only received cimetidine recovered, whereas all of the 85 who received DMSO and 84 who received allopurinol did. Additionally, 67% of those who received cimetidine over the next year relapsed, compared to 6% of those who took DMSO and 5% of those who took allopurinol.

•A randomized study took 101 patients presenting with hematemesis (coughing up blood) due to erosive gastritis (a fairly dangerous condition). It gave them

either saline or oral allopurinol and DMSO orally every 6 hours for 5 days. Of the 50 controls and 48 who were treated (along with 2 who left because they could not tolerate the treatment), 29% of the controls and 8% of who were treated had further episodes of hematemesis (with three of the controls requiring subsequent surgery—one of whom died). Of those who remained stable, a subsequent endoscopy showed evidence of hemorrhagic inflammation in 44% of controls and 9% of those who received DMSO and allopurinol.

Note: the six previously listed studies were conducted in Iraq between 1990-1994. What many don't know is that prior to the harsh economic sanctions on Iraq and subsequent bombing campaigns, the country was regionally recognized for its robust medical system (which then collapsed), a situation almost identical to what happened to Libya's healthcare system after NATO toppled its government.

•Another author reported on a doctor who had 5 patients with recurrent duodenal ulcers and were social drinkers he gave DMSO to. They were examined once a month for a year, and all 5 had no recurrence of ulcer symptoms (along with having better health than expected and excellent attendance at work). He also highlighted the case of a 55 year old woman with severe digestive tract issues (e.g., internal bleeding leading to her being anemic with a hemoglobin of 5.0), weakness, fainting and shortness of breath. After receiving an emergent blood transfusion and being diagnosed with angiodysplasia in her GI tract, she was started on IV iron (which is not pleasant and did not help her causing her to progress to being terminal). She was then started on injected DMSO and B-12, recovered, and over the six years of follow-up, did not require any subsequent blood transfusions.

Note: this type of chronic internal bleeding is quite challenging to treat (e.g., the only other approach I know of that consistently helps here is a Chinese herbal formula).

•Cutting off the blood supply to the small intestine will rapidly cause the tissue there to die and often rupture (leading to fatal peritonitis). In rats, giving IV

DMSO to rats after 30-60 minutes of the intestinal blood supply being cut off, resulted in 28 out of 29 not developing gangrene, and within 24 hours, there was no evidence of ischemic damage to the intestines.

Liver and Gallbladder

Many different facets of DMSO's interactions with the liver, gallbladder, and biliary system have also been researched:

Liver Injury

•A rabbit study, found that DMSO reduced ischemia-reperfusion injuries to the liver that resulted from clamping its artery.

•A rabbit study found DMSO reduced the injury to the liver that resulted from clamping its portal vein.

•In rats, drinking 2 mL/kg of DMSO daily for 4 weeks was seen to prevent dimethylnitrosamine induced liver damage without any major side effects. Specifically, it prevented body and liver weight loss and the induction of hepatic fibrosis and the expression of mRNA for type-1 collagen in the liver. Additionally, DMSO was also found to inhibit LPS induced TNF-alpha and nitric oxide production (e.g., TNF-alpha mRNA levels were reduced).

•A rat study found DMSO inhibited liver necrosis and oxidative stress triggered by injecting D-Galactosamine and restored liver vitamin C levels.

•A rabbit study found that DMSO and tocopherol prevented the liver damage caused by injecting carbon tetrachloride.

•A Brazilian study found that DMSO reduced the oxidative stress that followed part of the liver being surgically removed.

•A study found giving DMSO to rats 10 hours after they were exposed to halothane (an inhaled anesthetic that was phased out of the richer nations due to

its toxicity profile), chloroform, or bromobenzene and was found to prevent liver damage these toxicants typically cause. Additionally, they also found DMSO prevented chloroform's **kidney toxicity** (renal tubular necrosis) and that none of these benefits resulted when DMSO's metabolite dimethyl sulfide was given instead. A followup study instead gave DMSO 24 hours later found DMSO reduced the resulting liver damage 4-fold (which without treatment within 48 hours would have occupied 40-50% of the liver) and ALT levels 8-16 fold.

Liver Failure

•This author reported on a study with 12 patients who had terminal liver cirrhosis who agreed to stop drinking all alcohol for the duration of the program were put on daily oral DMSO and aloe vera. Of the 8 who chose to continue the program for 6 months, **all had improved health, significantly reduced vomiting, and improved liver function tests, and rather than all being dead within one year as expected, they were in better condition than they had been at the start of the study.**
Note: if using DMSO for cirrhosis, it is critical to stop consuming alcohol, as DMSO can slow the metabolism of alcohol.

Gallstones and Jaundice:

•A rat study created obstructive jaundice by ligating (cutting off) the common bile ducts and found that DMSO mitigated the pathologic effects of this (e.g., it normalized laboratory values).

•A Japanese study found that injecting 90% DMSO mixed with 5% hexametaphosphate into the biliary tract effectively dissolved gallstones within the liver and was safe for the patients.

•One study injected DMSO directly into the biliary tree of mice (as sludging of bile in this region can lead to challenging gallstones). That study found that 50% DMSO caused no irritation, but 65% did (e.g., liver enzymes were elevated and

necrosis, inflammation and fibrosis were observed). However, the irritation caused by 65% was transient and the rest of the bowel was not affected. Given that direct injections of 50% DMSO caused no issues and typically much lower concentrations of DMSO will contact the bile tract, this suggests DMSO is safe to administer to the biliary tract.
Note: the purpose of this study was to determine if they were harmless agents which could be used to develop treatments for biliary disease (something which can often be quite challenging to deal with).

IV DMSO saved my gallbladder and reduced my inflammation to almost nothing in 2013. Soon after, my alt GI doc no longer had access to it. She was getting it from Switzerland at the time.

Lungs

DMSO protects the lungs from injuries, treats acute respiratory diseases (e.g., acute stenosing laryngotracheobronchitis in children**)**, and also helps with a few challenging conditions.

Lung Injuries

•DMSO was found to prevent ischemia-reperfusion injuries to the lungs.

•In rats, DMSO was found to prevent lung injury from hemorrhagic shock (significant blood loss) and transfusing lost fluids back into the circulation.

•Giving DMSO before alloxan (a toxin) was found to prevent the inflammation, cellular damage, and edema alloxan causes in the lungs.
Note: this study also found DMSO prevents acute pulmonary edema.

•DMSO was found to prevent the oxygen deprivation and inability to exchange gasses through the lungs which results from an Ehrlichia ruminantium infection (which is typically fatal).

•In rats, DMSO was found to prevent the significant inflammation and tissue injury which follows a significant traumatic impact to the lung.

•After sheep experienced a lung injury from inhaling smoke, nebulized DMSO (with heparin) was found to reduce the damage to their lungs significantly.

Note: as I have shown in this section, studies exist that show that nebulizing DMSO can be quite beneficial to the lungs. In contrast, a rabbit study found that inhaling 25-50 ml/hr of DMSO for an hour each day for 8 weeks caused pathologic changes in the liver and lungs. While this was a high dose, nebulizing DMSO has nonetheless been advised against in the DMSO field (which I believe was due to that rabbit study). The best conclusion I can draw from these conflicting data points is that DMSO should only be used for acute injuries in the lungs but not chronically nebulized.

Acute Respiratory Distress Syndrome (ARDS)

ARDS is quite challenging to treat (and a common reason people end up on ventilators), so DMSO's potential to help the condition is quite noteworthy:

•In hamsters, an inflammatory peptide was put into the airway to trigger ARDS (a severe lung condition that often results in ventilation). When DMSO was subsequently given, it was found to reduce the inflammation and fluid in the lungs significantly.

•A similar mouse ARDS study that used bacterial LPS to injure the lungs also found DMSO reduced lung inflammation and fluid leak along with damage to the lining of the lungs.

•A third mouse study found that DMSO prevented LPS damage to the lungs, kept all treated mice from dying (whereas 58% of controls died), and maintained the ability of the lungs to produce ATP.

Note: a few studies have found that DMSO makes a part of the mitochondria able to synthesize ATP (the source of cellular energy) without the rest of the

mitochondria being present. This, in turn, hints at the possibility DMSO can allow compromised cells to continue producing ATP (and thereby play a role in preventing cell death).

In the one human study where DMSO was used for ARDS (given intravenously at concentrations under 10%) it was found to produce a dramatic improvement in all three patients who received it (e.g., one patient's lungs were completely normal after a week) and prior to receiving DMSO all three were near death. Additionally, in the one case when DMSO was nebulized, the improvement occurred in 1 hour.

TABLE 1

Patient		pH	$paCO_2$	paO_2	HCO_3^-	% O_2 Sat.
1	pre-DMSO	7.37	50	60	29	89.0
	1 h post-DMSO	7.35	43*	91*	26	95.0*
2	pre-DMSO	7.36	51	58	29	87.6
	8-h post-DMSO	7.33	52	86*	27	94.5*
	5 days into therapy	7.37	34*	84*	19	94.5*
3	pre-DMSO	7.32	48	66	24	89.9
	8-h post-DMSO	7.27	45	95*	20	94.9*

*Asterisks used for emphasis.

Note: another study found that DMSO reduced immune cell infiltration of a lung infection, which can both be beneficial (as it explains how DMSO prevents the immune system from attacking the lungs), but also problematic as it loses the ability to fight off a significant infection. That study, hence suggests that DMSO should never be used alone as a treatment for bacterial pneumonia (whereas later in this series I will discuss how DMSO can increase the potency of antibiotics).

Chronic Lung Diseases

DMSO was found to reduce chronic pulmonary fibrosis, and this beneficial effect was increased when it was mixed with zinc.

For older patients with chronic respiratory insufficiency (leading to chronically low blood oxygen levels, elevated carbon dioxide levels and an abnormal acid base balance, especially during exercises) due to issues in the lungs or bronchi, daily intramuscular DMSO was found to bring about a recovery without the need for hospitalization in 35/43 (81%).

Note: DMSO has also been shown to treat asthma and chronic non-specific lung diseases.

Pancreas

DMSO also shows promise for diabetes and pancreatitis.

Diabetes

Some Type 1 and Type 2 diabetics have reported that DMSO reduces (but does not eliminate) their need for insulin and that DMSO is particularly helpful for the condition since it can also alleviate the pain from diabetic peripheral neuropathy. Studies in this area include:

•Alloxan is toxic to the insulin producing cells of the pancreas and can be used to induce diabetes. A 1977 study found that if DMSO was injected prior to administering alloxan, they did not develop diabetes (although a higher dose of alloxan caused the dose of DMSO only to provide partial protection against diabetes).

•Type 1 diabetes results from the immune system attacking the insulin secreting cells of the pancreas. One strategy for treating type 1 diabetes is to transplant healthy insulin secreting cells into the pancreas. Unfortunately, this strategy often fails because the immune system will attack the transplanted cells too. However, in a mouse study, DMSO was found to protect those transplanted cells by decreasing IFN-γ expression and the number of dendritic, CD8, and Th1 immune cells while increasing Treg cell differentiation—all of which showed DMSO prevents suppresses spontaneous diabetes and autoimmune

recurrence of type 1 diabetes.
Note: while type 2 diabetes (the more common form) is not considered to be autoimmune in nature, we have seen many compelling cases suggesting that autoimmunity plays a role in it as well.

•GLP-1 is a key hormone the body uses to regulate satiety and blood sugar (and which diabetes drugs like Ozempic mimic). One study found that 0.5-2.5% DMSO increased GLP-1's production of insulin by 2-2.5 times. The study's findings suggest DMSO could help treat diabetes or allow GLP-1 users to use a lower dose of the medication.

•Exposing insulin secreting cells to DMSO was found to enhance glucose-induced and tolbutamide-stimulated insulin secretion without significant effects on basal secretion or potassium responsiveness. Conversely, another study found that at high doses, DMSO would inhibit insulin secretion (however that inhibitory dose is much higher than a DMSO user's pancreas would ever be exposed to).

Pancreatitis

Another condition, pancreatitis is often quite challenging and dangerous (as there are no conventional treatments for it outside of cases where an obstruction causes it—rather hospitals can only support the patient until they recover). Fortunately, DMSO (and ultraviolet blood irradiation) have been shown to be quite effective for treating it. For example:

•After inducing pancreatitis in rats, DMSO was found to improve pancreatic microcirculation and reduce ICAM-1 expression (a key part of the disease process) and subsequent leukocyte adhesion.

•Another mouse study found DMSO significantly reduced the pancreatic edema resulting from dietary induced pancreatitis.

•A rat study found DMSO protected the pancreas from cerulein induced pancreatitis (e.g., through inhibiting lipid peroxidation in pancreatic tissue,

reducing pancreatic edema, reducing how many digestive enyzmes leave the pancreas and reducing the pathologic vacuolization of the pancreas's acinar cells).

•A randomized double-blind trial took 78 patients with chronic recurring pancreatitis (and no other confounding gastrointestinal disorders) who presented within 2 hours with signs of pancreatitis but did not have signs of generalized peritonitis. Of them, 26 received 10% DMSO rectally, and at least 57% were free of pain after 12 hours (compared to 17% of controls), and all were free of pain after 24 hours (whereas 48% of controls were still in pain). As a result, all DMSO subjects were discharged within 3 days, whereas only 22% of controls were discharged after 5 days of hospitalization.

Note: one German author advocates combining IV DMSO with chlorine dioxide (given at a much slower drop rate) for pancreatitis.

Kidneys

Many different facets of DMSO's interactions with the kidneys have been researched:

Safety

•A rabbit study found that rabbit kidneys perfused for 60 min with DMSO was unaffected by 1.4M (10.8%) DMSO, but higher concentrations (2.1 and 2.8 M) produced appreciable toxic effects to the kidneys.

A study of paraplegics found that IV DMSO caused no alteration of urinary function or urinary sediment (other than a transient increase in blood cells if osmotic hemolysis occurred from too high of an IV DMSO concentration).

•This study of 7 people found 10-40% IV DMSO caused no acute toxicity to the kidneys.

•A dog study found that in dogs with chronic kidney disease, unless they had stage 4 CKD, DMSO had no adverse effects, and in less severe cases, some improvements were observed.

Note: DMSO often functions as a potent diuretic (although the effects are highly concentration dependent). For example, one dog study found after 1 hour 40% IV DMSO caused a fivefold increase in urination, a rat study found giving it topically five times a day increased urine volume 10-fold, and human study also found 40% IV DMSO caused significant urination. Conversely, this diuretic function is often extremely helpful (e.g., it will take excessive fluid outside of regions it has leaked into) and accounts for some of the significant benefits seen from DMSO.

Ischemia-Reperfusion Injuries

•In a rat study, renal ischemia was induced by cutting off the blood supply to the kidney for 1 hour, after which, DMSO or saline was given intravenously. All the saline treated rats had significantly worsened kidney function and died within seven days, while all the DMSO treated rats survived and had near normal kidney function. A similar experiment was then done in dogs, where DMSO again preserved a near normal kidney function (whereas in the saline treated dogs, 1 died and 4 had transient renal failure).

•Another rat study also found DMSO prevented ischemia-reperfusion injuries.

•A nuclear magnetic resonance imaging study of rat kidneys (a method which makes it possible to detect minute and otherwise invisible changes) found that DMSO protected the kidneys from the damage that occurred when their access to oxygen was cut off, but it did not prevent the transient drop in kidney function which occurred during this period.

Toxic and Dietary Injuries

•A mouse study found if DMSO was given within 3 hours of injecting mercury subcutaneously, it prevented the kidney damage which typically resulted over

the next two days (however at 5 hours it was too late). Additionally, the results suggested this protection was not due to DMSO chelating mercury.

•A rat study found DMSO prevented the kidney damage caused by gentamycin, and that (like the previous mouse study) it also restored the levels of GSH and SOD enzyme activity to near normal.

•DMSO was found to protect rats from radiation induced kidney damage.

•In rats with dietary copper deficiencies, DMSO was found to attenuate the increase in blood urea nitrogen and significantly decrease in gamma glutamyl transferase caused by the copper deficiency.

Kidney Function

•When kidney tissues were frozen, DMSO was found to greatly increase the conductivity of the tissue.

•DMSO was found to increase rabbit kidney's flow rate and changed the GFR, but did not change Na^+ reabsorption or fractional water excretion, leading the investigators to conclude DMSO may shift the regulation of urine flow rate from tubular reabsorption.

•Many studies and case reports (listed in this article) have found that DMSO improves renal function in patients with amyloidosis. For example, this study of 15 patients with amyloid A amyloidosis resulting from autoimmune conditions improved the kidney function in 5 out of 10 renal amyloidosis patients but could not help severe cases, while this study of two people with renal failure found both had a dramatic improvement from DMSO.

•DMSO was also found to inhibit the kidney's Na^+-K^+-ATPase pump in a comparable degree to Ouabain or atrial natriuretic peptides (ANP), but did so in a manner independent from how either functioned.
Note: Ouabain or its derivatives are often used in integrative cardiology, while ANP is a naturally occurring hormone that protects both the heart and kidneys.

A rabbit study found DMSO caused an increase in filtration fraction, and at high concentrations, a decrease in renal blood flow and urine volume.

•Exposing kidney cells to 10-20% DMSO was found to increase their metabolism, while higher concentrations (which are never used in humans) was found to be toxic to the kidneys.

Autoimmune Diseases

•Many kidney autoimmune diseases result from immune deposits in the kidneys (one of which is Heymann nephritis, an experimentally induced form of nephritis where antibodies that target the kidneys are injected causing immune deposits on the glomerular walls). In a rat study of Heymann nephritis, DMSO was found to reduce protein leaking into the urine, suggesting it prevents autoimmune kidney damage. Another rat study (which was more detailed) also had similar results, as did a third rat study.

•A study of 56 DMSO treated rats (and 48 controls) with lupus nephritis found that those who received DMSO had nearly normal kidneys, whereas the controls had significant damage to their kidneys.

Kidney Stones

•A study of 6 patients with kidney stones (5 of which were confirmed by ultrasound) found IV DMSO resolved the condition in 2-3 treatments (although one patient had a complete resolution after a single infusion).
Note: I located a rat study which I believe found similar results, but I could not find the actual study to verify this.

A 1967 study fed rats a diet designed to create kidney stones, and found that after two months, 40 of the 45 water-drinking rats had developed stones in the kidney, bladder or ureter, while only 11 of the 46 DMSO group did.

Note: the author of that study later conducted another studythat strongly suggested DMSO eliminated kidney stones by improving their colloidal

dispersion (zeta potential). We in turn, have had a great deal of success treating kidney stones by improving the physiologic zeta potential.

Genitourinary Disorders

In a previous article, I presented a wealth of evidence that DMSO (either consumed orally or directly administered into the bladder) with a catheter is often extremely helpful for inflammation of the bladder, particularly "interstitial cystitis" (also known as painful bladder syndrome), a challenging condition which results in very frequent, painful (and often bloody) urination.

DMSO, however can also help many other parts of the urinary tract. For example, consider this 1967 study:

TABLE 1
TOPICAL THERAPY WITH DMSO IN VARIOUS GENITOURINARY DISORDERS

Disease Entity	No Pts Treated	No Pts Improved
Peyronie's disease	13	6
Interstitial cystitis	15	2*
Epididymitis	12	7
Herpes progenitalis	5	2
Polycystic kidneys	2	2
Incisional pain, flank	3	3
Vague genital pain	14	1

*Intravesical instillation of definite value in some pts, not responding to topical therapy.

Interstitial cystitis requires oral or intravesical DMSO administration.

Note: DMSO has also been used in the treatment of orchiepididymitis.

Likewise, a study (which can be viewed here) of inflammatory conditions of the urinary tract, in addition to showing significant benefit for interstitial cystitis, also found:

•Of the 12 patients with radiation cystitis (e.g., from prostate cancer therapy) 50% had a positive response to it (3 "excellent," 2 "good" and 1 "fair").

•Of the 35 patients with chronic prostatitis, 75% benefited significantly, with 12 having a "excellent" response, 14 a "good" response, and in 90% of cases, inflammation of the prostatic urethra improved.

Another study gave 4 men with chronic excessive (and untreatable) urination due to either chronic prostatitis, chronic cystitis, tuberculous contracted bladder and interstitial cystitis DMSO. Three of the four had an excellent response to treatment, with the one non-responder having an unclear disease process (the doctors' best guess was that it was chronic cystitis).

Note: various DMSO drug mixtures have also been used to treat chronic prostatitis.

•Finally, a Polish study found urethral syndrome (chronic irritation of the urethra without signs of an infection) responds to DMSO being put into the urethral tract.

There are also many anecdotal reports of DMSO being remarkably helpful for these conditions (e.g., one author shared that DMSO made it possible for men to resume sexual intercourse where previously pain or urethral blockage made it impossible).

Note: in a previous part of this series, I provided evidence that DMSO can treat Peyronie's disease, an unfortunate contractile condition that causes a gradual curvature of the penis and significant pain during intercourse.

However, most of the anecdotal reports for DMSO's use for the urinary tract are in regards to it helping the prostate. For example, Stanley Jacob MD (the

pioneer of DMSO) would recommend DMSO for enlarged prostates that were making it difficult to urinate (which as one man shares allowed him to be able to sleep through the night), Pierre Kory recently shared a case of it curing a patient's prostatitis, this reader foundit helped prostate pain, and this reader found it helped difficulty urinating from an enlarged prostate). However, the most compelling account I heard came from this physician with extensive experience using DMSO:

Dmso is indeed marvelous. We gave 50 grams of Dmso i.v. daily for five months to a person who severed her lumbar spinal column. No organ damage noted from the Dmso and she can now drive and walk albeit slowly. Approximately forty (out of forty) patients with confirmed bacterial prostatitis have eliminated the bacteria in their prostate with a single dose of antibiotic dissolved in Dmso administrated via catheter three times a week for 4 weeks. No recurrences.

Note: Jacob also shared with an author that a physician in Texas some years earlier had reported injecting DMSO plus progesterone into enlarged prostates and that biopsies, examined under the microscope, indicated a return toward normal (which seems plausible as like DMSO, progesterone has been reported to shrink enlarged prostates).

Another Russian study found that when DMSO was administered into the vagina as a suppository, its anti-inflammatory properties and muscle relaxing properties significantly benefitted patients with pelvic inflammatory diseases, particularly those with pelvic floor syndrome (as it normalized the muscle firing).

Finally, one study examining the effect of DMSO on the testicles found that at freezing temperatures, DMSO did not affect testosterone synthesis, but at high concentrations (5-10%), reduced its secretion out of the testosterone producing cells.

Ovaries and Uterus

A few studies also show DMSO can help the reproductive tract:

•A rat study found that DMSO plus erythropoietin protected the ovaries from ischemia-reperfusion injuries.

•A 1975 Chilean study at a Navy hospital took 69 women who were infertile due to an obstruction in their fallopian tubes and injected a DMSO mixture into their fallopian tubes via ascendent hydrotubation (the specific mixture was 5ml of DMSO, dexamethasone, and chlorpheniramine diluted in 20 ml of distilled water). A series of 6 DMSO hydrotubations was given (every 3 days) followed by temporary breaks of varying lengths, and then an evaluation to determine if the tubes had opened. Once the tubes were opened, the patient was instructed to lead a normal sex life, and then repeat the hydrotubations if they had not gotten pregnant.

The authors reported carrying out a total of 426 DMSO hydrotubations in 69 patients, of whom 47 were available for analysis at the time the article was published. Of those 47, 27 (57.4%) subsequently became pregnant, including one who got pregnant twice (without any further assistance). Of the 27 pregnancies, 12 resulted in successful deliveries, 7 had a normal pregnancy at the time of publication, 4 patients chose to have abortions, and 3 had spontaneous abortions, and 1 had an abnormal pregnancy requiring a surgical intervention, and 0 had ectopic pregnancies (one of the risks of surgically opening the fallopian tubes). Additionally, in the 426 DMSO hydrotubations, 4 experienced discomfort and fatigue during the procedure, and 2 had psychiatric changes (in one case a sensation of anguish with difficulty breathing and in the other hypothymia and psychomotor agitation). These rare side effects (occurring in 1.5% of intubations) did not require suspending the treatment, and did not increase overtime.

Note: 25-35% of infertility is due to tubal obstructions (typically from inflammation there). The current surgical approach for opening a tubal obstruction and restoring fertility (which bears some risks) has a 10-30% success rate (figures on this vary widely, but are almost always under 50%).

•This horse study and this horse study) found that applying DMSO directly into the uterus does not harm its lining (the endometrium).
Note: there are many studies showing DMSO prefers the function and structure of tissues that get frozen (e.g., this one of a horse's uterine lining).

•A Russian study found DMSO could be used to treat erosion of the cervix.

•One study administered 10-30% DMSO into the uteruses of horses that could not get pregnant. It found no harm occurred to the lining of the uterus and that 18 out 27 had significant improvement to the lining of their uterus (compared to 2 out of 18 who received a saline placebo), such as a reduction of chronic inflammatory cell infiltrates and reduction of periglandular fibrosis. Additionally, there were signs their fertility improved, but the trial's design made it impossible to be sure this improvement occurred.

Note: these results suggest administering DMSO directly into the uterus could help a few challenging gynecologic conditions, but I do not know of any researchers who have tried this approach. However, I did receive this comment from a reader.

I have been suffering from endometriosis pain since I was 13. I am now 43 and I have tried everything other than surgery. Including a progestin IUD from my gyno that almost killed me (seriously). After giving up on mainstream medicine 3 years ago, I started using bio identical progesterone after reading Dr. Mercola's articles. The progesterone did help with some of the pre menstrual pain but I was still struggling with mid cycle pain, menstrual pain and horrendous inflammation of the endometrial tissue. I started using DMSO 70% topically and then a couple doses orally (1tsp) spaced a week apart. I quickly noticed the reduction in inflammation, cramping and pain. I had no mid cycle pain or PMS for the first time since I was last pregnant. Also, for the first time in years, I did not have to take any medication during my cycle for pain or inflammation. The cramping/inflammation I usually experienced was debilitating but the cramping I had was painless and more like a warm pressure. Truly incredible. I will continue my regimen but I am curious to see if this is a

cure or an ongoing treatment I will need to maintain. Thank you Midwestern Doctor for your research and voice.

P.S. Added positive side effects I have experienced: less joint pain and quicker recovery after exercise. No blister or pain after applying DMSO to a small burn from cooking.

A New Therapeutic Principle

When DMSO was discovered, Stanley Jacob quickly realized that it represented a new therapeutic principle since it made so many things which had previously seemed impossible in medicine suddenly possible—and even more remarkably, 60 years later, many of the things DMSO can address still remain a perpetual challenge for the current medical paradigm. As such, I find it remarkable that in the brief time DMSO was in widespread use and being researched worldwide, so many different uses for it that are still just as applicable today were discovered.

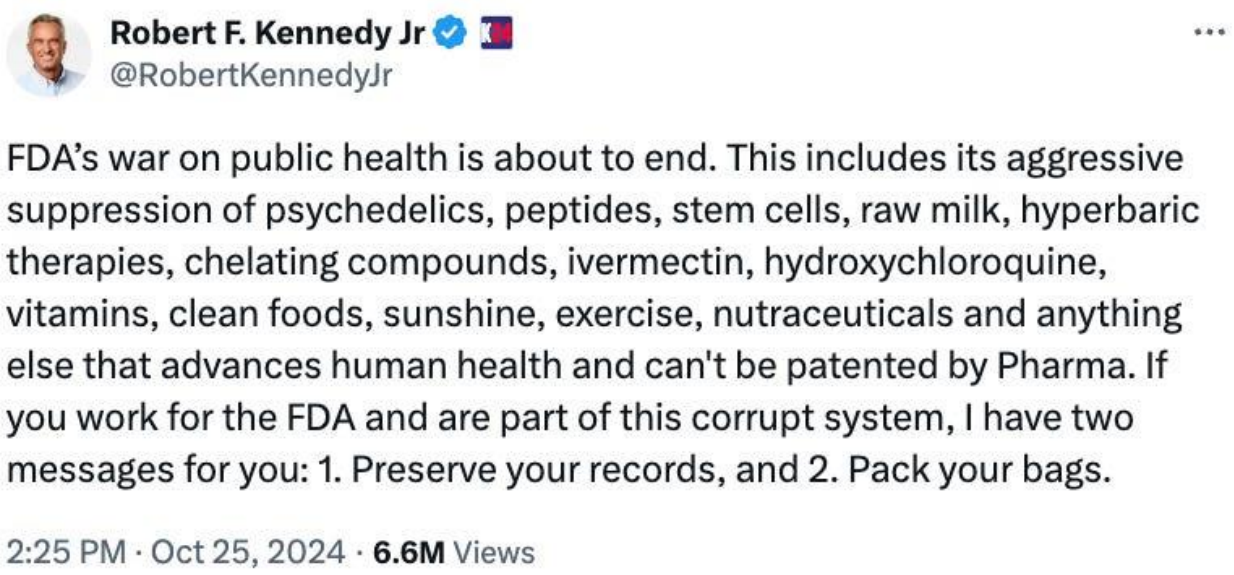
For example, much in the same way I recently showed how DMSO could significantly improve surgical outcomes, the data here makes good case that DMSO should be a mainstay therapy whenever someone is at risk of organ failure from being poisoned (e.g., due to a drug overdose). Likewise, the data here shows how numerous immensely challenging diseases that require a hospital or intensive care admission could be dramatically improved with DMSO.

However, while this stonewalling is immensely unfortunate, I am extremely hopeful that we will soon see a paradigm shift on this issues as:

•Much of the public (and much of the medical profession) has lost faith in the medical orthodoxy's verdict on what does and does not work.

•Twitter (**𝕏**) now allows the rapid diffusion of information, making it impossible to censor the medical truths the public is craving.

•The incoming administration (particularly RFK Jr.) are strongly committed to this issue.



As such, my goal is now transitioning to trying to support this paradigm shift.

Protocols

In the final part of this article, I will discuss how DMSO can be used to treat the conditions listed throughout this article (e.g., cirrhosis, prostate enlargement, GI ulcers, ulcerative colitis), along with a few other integrative approaches we use for those conditions (e.g., for ARDS, heart attacks, gallstones, gastric bleeds, and smoke inhalation). Additionally, I will also provide a revised set of simplified instructions for the product sourcing and general use of DMSO (as I've received a lot of useful feedback over the last few weeks that has provided some important hints for ensuring safety).

(paywalled content)

Conclusion

I hope you have appreciated this series so far. I have put a lot of work into it, and based on all the reports I've been coming across (from both readers and colleagues), it seems to be doing much more for the world than I ever expected it could. Fortunately (for me) we're at last over halfway through it.

For those of you who are wondering, the remaining parts of this series will be:

•How DMSO can be used for challenging diseases of the skin and the related issues like hairloss
•How DMSO transforms the treatment of cancer and infectious diseases.
•How DMSO can be mixed with a variety of other therapeutics.
•A summary of all the reader DMSO feedback I've received.
•A summary of this entire series.

DMSO Revolutionizes Skin Care and Dermatology

Story at a Glance:

•DMSO has a variety of unique therapeutic properties that allow it to address the root causes of many different illnesses—including those of the skin.

•DMSO effectively protects the skin from damage (e.g., radiation, chemotherapy, freezing, blood loss) and rapidly heals skin injuries (e.g., burns, chronic wounds or surgical incisions).

•DMSO addresses many circulatory disorders such as hemorrhoids, varicose veins, venous and diabetic ulcers, and Raynaud's.

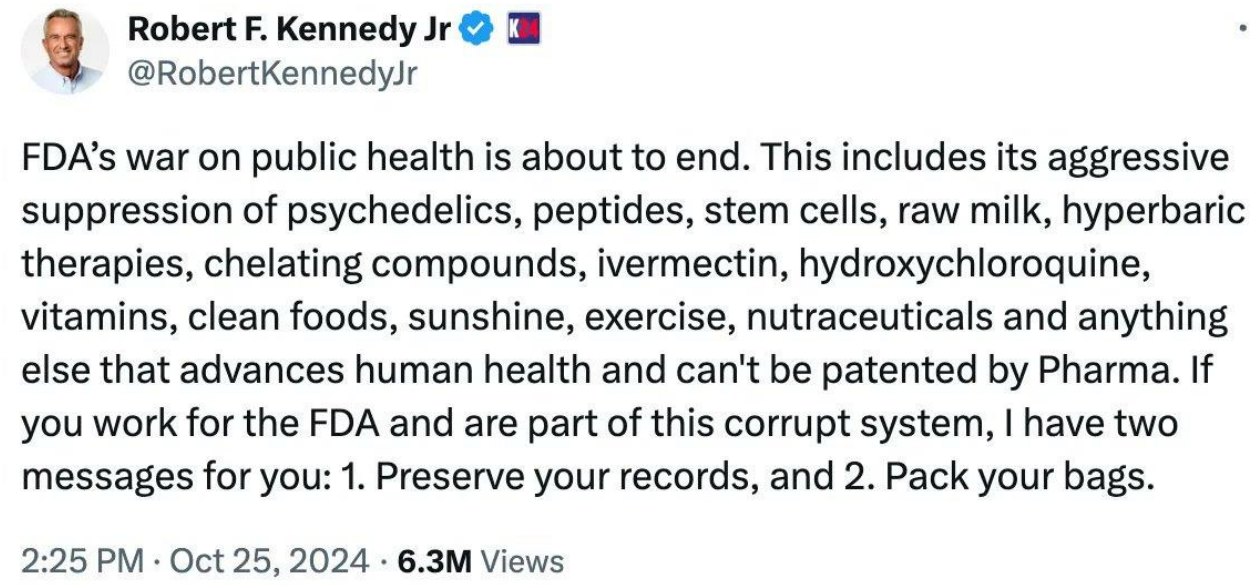
•DMSO also effectively addresses many common (but often challenging) dermatological conditions such as hair loss, psoriasis, shingles, herpes, skin cancer, lichen sclerosis, skin infections, nail issues, acne, eczema, pruritus, mastitis, insect and animal bites, sunburns and skin growths.

•This article will review DMSO treatment protocols for those conditions (along with non-DMSO approaches we utilize for them) and provide general DMSO information for those looking to use DMSO for their own health.

The American medical industry has accomplished a remarkable feat; each year it consumes a greater portion of the national budget (currently over 17.3% of

GDP) yet it continues to have some of the worst outcomes in the developed world (despite spending 2-4 times as much on healthcare). This is made possible by a vast medical monopoly that prevents economical therapies from out-competing the medical industry's cash cows and systemic corruption that makes the government unwilling to confront the sources of illness in our society (e.g., processed food companies or vaccine manufacturers).

In the months leading up to the election, I decided the most helpful thing I could do would be to bring attention to suppressed medical therapies that could directly impact people's health (so people could begin to grasp just how much these predatory tactics had directly harmed them), and to conclude this process by drawing a lot of attention to an easily accessible therapy that provided immediate and dramatic benefits. As it so happened, RFK Jr. had a similar thought process and shared this very controversial message shortly before the election:



The natural therapy I decided to focus on, dimethyl sulfoxide (DMSO), was an ideal choice for this task, as it's very safe (provided you use it correctly) and rapidly improves a variety of conditions medicine struggles with—particularly

chronic pain (discussed here). As such, I've received many reports of life-changing benefits from it that left even the reader in disbelief:

I have been dealing with chronic neck and lower back pain for over 10 years and tried so many treatments with little success. I tried DMSO and it stopped about 90% of the pain in less than a half hour...I literally started laughing because I couldn't believe it!"

…finally one night he dared me to rub it on his head. I did so and all of a sudden he got real quiet and a funny look appeared on his face. His mom told him it tingles, but that would go away. He got up and left the room. Ten minutes later he came back and asked how long ago since I rubbed it on him. Then he said, "I taste it in my mouth, but my bad headache and neck pain is GONE! I am so relaxed and mellow right now." He was laughing in relief.

He has near constant neck/head pain and his migraines have been getting so bad he broke down recently and very reluctantly started taking a pill. I had no idea this would work as well as it has for him.

However, while profound, DMSO's remarkable ability to treat pain is just one small facet of what this substance can do, and in this series I've thus far shown how it:

•Treats strokes, traumatic brain injuries, spinal cord injuries, and many circulatory disorders (discussed here).

•Treats a variety of acute and chronic tissue injuries (discussed here).

•Treats a variety of "incurable" autoimmune and connective tissue disorders (discussed here).

•Treats a variety of challenging (and often incurable) eye, ear, sinus, and dental conditions such as tinnitus and blindness (discussed here).

•Treats a variety of difficult internal organ disorders (discussed here).

Many of those remarkable results (which in many cases exceed anything conventional medicine has to offer) stem from DMSO being uniquely suited to address common root causes of illnesses (e.g., inflammation, microclotting, cells getting trapped in the cell danger response), and those myriad of diseases in turn simply being unique manifestations of those same processes gone awry.

DMSO and the Skin

One of DMSO's unique properties is that it (and anything mixed with it) rapidly spreads throughout the entire body regardless of the route of administration. Since DMSO is uniquely suited to address the root causes of illness, that means individuals who take it for one issue will frequently observe other issues fix themselves as well (e.g., I deliberately avoided mentioning that DMSO improves sleep in the hope unbiased readers would voluntarily share it was causing them to have more vivid dreams—which a few did—and far more shared once I alerted them to this effect).

As DMSO is frequently applied directly to the skin (so it can be absorbed systemically), it should thus come as no surprise, DMSO users rapidly noticed DMSO's positive effects on the skin. For example, one reader recently shared:

We got DMSO about three weeks ago for my wife's swelling. She has had swelling since she had a c-section almost two years ago. Her feet were so swollen she could hardly walk and were painful every single day. One day of DMSO and the swelling reduced by 90-100%. It came with a few "side effects", such as clearer skin, more energy and improved mental clarity. She then used it on the c-section scar, and it improved immensely. It was a giant knot of pain and hardness that she had tried to treat with message and essential oils for over a year with no improvement. After only few days of DMSO it lost inches of bulk. I tried it on an old injury on my finger and noticed improvement the first day with being able to extend my finger more than I had been able to in years.

Likewise, the DMSO field soon noticed DMSO helped a lot of skin conditions, to the point some doctors began using DMSO as their default treatment for challenging skin lesions when they weren't sure what else to do (as it often worked and posed no risk to their patients).

In turn, I've received a large number of reports from readers that DMSO greatly helped a variety of skin conditions such as:

•DMSO causing aging skin to be rejuvenated and look much younger and healthier (e.g., it happened in a few days to a 101 year old grandmother, another reader reported incredibly smooth skin, and another reported smoother skin on her face despite not applying it there and another reported it improved crepey skin on the neck and sun damaged skin on the chest).

•A dramatic improvement of chronic hemorrhoids (e.g., this reader, this reader and this reader).

•A dramatic improvement of varicose veins (e.g., this reader, this reader, this reader, this reader, this reader, this reader, this reader, this reader, this reader).

•Severe burns healing (e.g., a reader astonished by the complete recovery of a ten year old third-degree finger pad burn, a reader who had it rapidly treat blistering burns on the thighs, and a reader whose father recovered from a severe electrical fire burn). This reader, this reader, this reader, this reader, this reader, this reader, this reader, and this reader also reported that applying DMSO after a burn (e.g., from cooking) takes away the pain and promotes rapid healing.

•Using it for sunburns (something DMSO has long been recognized to help provided any toxic sunscreen has been cleared away before applying DMSO).

•DMSO consistently treating herpes type 1 and type 2 viral eruptions.

•DMSO treating mastitis.

•DMSO treating psoriasis.

•Hidradenitis suppurativa (a challenging skin condition that lacks safe or effective treatment options) responding to DMSO.

•Using it to treat the skin issues (e.g., oozing cysts) that developed on an aging Golden Retriever.

•It accelerating the healing of bruises (also reported by this reader who's done that for years, this reader who used it for bruising from IV lines, this reader who had a traumatic fall shortly after reading a DMSO article here, and this reader whose elderly mother fell on her face and fractured parts of it) along with it dissipating capillary bleeds under the skin (also reported by this reader).

•DMSO accelerating the healing of an ear surgery and significant leg rash (that followed a traumatic impact).

•It treating poison ivy.

•It treating a "miserable autoimmune skin condition which NOTHING else has worked on, including the "standard of care" prescription steroids."

•In a week, it permanently eliminating blackish plaques on her mom's legs multiple dermatologists were unable to treat.

•It treating recurrent facial seborrheic dermatitis flare-ups (also reported by this reader).

•A chronic skin eruption completely disappearing.

•This reader, this reader and this reader reporting it treating bacterial and fungal skin infections.

•It being miraculous for fire ant bites (also reported by this reader), and another reader using it for a black widow bite.

As I will show in this article, those same effects have also been reported throughout the medical literature—yet remarkably, the dermatologic profession remains unaware of it.

Note: some of the reports I've received are instead quoted throughout the article. The complete list of reports I've received (now over a thousand) can be viewed (and added to) here.

How DMSO Treats the Skin

One of the most significant challenges of being a dermatologist is being able to recognize a large number of skin diseases (over 3,000). In parallel to this, dermatologists also learn how many specific skin lesions can represent unique diseases within the body, and hence can diagnose illnesses other physicians fail to identify.

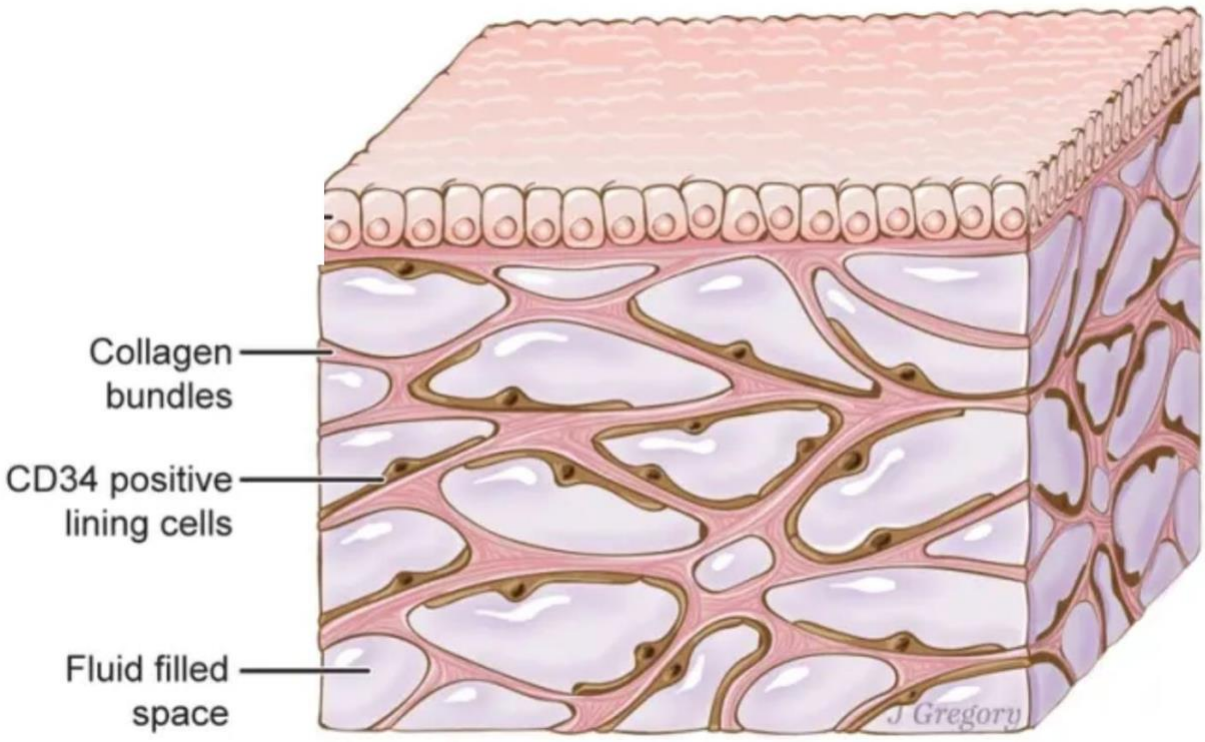
While I very much agree the skin can tell us an immense amount about the body, I believe that rather than associating a specific skin lesion with a specific disease, it's ideal to have a broader view that tries to grasp what type of underlying problem could cause the skin issue currently being observed and then deduce what might be causing that underlying issue or what other diseases it might be creating in the body.
Note: Chinese medicine often does this.

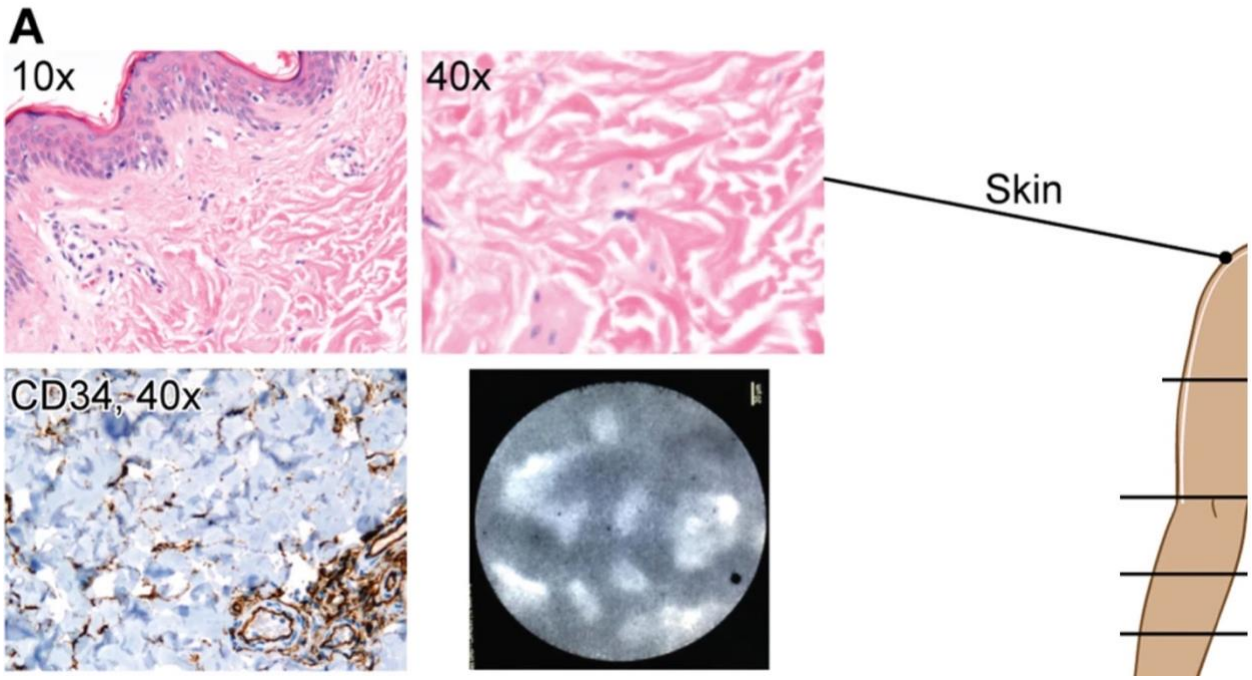
This framework also helps explain how DMSO is able to help a wide variety of skin issues as DMSO's potent mechanisms of action (e.g., being anti-inflammatory, improving circulation, rescuing cells trapped in the cell danger response, and stabilizing proteins) underlie many dermatologic conditions.

One of the things I have always marveled at with the body is how much is hiding in plain sight in front of us, and how as the years go by, profound discoveries continue to be made about it that rewrite our understanding of physiology. In 2018, one such discovery made a lot of observations I'd made about the skin come together.

Briefly, researchers (using advanced imaging technology) noticed when they placed a dye into the bile duct, it diffused out in a spider web-like pattern, suggesting it was traveling within an unknown vessel system (they termed the interstitium). Eventually, the researchers discovered that a delicate web of collagen strands travel throughout the body and form vessels the interstitial fluid travels in—something which was missed because those strands initially appear to be disorganized inconsequential debris on pathology slides.

While this network travels throughout the body, what immediately caught my attention was that it was consistently found in the dermis.





Note: the above picture shows how the interstitium's conduits are right under the skin, that they match the reticular pattern and the CD34 stain observed in it throughout the body, and the usage of a specialized imaging technique (confocal microscopy), which shows these structures indeed function as a conduit with a reticular pattern.

This led me to theorize that many dermatologic diseases result from congestion within the interstitium. For example, a primary function of the interstitium is to dissipate energy the skin absorbs (e.g., sunlight) and transfer it into the body. When this cannot happen, the body becomes malnourished. Likewise, if the transfer is impaired, the skin becomes easily overloaded (e.g., more sensitive to sunburns). Likewise, various approaches (besides sunscreen) have been discovered that make the body much more able to tolerate prolonged sunlight exposure—many of which coincidentally also improve movement within the interstitium.

Note: systemically or locally, improving the physiologic zeta potential can often benefit a wide range of skin conditions. I believe this is in part due to the structure of the interstitium (e.g., the vessels are small and it has no external

pump), making it highly susceptible to becoming obstructed by an impaired zeta potential.

In turn, I believe that beyond DMSO protecting the skin's blood supply and reducing inflammation, a major reason why it can help so many different skin conditions is because it removes obstruction from within the interstitium.

Note: one of the significant questions in Traditional Chinese Medicine has been what its 12th organ, the Triple Burner represents in the body. I would argue that it is likely the interstitium, as the two share many unique characteristics (and oddly, many of DMSO's therapeutic properties counteract pathologies associated with Triple Burner dysfunction).

Additionally, DMSO has been shown to increase light's ability to penetrate the skin. This was done to improve the ability of optical systems to diagnose the skin. Still, it likely could also enhance the body's ability to absorb natural light (a critical nutrient that typically can't enter through the skin).

Note: DMSO in combination with sodium chloride, has also been shown to reduce skin electrical conductance and in combination with lactated ringers, to decrease the electrical potential across the skin.

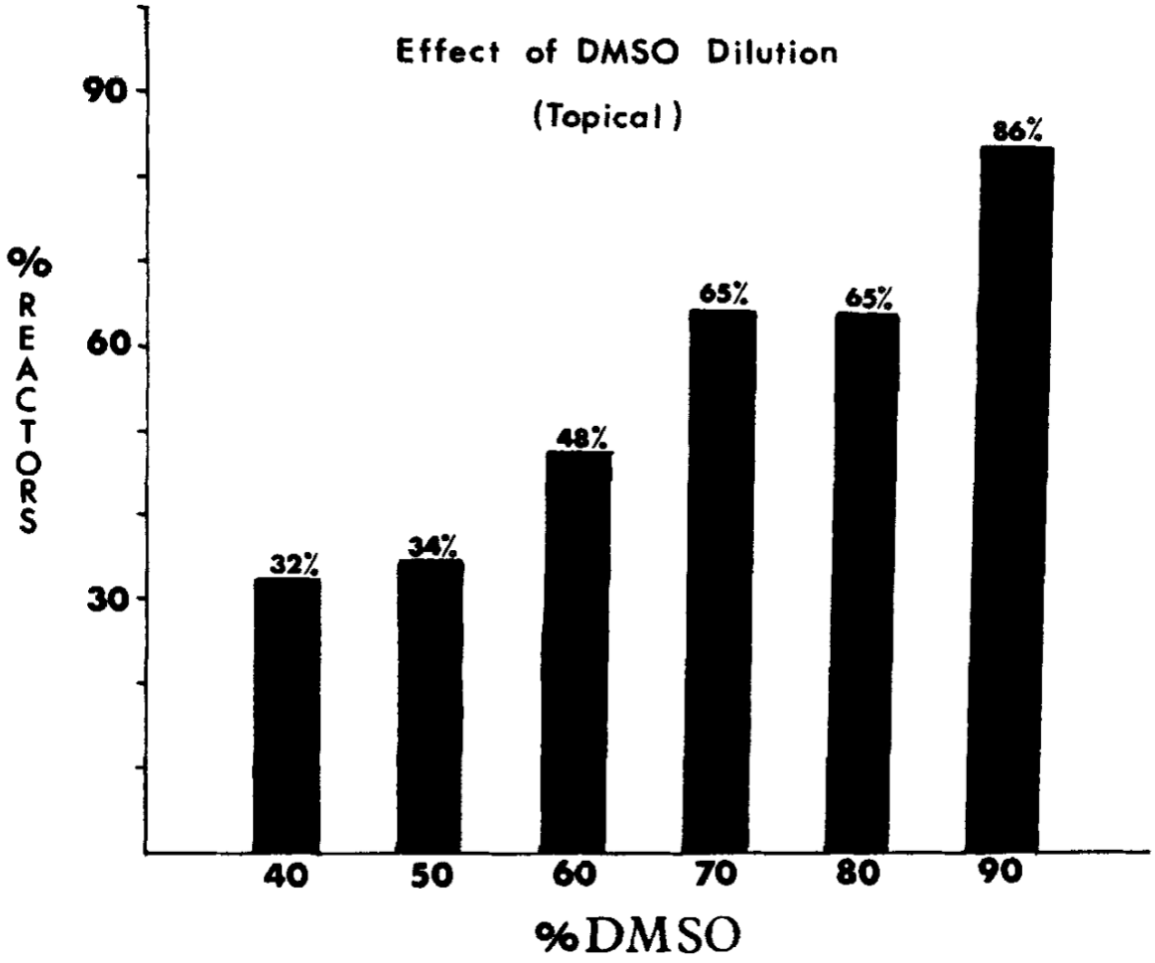
Topical DMSO Safety

Generally speaking, DMSO is a very safe substance (e.g., the most common side effects, skin irritation and an unpleasant odor, are not dangerous). These two primary concerns with it, and not applying it to skin that has a toxin on it (as DMSO will drag it (absorb) into the body), are rarely an issue for users. Also, avoid it if you are allergic (which affects roughly 1 in 2000 people **and must be ruled out before taking too much DMSO**).

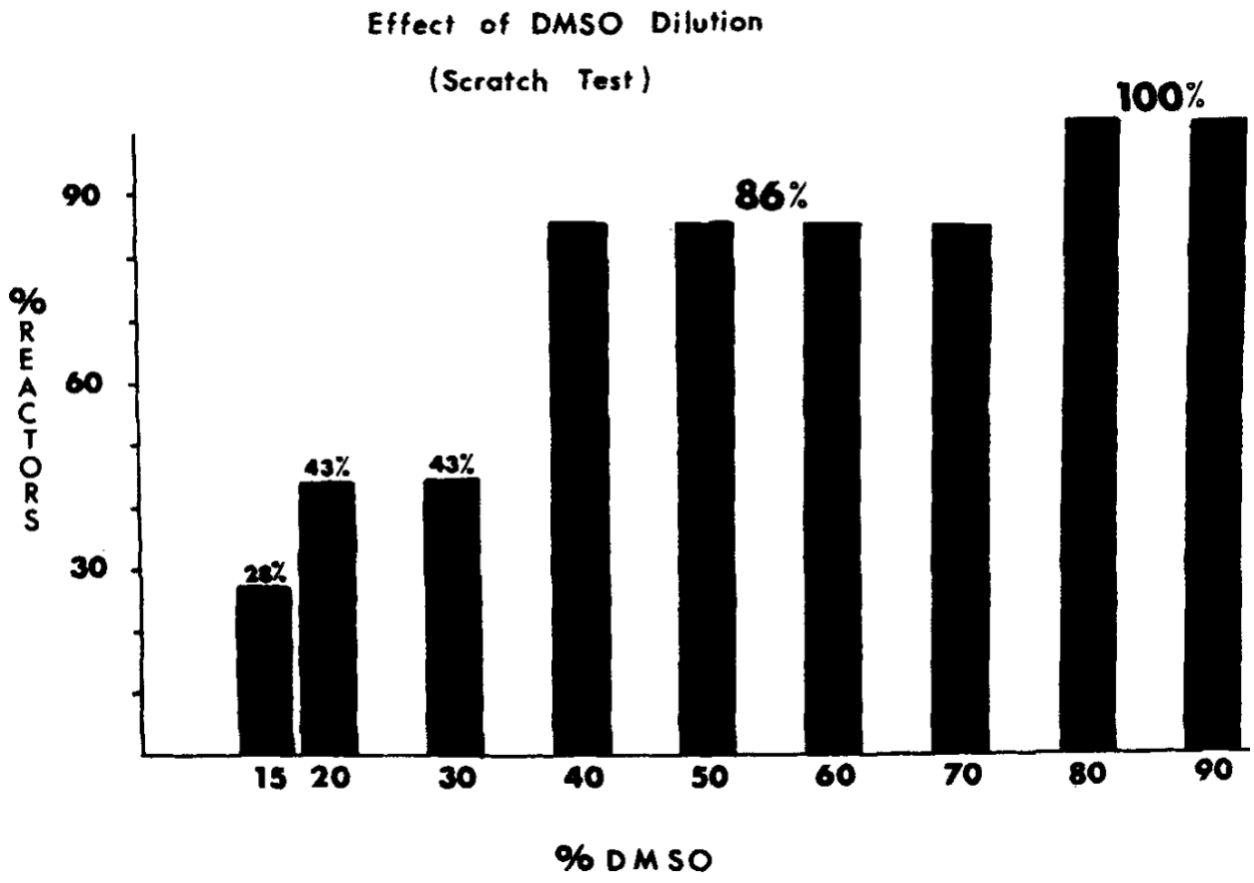
In turn, virtually every published study emphasizes that DMSO was safe for the participants, and a large body of evidence (compiled here) shows DMSO is safe for skin applications. For example, one dermatologist who treated 613 patients

successfully with 50% topical DMSO combined with the steroid triamcinolone acetonide reported that out of 363, no systemic reactions occurred except for one patient who felt "jittery," after use over a large area, along with two cases of contact dermatitis and temporary complaints of burning. Likewise, another team of dermatologists reported that in more than 1,315 cases, no systemic toxicity arose from topical DMSO.

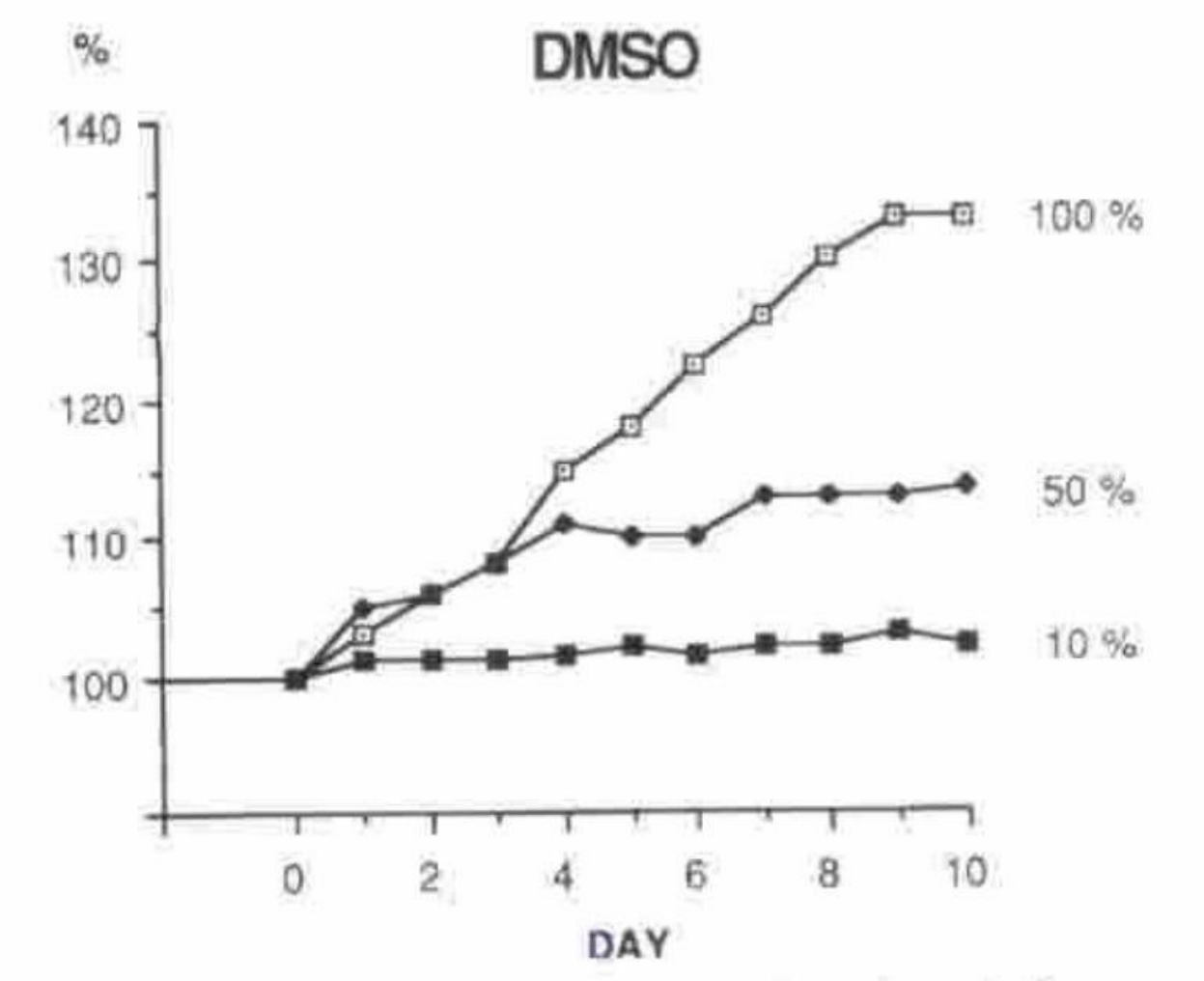
As such, the primary effect to discuss is skin irritation, which becomes more common as higher strengths are used (and which typically decreases with prolonged use, but in some cases can also result in changes to the skin). The best illustration I've seen of this concentration dependent irritation came from this study of 64 healthy male volunteers:



Furthermore, when DMSO was applied under the skin (e.g., through a scratch), this sensitivity to an immediate reactions significantly increased:



Likewise, this guinea pig study exposed their skin daily to various irritants and then assessed if the skin became thicker (as that is a sign of inflammation and edema). While these results do not exactly match what's seen in humans (as many individuals can tolerate 70% DMSO without any skin changes, and in many cases skin tolerance increases with time), they do generally demonstrate what's observed:



Note: when concentrated DMSO is diluted with water, it will heat up (this is a normal process). In some cases, this results in the DMSO applied to the skin being quite warm (but does not increase skin irritation).

Additionally:

•DMSO has not been shown to create allergic tendencies. For example, when it was mixed with a variety of common allergens (e.g., dust mites or pollens) and applied to the skin, it didn't create sensitivities or reactions (whereas a serious issue with certain childhood vaccines is that they can create allergies to other things the child is simultaneously exposed to like ragweed pollen). However, when DMSO was mixed with a potent allergen (e.g., penicillin in someone with

a penicillin allergy or the castor bean allergen), a more severe reaction occurred when DMSO was mixed with the substance and applied to the skin, than when DMSO was applied alone.

•Individuals with eczema are not more sensitive to DMSO (unless the skin is already irritated).

•The face is more sensitive than the rest of the body. As such, a significantly lower concentration should be applied there.

•For those who react to topical DMSO, repeated applications of DMSO (but not always) decrease their reactivity.

•DMSO is often used as a vehicle to bring other drugs into the body. Propylene glycol can also be combined with topical steroids to bring them into the body, but while less irritating, it is also much less effective.

Protecting the Skin

DMSO's therapeutic properties come from its ability to protect tissues (e.g., the brainand the internal organs) from danger and death. Numerous studies in turn, corroborate DMSO's ability to protect the skin:

•Many chemotherapy drugs are destructive to tissue, so when they leak out of blood vessels into the wrong place, they will cause challenging-to-treat ulcers. Many studies (which I compiled here) have found that DMSO will treat this tissue damage.

•DMSO has been found to be a protective agent during the freezing and thawing of mouse skin (e.g., see this study and this study). Likewise, there have been cases of DMSO saving the fingers of individuals with severe frostbite that would otherwise require amputation. DMSO has also been shown to protect cells from freezing damage, and to protect rabbit ears and thighs from frostbite induced by immersion in a -42°C bath.

•A variety of studies (which will be covered in a later article) have found DMSO protects the skin from being damaged by chemotherapy drugs. One unusual use for chemotherapy drugs is to inject one into the muscles of an excessively spasming eyelid (as they destroy the muscle), but this approach has the side effect of also killing skin in the vicinity of the injection. In one study, mixing DMSO with the chemotherapy drug protected the eyelid from tissue death.

•A significant body of evidence shows DMSO protects cells from radiation damage. In turn, DMSO was shown to protect skin cells from dying after exposure to gamma radiation, and numerous studies have reviewed DMSO's ability to protect the skin from radiation (e.g., this one, this one, this one, this one, this one).

•Pulsed Ruby lasers are often used in dermatology to remove unwanted things from the skin but can irritate the skin. One investigator found that DMSO (or DMSO with a low dose of a topical steroid) significantly reduced the reactivity that was created.

•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, this one, this one, this one, 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 it is 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 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 rabbitsdemonstrated 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.

•Studies have found skin flaps treated with DMSO had increased glucose utilization and increased oxygen utilization, suggesting DMSO increases mitochondrial function (and may in part explain how DMSO can protect cells with an impaired blood supply as numerous studies such as this one and this one have also found DMSO can maintain mitochondrial function in these stressful situations).

Burns

The protective mechanism of DMSO which most commonly applies to the skin is its remarkable utility for burns (e.g., consider the 12 reports I shared above from readers).

DMSO in turn has been shown to treat a variety of burns (e.g., superficial burns or partial thickness burn wounds) without being prone to producing infections (e.g., a 1985 study by Russian burn specialists, in adolescents, found DMSO was superior to the other treatment options [nitrofurazone, trimecaine, and monomycin] while another study also found DMSO prevents burns from becoming infected).

This includes severe acid skin burns (along with preventing their progress), and both acidic and alkaline burns that erode the esophagus (e.g., by inhibiting the destructive inflammatory response following those esophageal burns) or alkali burns to the eye.

There are also countless cases of severe burns that within minutes of DMSO stopped hurting (a major problem with burns), didn't blister, and subsequently fully recovered (e.g., no skin contractures)—many of which can be found in the reader reports I shared.

One of the most extraordinary ones (reported by William Campbell Douglass) involved six year old girl who'd slipped her index finger in a light socket for a prolonged period, after which it was cooked through and burned ash white at the tip. Within 30 minutes Douglass got the finger into a full-strength DMSO bath, and after 20 minutes, the searing pain had disappeared, the next day the finger turned pink, and then rather than be lost, fully recovered.

Note: DMSO has also been shown to be very helpful for sunburns.

Venous Disorders

Presently, I believe many venous disorders arise from a combination of weakened blood vessels which is often due to inadequate nutrition (discussed further here) and an impaired physiologic zeta potential which creates congestion in the veins (that becomes much more problematic if the blood vessels are weakened—a very common issue in individuals with hypermobility due to them also having looser blood vessel walls).

I have been following your zeta potential protocol for the past month, and I am using liquid DMSO for a slight neck tremor and for an allergic, itchy skin rash and spider veins. The skin rash is largely healed with the exception of some pealing of the skin around my nose and the palms of my hands. However, what is absolutely remarkable and unexpected is that the two clusters of unsightly spider veins on my right calf and thigh are almost completely gone. If things keep going like they have been my legs should look flawless within a month's time. Fingers crossed. I wanted to share this with you because spider veins are a woman's worst enemy they are expensive to have blocked and they always come back within the year of having the procedure, and I have been told by a vascular surgeon that it is dangerous to do repeatedly.

In turn, like the above reader, we've found a variety of venous disorders (e.g., hemorrhoids, varicose veins, and venous stasis dermatitis) respond quite well to addressing those two issues.

Note: in this article, I will list numerous studies showing DMSO's utility for varicose veins. However, while Stanley Jacob (the pioneer of DMSO) treated hemorrhoids with DMSO, another author uses DMSO to treat them, and Merck reported it improved recovery after their surgical removal. I am not aware of any studies that directly assessed DMSO's use for hemorrhoids.

Since DMSO is venotropic (enhances venous function), anti-inflammatory, and eliminates pain, a group of investigators tested if it could enter and penetrate diseased tissue (which typical agents have difficulty doing), finding that DMSO could also bring other substances with it.

Later, they found they got the best results when using three other therapeutics together (rather than just one), a standard spray containing 20% DMSO, 5% diphenylbutazone, 0.2% sodium-rutin sulfate, and 0.5% prednisolone was tested over the course of three years, finding:

TREATMENT OF ACUTE OR CHRONIC VENOUS DISORDERS OF THE EXTREMITIES

Group	Condition	Results Good	Fair	Poor
1	Spontaneous superficial phlebitis (varicophlebitis, thrombophlebitis)	14	3	4
2	Phlebitis after infusion treatment	16	3	8
3	Subjective complaints due to chronic venous disorders (mostly varicose veins)	29	10	8
4	Postphlebitic leg with dermatosclerosis, indurations, hyperkeratosis, etc., and subjective complaints	17	6	9
5	So-called additive factors in chronic venous insufficiency (tendo-periostitis, myogelosis, arthropathy of the knee joint, static insufficiency)	6	2	4
	Total numbers (overall total 139)	82 (59%)	24 (17%)	33 (24%)

TABLE 2

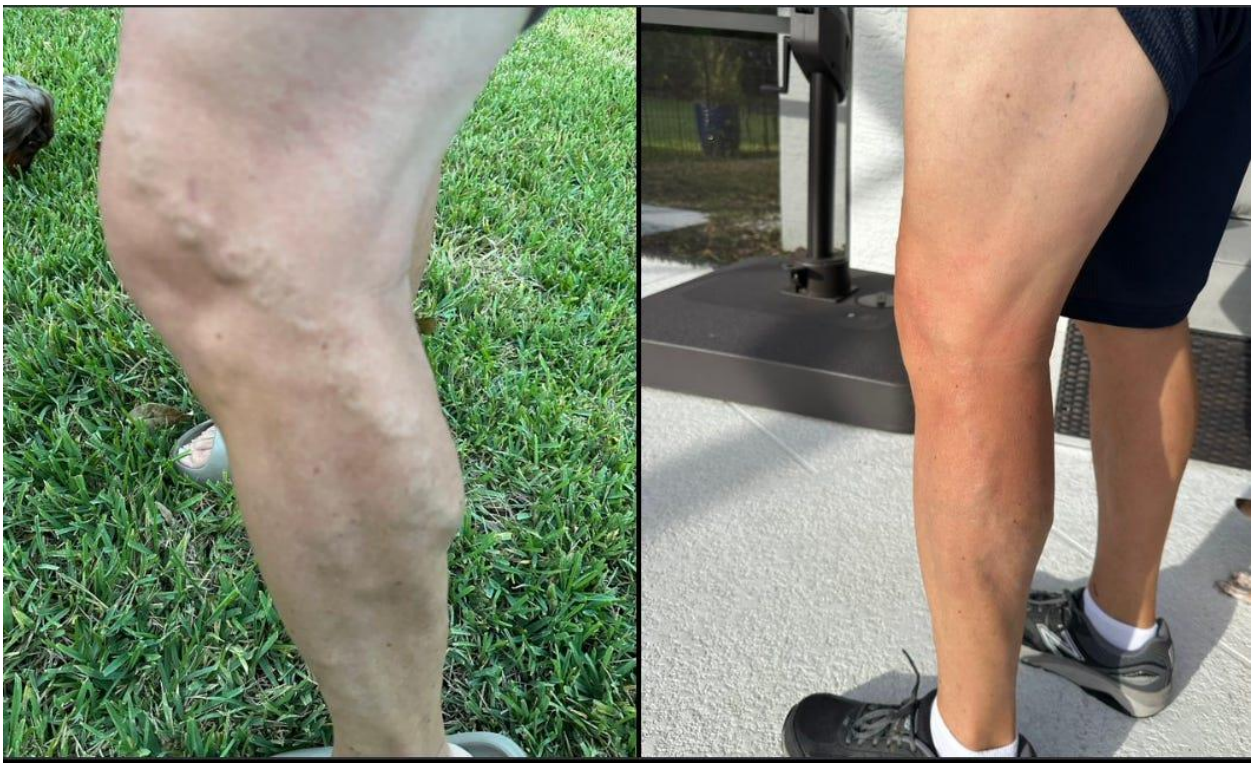
DOUBLE-BLIND TREATMENT OF ASEPTIC SUPERFICIAL CUBITAL PHLEBITIS AFTER INFUSION THERAPY

Treatment	Results		
	Good	Poor	Total
DMSO-compound spray	16	7	23
Placebo spray	10	14	24

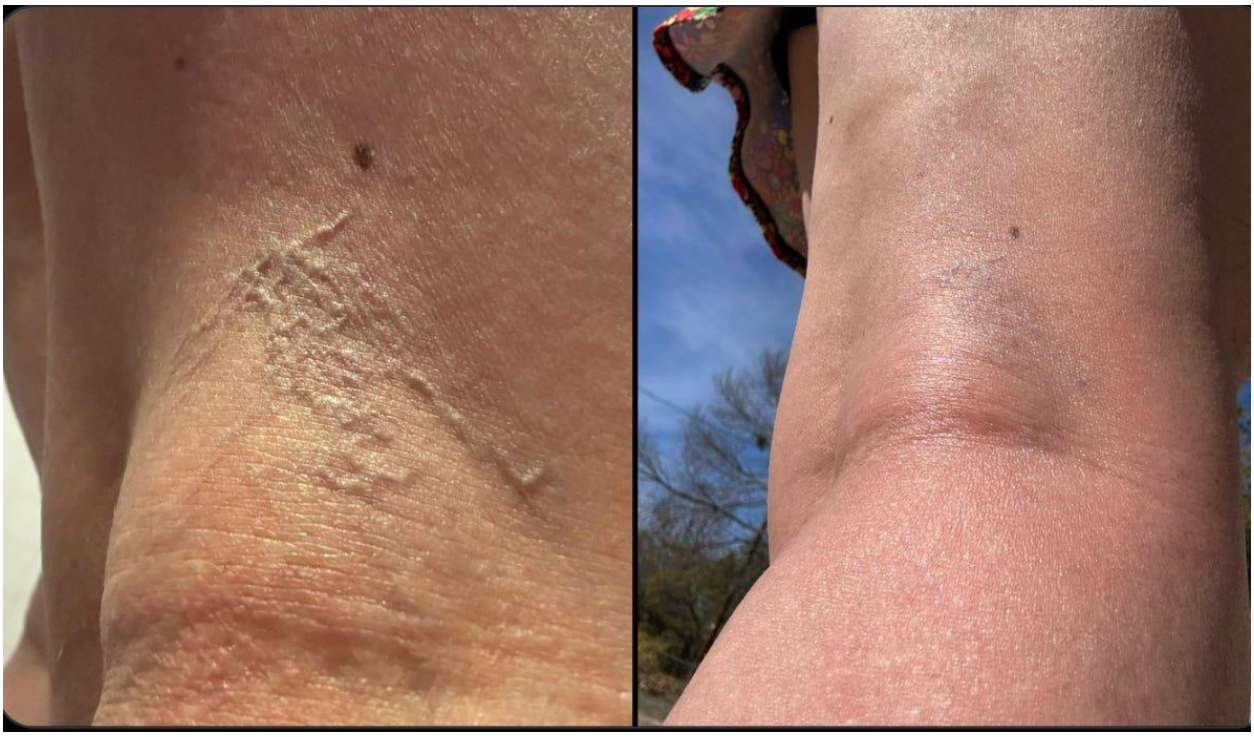
Other physicians have also used this spray successfully. In one double-blind study, it improved subjective complaints and subcutaneous indurations in patients who had recovered from deep vein thromboses (which can cause lasting damage to the veins). Another team found it decreased the visible hyperpigmentation and indurations in post-thrombotic patients and that after veins have been operated on (e.g., stripping or ligating them), it caused the wound healing to be smoother and have almost no pigmentation (discussed further here).

My 80 year old mother…has been using DMSO on her legs for several weeks now and has noticed a huge reduction in pain, discomfort, swelling, and discoloration of the skin.

Lastly, I was recently sent a picture showing someone's leg before DMSO and then 24 hours after:



Along with this one:



Wound Healing

I dropped the edge of a washing machine on my wife's finger, it went behind her fingernail down to the bone. She soaked it in DMSO on for 3 min. It healed completely in 1 week, on bruise or scar & no nail loss.

As shown in this article and with the data I've presented here, DMSO is remarkably effective at healing tissue throughout the body (e.g., surgical incisions).

For example:

•A veterinary school reported that painting DMSO onto open wounds of horses stimulated "fantastic" healthy granulation during the first few days, reduced excessive granulation to normal in a month, and disinfected badly contaminated wounds (without pus formation) with a protective film forming over the wound surface.
Note: this paper included before and after pictures of the wounds.

•DMSO was found to accelerate wound healing in both diabetic and non-diabetic mice. Also it has been found to increase the biomarkers of tissue regeneration in burned skin.

Note: 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).

•Authors of a 1998 Russian paper stated that they routinely apply DMSO to surgical wounds as it accelerates healing and provides general infection control. This is congruent with the studies mentioned earlier in this article that show DMSO improves the healing of surgical wounds.

•At low concentrations, DMSO has been shown to increase the proliferation of skin fibroblasts (which repair damaged tissue), but at high concentrations to inhibit it, results consistent with DMSO being able to accelerate wound healing and prevent adhesions and eliminate scars.

•A large number of studies (which I compiled here) also show that DMSO can prevent surgical incisions from developing adhesions or keloid scars, and in many cases reduce or eliminate scars.

Note: similarly, many studies (which I compiled here) show DMSO can reduce excessive collagen deposition that causes challenging contractile disorders such as Scleroderma, Peyronie's disease, and Dupuytren's contracture. Lastly, there are also case reports showingDMSO treats one of the most challenging diseases in medicine, fibrodysplasia ossificans progressiva (a very rare disease where the connective tissue of the body turns into bone).

Ulcers

DMSO's ability to both heal tissue and restore tissue blood supply (e.g., it frequently treats Raynaud's disease) makes it uniquely suited to treat chronic non-healing ulcers (an issue many physicians struggle with). As such, many physicians used DMSO to treat chronic ulcers, and a significant body of evidence exists supporting that approach:

•A study evaluated the use of local DMSO for 20 diabetics with peripheral neuropathy and perforating foot ulcers (a challenging condition to treat). Complete healing occurred in 14 (70%) patients after 4-15 weeks of daily treatment, whereas in controls receiving conventional treatment, only 2 out of 20 recovered.
Note: DMSO also frequently helps diabetic peripheral neuropathy.

•A study (discussed below) also reported on 67 patients with chronic varicose ulcers, who had a remarkable response to DMSO.

•A study reported on the 1371 Chilean dermatologic patients they treated over 22 months who received a DMSO spray also containing the anti-inflammatory agents y-ketophenylbutazone, p-hydroxy phenylbutazone, and hydrocortisone, the antimicrobial agents moroxydine hydrochloride and dequalinium hydrochloride and the hemostatic n-butanol.

TABLE 1

TYPES OF SKIN AFFECTIONS TREATED AND NUMBER OF CASES RECORDED

Condition	Number of Cases
Ulcerations of legs, feet, and/or upper extremities	401
Infected wounds of diverse localizations (including 7 due to urticaria and 8 from mosquito bites)	747
Infected dermatomycosis on feet and/or hands	50
Second- or third-degree burns on hands, feet, and/or legs (most were infected)	173
Total number of cases treated	1371

Of those patients, 1,313 (95.04%) were completely restored or cured, and the patients were enabled to return to their usual activities—a dramatic effect that could not be obtained by any other available therapy. The other 4.96%, for various reasons, prematurely suspended treatment, and hence were no longer possible to observe and assess.

The average number of applications of the DMSO spray needed for the various conditions were as follows:

•9.41 were needed for a complete cure of infected ulcers
•6 applications were needed for a complete recovery of infected wounds
•19 applications were needed for infected mycosis
•7 applications were needed for the healing of burns.

Note: in chronic alcoholics and chain smokers, the therapeutic results, although favorable, were less rapid.

With diabetic ulcers, remarkable improvements were seen (e.g., one who'd had ulcers develop over 15 years was completely healed after 20 days of DMSO). *Note: DMSO has also been used in combination with antibiotics to treat bed sores with tissue necrosis.*

With varicose ulcers, rapid healing (and immediate cessation of pain) occurred in ulcers that had not responded to years of conventional treatments. Additionally, some patients who suffered from intense joint pains from other causes reported the pain rapidly disappeared following DMSO application (an effect commonly reported by DMSO users).
Note: rapid healing was also observed in ulcers from fungal infections, which have persisted for over three years despite conventional care.

Of the burn patients, 100% recovered, with none having the deforming scars typically seen after severe burns.

No adverse reactions were noted except for temporary severe pain when DMSO was applied to deep wounds (which did not interfere with the treatment), something that was likely due to them using a lower DMSO concentration in all applications.

Note: this study also included three cases of patients with severe and debilitating illnesses who had rapid and dramatic improvements from DMSO.

•A study found that 80-90% DMSO combined with 0.025% fluocinolone (a topical steroid) caused no toxicity when put over the entire body (although around 27% discontinued it due to skin irritation—typically from higher DMSO concentrations) and performed equivalently to 0.2% fluocinolone in treating the following conditions:

TABLE 2
LESIONS STUDIED WITH DMSO-FLUOCINOLONE

Disease	Duration of Therapy	Average Daily Dose (ml)
Scleroderma	months	20–30
Psoriasis	months	3–40
Atopic dermatitis	months	10–20
Dyshidrosis	weeks	5–12
Granuloma annulare	weeks	1– 2
Necrobiosis lipoidica	weeks	1– 5
Balanitis xerotica obliterans	months	1– 2
Lichen sclerosus et atrophicus	months	2–10

Note: this study also found that 1% hexopyrronium bromide in 90% DMSO was of value in the treatment of dyshidrosis (blistering eczema) and hyperhidrosis (excessive sweating).

•Finally, 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 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.

General Dermatology Studies

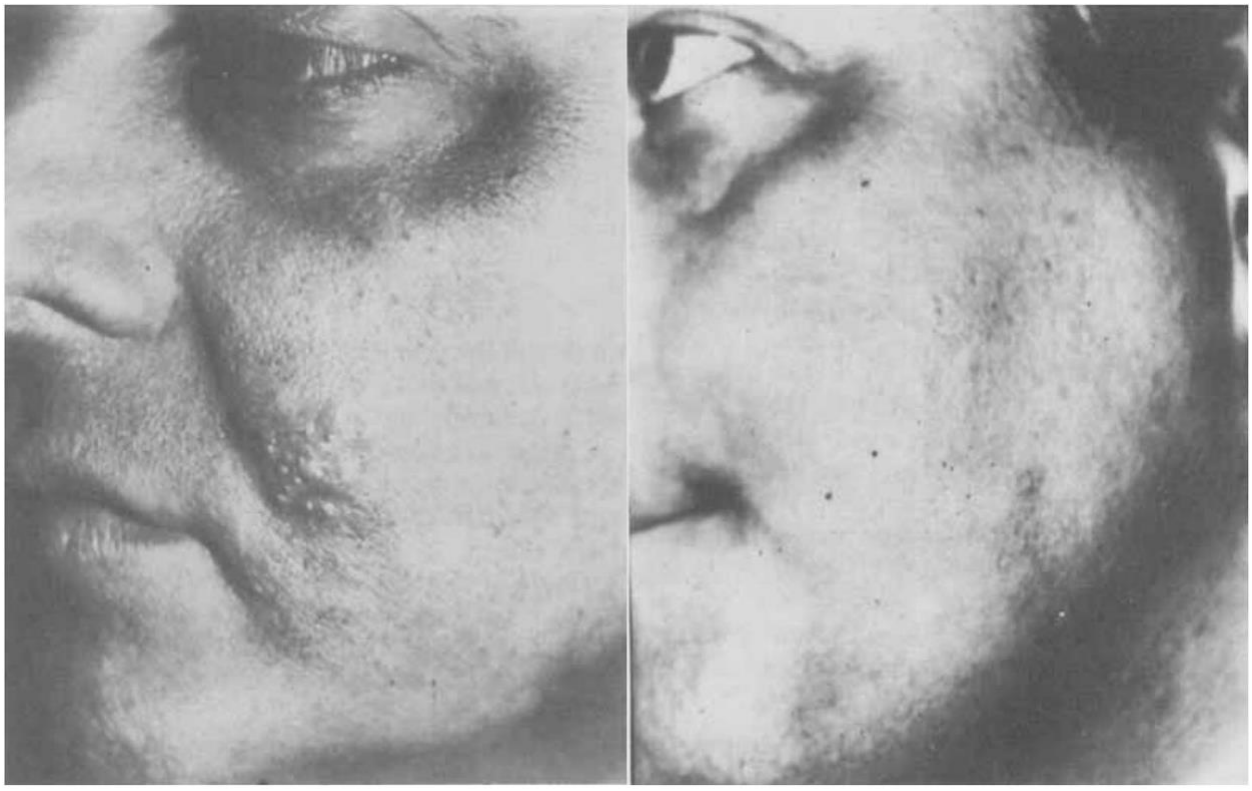
Since many of the published dermatologic DMSO studies evaluated a variety of conditions, I could not place some of them under a specific category. Those three studies (along with an animal one) are as follows:

1. A study reported on 152 patients with a wide range of dermatologic conditions who received a topical DMSO spray (with no side effects except temporary intense pain in two of the recipients). These included:

•Varicose ulcers (67)—many had taken years to develop, and had received numerous (ultimately unsuccessful) surgical treatments. DMSO caused a rapid healing of the microbial infections, significant edema, pain, and patient's inability to conduct their daily activities. Typically, the scars shrunk between 3 and 4 mm per week and patients experienced a recovery far faster than any existing treatment.
•Shingles (7)—all 7 had dramatic results within 48 hours (often completely disappearing).
•Herpes simplex (4 on the penis, 4 on the lips, 2 on the cheeks)—all 10 had dramatic results within 48 hours (often completely disappearing).
•Impetigo (8)—Improvement took up to 48 hours (impetigo is a skin infection).
•Pityriasis versicolor (42)—disappeared within a week (compared to it typically taking at least 2 months to recover).
•Ingrown toenails and infected nails (6 caused by candida, 3 caused by trichophyton)—significant improvement occurred, but it only lasted for 24 hours after the application of the spray.
•Pityriasis rosea (2)—both permanently resolved in a week (whereas this issue typically recurs).
•First and second degree burns (3)—none of the patients developed the typically expected keloids.
•Skin grafts (4)—DMSO significantly improved the final outcome.

Note: in addition to treating herpes, DMSO has also been observed to be an effective treatment for other small ulcers within the mucus membranes of the mouth and genitals.

The paper also included photographs of some of these results:



A case of Herpes 48 hours before and after DMSO

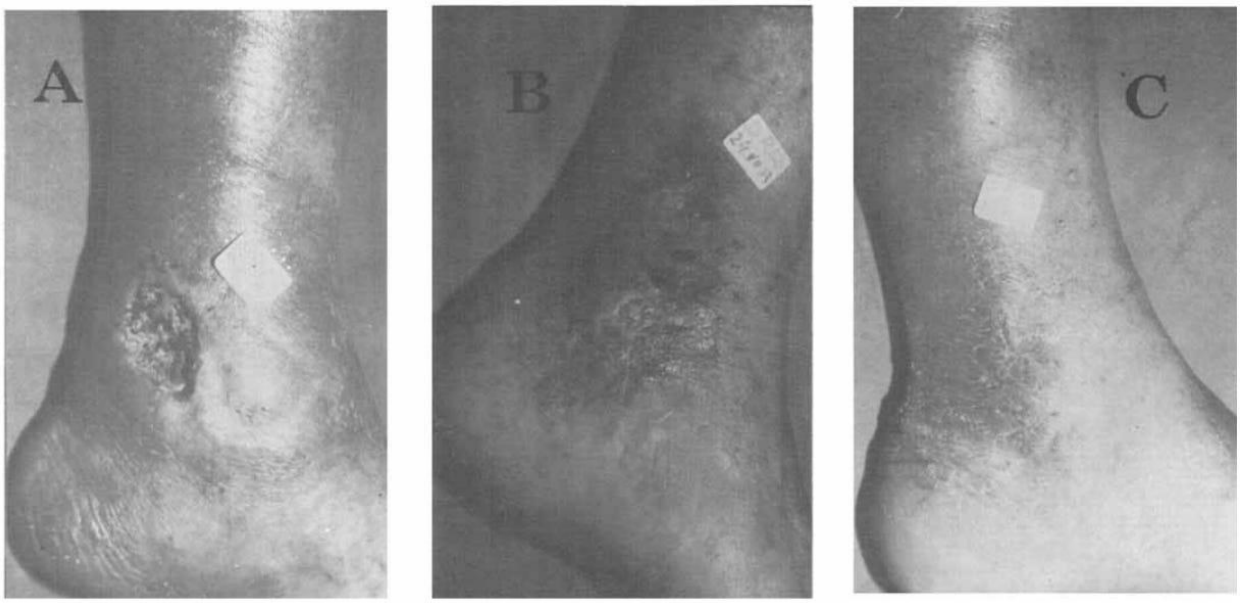


FIGURE 3. A varicose ulcer (case no. 35). A shows the ulcer at the beginning of treatment (June 9, 1973), B the ulcer after 15 days' treatment, and C the cicatrized ulcer after 60 days.

Significantly more graphic ulcers that improved are also included in the study.

2. A German study reported that DMSO yielded positive results for 75 of 106 dermatology patients. Specifically it helped:
•16 of 23 keloid and hypertrophic scars
•1 out of 3 Peyronie's disease cases
•6 of 9 of Dupuytren's contracture cases
•3 of 4 scleroderma cases
•4 of 7 sclerodermic changes in post-thrombotic syndrome
•17 of 21 eczema tyloticum (palmoplantar keratoderma—a challenging and incurable condition where thick plaques form on the palms and bottom of the feet) cases.
•6 of 9 infiltrative processes of the lower limbs
•3 of 5 granuloma anulare
•3 of 4 hypertrophic lichen planus
•2 of 4 verrucae vulgaris (common warts)
•4 of 4 combustion (lesions from burns)
•10 of 11 shingles and post shingles neuralgia cases
•2 fibromas

3. A group of Russian clinicians reported that DMSO had become the standard of care at their hospital for trauma and orthopedic conditions. They then published a reportdetailing the skin conditions they had treated with DMSO:

CONDITIONS TREATED WITH DMSO, ALONE OR IN ANTIBACTERIAL COMBINATIONS

Condition	Number of Patients Treated
Suppurative wounds	153
Trophic ulcers of the leg	97
Abscesses	48
Carbuncles and furuncles	43
Paronychia	33
Osteomyelitis	31
Phlegmonous ulcers	22
Thrombophlebitis	21
Lower extremity gangrene	16
Mastitis	15
Erysipelas	8
Burns	7
Parotitis	2
Epididymitis	2
Sepsis	2
Total	510

Unfortunately, other than specifying that 11 patients had side effects (8 had dermatitis and 3 had nausea and vomiting), very little data was provided, so it was unclear what percent of these cases responded to DMSO (although, based on comparable data from other studies it was likely the majority of them).

4. A veterinary practice using 90% DMSO reported that:

•In 25 dogs with mammary gland engorgement (which commonly leads to mastitis), applying DMSO three times daily to the affected area generally resulted in cessation of lactation and significant reduction of enlargement within three days (wheres standard treatments took 5-7 days).

•Interdigital cysts are a common issue in certain breeds of dogs but are challenging to treat (especially since they recur). In six cases, DMSO and nitrofurazone (an antibiotic) were applied daily, with prompt improvement occurring within 3 days, with four having a complete recovery in 3 weeks, one improving but plateauing, and one not being able to complete the program due to inconsistency on the part of the owner.

•DMSO was found to treat chronic local inflammatory reactions to vaccines (causing a significant reduction in one week and a complete resolution in two compared to the slow disappearance typically seen over several weeks).

•In 20 cases where a dog or cat had an allergy to flea bites, giving DMSO and something to eliminate the fleas resulted in prompt reduction in inflammation and healing of the animal's lesions.

•In 9 cases of severe dermatitis involving the feet and nail beds (where both pathogenic fungi and bacteria were cultured), a combination of equal parts of DMSO, nitrofurazone, and nystatin was applied to the area three times a day), with prompt improvement occurred in all cases. Eight made complete recoveries, and one (particularly sick) remains under treatment for one foot, which the animal persists in chewing. In many cases, these conditions become chronic because the animals will chew or lick them (as they itch), something DMSO fortunately reduces.

Note: another author reported on a feline with severe skin problems (e.g., the hair on a large part of her body was falling out, and the skin was raw and bleeding). Nothing veterinarians provided helped, but after a DMSO lotion was tried, pain seemed to be reduced within minutes, the cat quit scratching herself, everything healed, and two months later, she was a beautiful healthy cat.

Common Conditions

DMSO has also been shown to help a variety of other common skin conditions.

Note: the other data for DMSO's use in herpes and shingles will be discussed in a later part of this series that focuses on DMSO's utility in infectious diseases.

Hair loss

Hair loss is a pressing concern for many (especially now that it's a common COVID-19 vaccine injury). Unfortunately, the existing pharmaceutical options leave much to be desired. For example, one of the most commonly prescribed hair loss drugs, finasteride (which blocks the conversion of testosterone into another form of the hormone the body utilizes) is fairly toxic and there are a significant number of people who have been permanently disabled by it.

Note: DMSO has also been combined with finasteride, so that finasteride could be administered locally to regions of hair loss (and thus reduce its systemic toxicity). When this was done in rats, it was found to significantly increase hair density in the treated regions.

For over 40 years, DMSO has proven to be a potent hair loss treatment, something likely due to it improving the microcirculation and rescuing hair producing cells from the cell danger response.

Initially, this began with Stanley Jacob having a patient incidentally regrow their hair after receiving DMSO for another head condition. At that point, he tried giving it to 5 other balding men. This in turn, caused a fine fuzz to appear on the heads in the areas where they'd last had hair, and over time, then caused hair growth to begin in areas that had stopped producing hair earlier on (a pattern others subsequently observed). Because of this, the best results are typically seen when DMSO is used earlier in the hair loss process.

Additionally:

•Individuals who took DMSO for another reason sometimes report dramatic improvements in their hair (e.g., this author cited a case of someone who was saved from severe frostbite with DMSO who then had her hair grow back richer and darker than before).

•DMSO is often beneficial for the hair loss experienced from chemotherapy (although it's not our default treatment for this issue).

•There are many reports of animals (e.g., cats) regaining lost hair from DMSO.

Unfortunately, I have only been able to locate one published paper on DMSO and hair loss—a Japanese case report that described a 67-year-old male patient with rapid progression of whitening and loss of hair in the past 2 months, who after being worked up, was discovered to be suffering from amyloidosis. After starting DMSO, the scalp hair and beard grew and turned to black gradually several months after dimethyl sulfoxide (DMSO) treatment.

Acne and Eczema

Note: much like the common treatment for hair loss (finasteride) is quite dangerous, the common acne treatment (Accutane) is extremely dangerous, and in most cases, the "benefits" it creates are outweighed by the long-term harm it causes.

Many individuals have reported DMSO treats acne (or reduces the scarring from chronic acne). However, to the best of my knowledge, no published studies exist on the subject. Instead, the only reference on it was found within the guidance Merck gave their clinical investigators for DMSO, which stated that for acne "There have been some encouraging results. Long-term administration has been necessary."

Additionally:

•An early (unpublished) study by Stanley Jacob found that when 9 cases of dermatitis were treated with DMSO, all improved.

•DMSO has also been used to successfully treat suppurative diseases of the skin (conditions that cause painful bumps, boils, or abscesses that drain pus).

•Studies do exist on the usage of DMSO for acute pustular diseases.

Psoriasis

•A 1967 study of 45 patients given 40-80% topical DMSO 2-3 times each day (either by immersion or with a cotton applicator) found that the 18 with

psoriasis had a marked improvement over the first week, but then after 7-10 days either did not improve or significantly worsened (which was attributed to excessive administration of too high a concentration of DMSO). That study also found those with scleroderma greatly improved, and a variety of other skin conditions, including traumatic and burn keloids, hypertrophic scars, atopic eczema, and lichen amyloidosis, improved in varying degrees.

Note: the key point of this study is that if you use DMSO for psoriasis, it needs to be done at a lower concentration and stopped if the condition worsens.

•A 1973 study of 33 patients with severe psoriasis (25 with psoriasis vulgaris 7 with psoriasis guttate 1 with psoriasis pustulosa) found that an extract of camptotheca nuts dissolved in 70% DMSO was a "quick, effective and convenient treatment," as a year later, 21 had a complete resolution of the disease, while the remaining 12 had greatly improved (but a few eruptions still could be found along with discolored patches of skin, especially on the lower legs where lesions had previously been reported).

Typically, within five minutes, the patient usually felt an itching, stinging, or burning pain, which subsided in another five or ten minutes, then within three days, the slight rash at the application site subsided. The pimples began to shrivel up and disappear, with most skin eruptions being gone in two or three weeks.

Finally, in some cases, the ointment was only applied to one side of the body, and in those cases, only that side improved.

•A 1989 study of 35 male patients with psoriasis plaques (that had persisted for 2-5 years and did not respond to routine therapy) found giving an ointment of heparin and 15% DMSO under an occlusive dressing yielded positive results after being applied for 41.2 +/- 5.9 days. Complete resolution of the rash was observed in 19 (54.3%) patients, partial regression in 14 (40%), and no effect in 2 (5.7%) patients.

Note: due to its negative charges, heparin is an excellent agent for restoring the physiologic zeta potential.

•A 2009 study found DMSO, combined with topical corticosteroids, was very effective in treatment-resistant plaque-type psoriasis and could completely clear it in 3–4 weeks.

Additionally, at the time Merck was conducting large scale tests of DMSO (before the FDA unjustly banned all DMSO research), they sent all of their investigators an advisory memorandum on what they had learned about DMSO's uses which included:

psoriasis—Pilot studies are underway. Results may be better with DMSO/Decadron than with DMSO alone. Long-term therapy is necessary.

Lichen planus and lichen sclerosis

There is also limited evidence that DMSO can be used to treat the inflammatory disorders lichen planus and lichen scelorosis:

•The previously cited German study which found DMSO helped 3 out of 4 patients with this condition.

•A case study discussed a patient with lichen sclerosis that had developed over the last year and affected the chest nose face and forehead and allopecia that had now caused her to lose all her hair. She was given topical 90% DMSO mixed with 0.25% fluocinolone to apply topically, and after 6 months, much of her had begun regrowing and most of the lichen sclerosis lesion dissappeared.

•A study where photodynamic therapy successfully treated lichen sclerosis used a 2% gel as a vehicle to bring the active agent into the body, raising the possibility DMSO contributed to the therapeutic outcome.

•This reader reported DMSO resolved it in his mouth in about a month. This readerhad a dramatic result for it with a severe case.

Severe Itching (pruritus)

Many have reported DMSO significantly improves itching. Unfortunately, this area remains relatively unstudied. However:

•Amyloidosis can frequently cause very itchy deposits in the skin (known as macular [MA] and papular [PA] amyloidosis) that are resistant to treatment and worsen once scratched (making the condition quite challenging to treat. One study found daily DMSO provided significant relief for MA and PA patients (with pruritus resolving in an average of 4.1 weeks). A separate randomized controlled trial of MA patients found that DMSO decreased the pigmentation and significantly decreased the pruritus, even by the first follow up appointment.

Note: numerous studies (compiled here) have shown DMSO is an effective treatment for amyloidosis (an otherwise fairly challenging disorder to treat).

•The pioneer of DMSO research reported that 70% DMSO had a 90% success rate in treating pruritis ani (extremely uncomfortable anal itching) when applied to the itching areas.

Mastitis

A few of my colleagues use topically applied DMSO to treat mastitis in lactating women.

This use is supported by a double-blind study that applied topical DMSO to women with chronic cystic mastitis for one month. In it, DMSO was found to cause a statistically significant improvement (in terms of cyst size and mammography results).

A variety of bovine studies have also shown that DMSO helps mastitis such as:

•This one where DMSO plus antibiotics helped cows with chronic mastitis due to a *Staphylococcus aureus* infection.

•This one where 37 affected quarters of 26 infected cows were given DMSO plus an antibiotic. After 10 ten days, bacteria were no longer present in 10 of the 13 quarters infected with *Staphylococcus aureus,* 10 of the 13 infected with *Staphylococcus epidermidis,* 5 of the 6 infected with *Streptococcus agalactiae,* and all 5 infected with *Streptococcus lactis* or *Streptococcus faecalis.*

•This one where antibiotics, 90% DMSO, and 0.005% flumetasone together were found to treat 87% of acute mastitis cases.

•This one where 136 acute parenchymatous mastitis (from E. coli) received 0.25-0.5 mg flumethasone dissolved in 90% DMSO, with the addition of an appropriate antibiotic and 95% recovered (with the best results seen if treatment was initiated early). When it was caused by a streptococcal infection, there was a 90% recovery rate in acute cases, whereas in chronic cases, 46% of lactating quarters recovered and 24% of non-lactating ones did.

•This one where DMSO plus antibiotics was found to eliminate *Staph. aureus from the milk of* 42 of 49 lactating cows and 9 of 14 dry cows with chronic mastitis (with much lower success rates when alternatives to DMSO were combined with the antibiotics).

•This one where DMSO and EDTA were found to significantly lower how much antibiotics (gentamicin, ciprofloxacin, and norfloxacin) were needed to eliminate pseudomonas aeruginosa strains isolated from bovine mastitis.

Bites:

One author has found DMSO frequently quite helpful for insect and dog bites, and as mentioned above, multiple readers have seen the same.

According to this paper, DMSO has also been helpful in the treatment of snake bites in animals.

Note: this reader reported that "DMSO absolutely prevents the sloughing that typically accompanies pit viper bites. I even had a 13 pound terrier struck by a copperhead in the throat, who required critical care for the overwhelming venom, but as first aid I made sure the poultice was applied and she recovered with no sloughing or scarring."

Skin Growths and Cancers

Many like these readers have also observed DMSO can eliminate unwanted skin growths:

I use the horse DMSO gel on my face after washing. Within days I noticed how smooth my skin was. Then I started applying it all over my body after my shower. All little lumps bumps skin tags disappeared after a month or so.

I am a physician ophthalmologist…I created my own DMSO solution that contains green tea extract (EGCG), turmeric (curcumin), and some other natural goodies. I have used it topically on myself and my children safely. I applied it daily to a couple of my benign skin lesions (seborrheic keratosis-type lesions) which regressed completely after approximately two months.

Likewise, according to one author, studies showed that DMSO cleared up benign skin growths of the eyelids and neck by dissolving the oil fats that caused them.

Furthermore, another author shared that rubbing DMSO on mole like growths on their neck reduced their size by 2/3rds (while a newer one was completely eliminated).

Similarly, as mentioned before, applying DMSO to keloid scars can flatten them and cause some discoloration to disappear.

Note: DMSO has significant value in the treatment of skin cancer. This will be discussed later in this series (in the upcoming article about DMSO and cancer).

Treating the Skin with DMSO

In the final part of this article, I will review how DMSO is used to treat the conditions listed throughout this article (e.g., for acne, hair loss, hemorrhoids, sunburns and varicose veins), along with a few other integrative approaches we use for those conditions (e.g., for hair loss, acne, and mitigating the effects of chemotherapy). Additionally, I will also provide a set of simplified instructions for DMSO product sourcing and the general (safe) use of DMSO.

(paywalled content)

Conclusion

When I started the DMSO project, I was a bit reluctant to do it (as I knew how much work it would require), but despite that, I am incredibly grateful I did, as it's helped a lot more people than I could have imagined.

Now more than ever, that is important because if a sufficient amount of attention can be brought to the forgotten sides of medicine, a once in a lifetime window exists to bring them into the public consciousness. For that reason, if you are able to share this article with anyone you know (who could benefit from it) or able to share your own stories of how DMSO has benefitted you (ideally at this thread so I don't have to copy them over to it), that would be deeply appreciated as I believe there is a very real chance to reintroduce DMSO to medicine.

Truthfully, I never imagined something like this could be possible, and I am profoundly grateful to each of you for your support and for giving me the voice to get that message out.

The FDA's War Against DMSO and America

The Forgotten History That Led to the FDA Again and Again Keeping the Things We Most Desperately Need Away From Us

Over the last month, I have been diligently working to alert the public to the decades of evidence demonstrating the remarkable therapeutic potential of DMSO. In turn, quite a few of my colleagues have shared patients are now asking them about DMSO, and a few are shifting their practice to focus on it (e.g., Pierre Kory has done so and is already having numerous amazing results).

Likewise, I've now received hundreds (often unbelievable) reports of it it being life changing for people (which can be read here), and it now seems there is a temporary supply shortage of DMSO because so many people (and their friends) have been buying the brands I recommended.

For those who have not read the series, thus far I have made the case that:

•DMSO treats many circulatory and neurological disorders (e.g., Reynaud's and varicose veins) and profoundly transforms the outcomes of some of the most challenging conditions in medicine (e.g., strokes and spinal cord injuries)—to the point millions would have been spared from a life of disability or paralysis had it been adopted (discussed here).

•DMSO is a miraculous therapy for chronic pain, wounds (e.g., burns or surgical incisions), injuries (e.g., sports injuries) and all types of chronic pain (discussed here).

•DMSO is highly effective for treating a variety of challenging autoimmune disorders (discussed here).

•DMSO is highly effective for treating a variety of connective tissue issues such as scars and adhesions, collagen contractures, scleroderma, FOP (discussed here).

•DMSO is able to treat a variety of protein misfolding diseases (e.g.,

amyloidosis) including genetic disorders (e.g., Down Syndrome) which are classically considered to untreatable (discussed here).

•DMSO is incredibly safe, having only a limited number of known and manageable side effects alongside no risk of toxicity or death (provided it is used appropriately).

•There are thousands of studies that demonstrate both the safety and efficacy of DMSO (making it one of the most researched medical substances in history).

In contrast, most of the previously mentioned diseases have lackluster conventional options available for treating them, many of which are highly toxic, kill tens of thousands of Americans each year and simultaneously cause far more non-fatal injuries. Worse still, many of them simply are "untreatable" and have no option for what can be done with them.

In short, if what I've said so far is true, the fact that DMSO has been kept from us is so egregious, it's understandably hard to believe. It's specifically for this reason, that despite the fact I knew it could help a lot of people I really wanted to help by broaching this subject sooner, I had to wait until I had built a decent degree of credibility here before I spent hundreds of hours to begin trying to put the case for DMSO together, then once I did so, do so in a very specific order. Nonetheless, I still do not think anyone would have believed me or had the courage to try DMSO had they not just witnessed almost every medical authority in the world collude to suppress safe and widely used drugs (e.g., ivermectin and hydroxycholoroquine) so that dangerous and ineffective (but incredibly lucrative) pharmaceutical products could monopolize the COVID-19 market.

In turn, while I still desperately want to cover DMSO's utility for a variety of other challenging conditions (e.g., vision loss, tinnitus, cancer, chronic infections, shingles, and a wide range of skin disorders), I feel I first must touch upon another question—why did the FDA keep it from us, and how were they

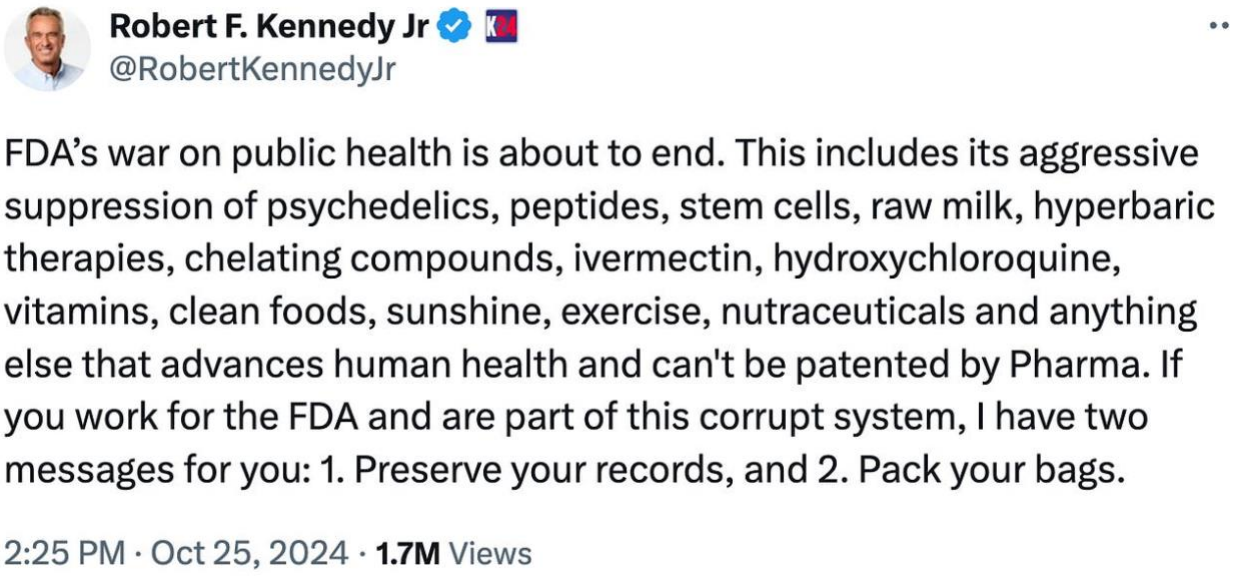
able to do it to something so much of the public and the scientific community demanded they legalize?

In my eyes, this story is critically important to understand because it:

•Helps us to understand the origins of the mentality within the FDA that to this day continues to ruin people's lives by burying promising therapeutics that compete with the medical industrial complex. Despite my best efforts over the last two years (e.g., with ultraviolet blood irradiation, AIDS treatments, or GHB for insomnia), I've still only scratched the surface of this (e.g., what's been done with cancer is really depressing).

•Provides a window into the remarkable dedication of a group of Americans which illustrates what our scientific apparatus could be capable of doing for us if it was not shackled by politics.

•Provides some context to why this recent statement from RFK Jr. is so, so, important:



Note: a significant portion of the first half of this article is an abridged version of the history detailed within DMSO the Persecuted Drug (internet archive link here)

The Discovery of DMSO

The simple compound dimethyl sulfoxide can be found throughout nature, and is present in many fruits and vegetables. It was first synthesized by Russian chemist Alexander Zaytsev in 1866. It was essentially forgotten until the 1940s, when industrial chemists, looking for more solvents were curious if this waste product from producing paper could be used instead of being thrown away.

Note: this chronology has been compared to how fluoride (an industrial waste product from aluminum and phosphate production) entered the water supply. The critical difference was that disposing of fluoride (due to its toxic and corrosive nature) was a major expense and liability for these industries (e.g., it regularly severely injured workers). As such, the desire to get it into the water supply was done to absolve the industries from their liability (e.g., "How could it have injured a worker if it's safe enough to put in the drinking water"). Initially, due to its evident toxicity, the government opposed this. Still, due to fluoride being necessary to produce original atomic bombs and destructive leaks of it creating immense damage to the surrounding areas, for national security purposes, the government relented (all of which is detailed here). In contrast, DMSO was simply looked at as a potential source of revenue that was being erroneously thrown away.

In the 1950s, Crown Zellerbach, a large American paper manufacturing company, began producing DMSO and soon became the world's largest producer. Curious if uses existed for DMSO besides being a highly effective solvent, Zellerbach assigned Chemist Robert J. Herschler to research it and other tree derived chemicals. Through a lab accident, he discovered that DMSO mixed with a dye would bring the dye into the skin, and before long verified it could be used to bring antibiotics and antifungals into plants.

Eager to share this discovery in 1961, he connected Stanley Jacob MD, a renowned surgeon with dozens of publications (in hours, he could produce first-rate papers that took others months to write) and professional memberships who taught at Oregon Health Sciences University (located across the river for Herschler). Jacob (whose brief biography can be read here), was searching for ways to preserve organs and had recently learned of DMSO's ability to function as an anti-freeze agent. After Herschler shared DMSO's unusual property, Jacob decided to test it by mixing it with iodine, noticed he could taste it, and realized that not only did DMSO bring things into the skin but also spread them throughout the body.

As this delivery method revolutionized pharmacology, Jacob immediately shifted his focus to it, and the next day topically applied it to his lab staff (the 1960s were a different time), many of whom then developed its characteristic odor. As DMSO dried the skin and wet skin often causes burns to become infected, he decided to test it on rats that were burned and saw a potential therapeutic effect, which then inspired Herschler to try it after a subsequent significant chemical burn. Since it gave immediate relief, Herschler then tried it on a sprained ankle in a lab assistant (where it also gave immediate relief) and then for an arthritic thumb (where it also gave immediate relief).

This early data convinced Jacob to put all his focus into DMSO (which was possible since his intellectual capacity allowed him to rapidly produce the high quality lectures required for his actual job). In turn, after many sleepless nights, and many tests on himself, Jacob became certain DMSO would revolutionize medicine. In turn, he began carrying DMSO on him to give to anyone in need (the 1960s were a different time), and quickly had numerous miraculous cures (e.g., headaches, sports injuries, cold sores, sinusitis, crippling rheumatoid arthritis), Simultaneously he also realized making a standardized dose was almost impossible because people's response to it was so variable and the timing often was critical (e.g., it only prevented adhesions in rats if given before surgery but not after).

Once Jacob had exhausted his personal funds on DMSO (e.g., he often treated people for free) another remarkable serendipity happened—rather than shoot his research down (as physicians at the medical school had predictably already begun complaining about Jacob doing something unorthodox), his dean decided to approve funding for Jacob's research (which almost any other dean then and particularly now would have rejected).

Note: it's hard to describe how extraordinary this confluence of events was. Had a single piece come together like it did, we likely would have never heard of DMSO.

The Thalidomide Era

As Herschler now puts it, "If there is such a thing as a Murphy's law of new drug development, DMSO proves it. Everything that could go wrong did go wrong."

Discovered in 1952, thalidomide began being marketed in 1957 (initially over the counter) by a German company (Chemie Grünenthal) as a miracle cure for morning sickness, insomnia, colds, and headaches, and before long 14 pharmaceutical companies were selling it in 46 countries under at least 37 trade names. Reports soon emerged of infants born with defects, in 1959 it was observed to cause peripheral neuritis, and at the end of 1961, it was taken off the German market in November and then globally in December after an Australian Obstetrician was able to get a letter published in the Lancet about it causing birth defects (after having unsuccessfully tried to sound the alarm since June of 1961).
Note: during its brief availability in Germany, thalidomide was estimated to have caused over 10,000 birth defects and the deaths of approximately 2,000 children.

Thalidomide's adoption in America was slower since the initial company Grünenthal approached (GSK's predecessor) found it lacked any efficacy in their preliminary trials and hence didn't want to market it. By the time a second

company began testing it across America at the end of 1960, concerns existed about thalidomide. This led the FDA reviewer assigned to thalidomide, Frances Oldham Kelsey, to repeatedly stall its approval (despite it already being approved in Canada). As a result, roughly American 20,000 women received it during the extended clinical trials (with many injuries being observed throughout that period by the FDA). Still, it was kept away from the general population (excluding doctors who gave it to their personal circle because the manufacturer had not told them it was still experimental).

Kelsey's actions resulted in only 17 American birth defects occurring (from the preliminary testing done across America) and earned her a presidential medal from Kennedy on August 7, 1962. More importantly, it got Congress to unanimously pass the 1962 Kefauver–Harris Amendment to address the concerns about the FDA's inability to block dangerous drugs (Kelsey had instead stalled thalidomide's approval) by requiring drug manufacturers to prove their drugs were "safe and effective" and accurately disclose each drug's side effects.

While well intentioned and necessary (e.g., it gave the Secretary of Health and Human Services clear authority to deny the approval of any drug which had not adequately proven its safety), the act ***also*** allowed approval to be denied (or for it to be pulled from the market) if:

There is a lack of substantial evidence that the drug will have the effect it purports or is represented to have under the conditions of use prescribed, recommended, or suggested in the proposed labeling thereof.

The term 'substantial evidence' means evidence consisting of adequate and **well-controlled** investigations, including clinical investigations, by experts qualified by scientific training and experience to evaluate the effectiveness of the drug involved, on the basis of which it could fairly and responsibly be concluded by such experts that the drug will have the effect it purports or is represented to have under the conditions of use prescribed, recommended, or suggested in the labeling or proposed labeling thereof."

All of this led to a few major problems.

First, Kelsey's actions dramatically increased the prestige of the FDA, both emboldening the agency and simultaneously leading to many other jealous officials wishing to get the recognition she did for stopping the next thalidomide (which DMSO conveniently fit the profile of). Because of this, the pace of new drugs entering the market dramatically slowed, and ever since then, a consistent complaint of Congress has been the FDA blocking medical therapies the public needs.

Secondly, it galvanized the FDA into rapidly establishing its authority and creating numerous divisions to "police" questionable drugs without the organization being structured to effectively or appropriately administer that authority (which led to perpetual mismanagement, chaos, and frequent abuse of that power).

Third, the FDA ***chose*** to define "well-controlled" as a double-blind trial (to the point they clung to this specific argument in 1980 when Congress and the Senate grilled them over their decision to stonewall DMSO).

This was a huge issue because:

•I believe it was what enshrined the scientific supremacy of randomized controlled trials (RCTs).

•RCTs are extremely expensive. As such, most can only be done by the pharmaceutical industry, which due to their cost, consistently frames them (presented in favorable ways, ignoring or adjusting harmful data) to protect the company's investment (which leads to RCTs frequently being highly inaccurate). This in turn, rapidly increased the cost of drug approval, effectively turning drug approval into a pay-to-play type situation (e.g., currently, the cost to bring a new drug to market is estimated to be between 0.98-4.54 billion dollars, which makes it impossible for any unpatentable product ever to get FDA approval*).*

•RCT fundamentalism is highly misguided as smaller observational unblinded trials will typically yield the same results as large (non-corrupt) RCTs (**proven by this 2014 Cochrane Review**), especially if the effect of a drug is significant (rather than a tiny one that can only be detected in a large controlled study and hence is likely inconsequential).

•It was impossible to test DMSO in a blinded fashion because it immediately produced a significant benefit everyone (including the patient) could see; it irritated the skin (to some extent this could be worked around), and it had a characteristic odor. Furthermore, since it was absorbed systemically, it could not be tested on only one side of the body (which would then be compared to the other side, that got a placebo). Additionally, the dose of DMSO patients required greatly varied (and hence made it difficult to standardize trials).

Note: somewhat analogously, I've had numerous frustrated patients ask me to find them a seed-oil free infant formula. I eventually discovered that the Infant Formula Act of 1980(which was virtually unanimously passed by Congress in response to more than 100 infants becoming seriously ill from nutritionally inadequate soybean oil-based formulas), due to outdated science from the 1970s (specifically these 1976 AAP recommendations which did not exist in the AAP's 1967 recommendations), required infant formulas to have at least 2.7% of its calories (300mg per 100 Kcal) comes from linoleic acid (the problematic ingredient in seed oils). Beyond this making it illegal to sell infant formula without them, I and many others believe this is a root cause of the childhood obesity epidemic in America as seed oils impair mitochondrial metabolism and cause you to gain weight (e.g., this systematic review showsinfant formulas cause excessive and rapid weight gain).

In short, while it was necessary to give the FDA the power to block dangerous drugs, giving in the ability to block "ineffective" drugs was a huge issue as "ineffective" is immensely subjective and often becomes a completely unreachable standard.

The ABC-TV program "Good Morning America", on February 5, **1981**, where David Hartman interviewed Robert Herschler, helps put all of this into context:.

Herschler: ... the toxicity of DMSO is very low. It's not true that it is dangerous. Compared to aspirin, DMSO is a much safer drug. People are killed taking aspirin; no one has ever been killed taking DMSO.

Hartman: If this is the case and you are so sold on it, why has the FDA not approved its use?"

Hershler: In 1964, the FDA complained bitterly about DMSO because it was both a commercial solvent and a drug. They could not control it. Beyond that, we had a meeting with Francis Kelsey of the FDA where she raised her hands and said, 'We simply cannot cope with a product like DMSO. We envision hundreds of applications [NDA's] coming in, and we simply don't have a budget or staff.'

From then on they took a hard line against DMSO . . . There are many controlled studies that prove it is both effective and safe. And the FDA knows it! The FDA has at least 100,000 clinical [patient reports], and if they statistically evaluate them, and they have, and if they try to prove it is not safe and effective, **they simply cannot do it.** They have been using this gambit of 'double-blind'—being able to use the 'double-blind' as the reason for rejecting it.

Note: I believe one of the strongest proofs that the thalidomide disaster was nothing more than a tool for the FDA was how quickly they abandoned the fundamental foundational principle it had enshrined and which the FDA's authority originated from (do not give pregnant women experimental medications) during COVID-19—which has sadly created entirely predictable fertility impairments that precisely mirrored what had been done with the HPV vaccines.

The Early Days

Stanley [Jacob] is a generous man who lives only for others. He has not the slightest desire for money. He is the complete genius. He can turn off all his personal troubles and give himself completely to what he feels must be done for others. In this case, DMSO had to be made available to sick and suffering people.

His motive is that simple…He has no hobbies, no sports. He has no time to play. At parties, he'll toy with a drink for a while and then take off. When he comes to dinner, he eats, sits on the davenport, falls asleep, gets up and goes home—or, more often, back to the lab.

As it so happened, Rosenbaum was the initial discoverer of chloroquine's utility in rheumatology, but since he took the time to do a meticulous double-blind trial to prove it, while he was awaiting publication, another team got a rushed investigation published and all the credit for the discovery. As such, Rosenbaum recognized he could not be too hesitant to promote DMSO. In the summer of 1963, he and Jacob submitted foundational papers on DMSO (which *Science*, *Nature and Surgery* rejected as they were understandably skeptical something like DMSO could exist). Then in October 1963, Jacob simply presented it at the prelude to the annual meeting of the American College of Surgeons.

Note: the first investigational new drug application for DMSO was submitted to the FDA on October 25, 1963 and quickly approved.

Simultaneously, as word of DMSO's remarkable therapeutic potential began to spread through word of mouth, Rosenbaum and Jacob tried to delay it getting into the mainstream press (as the scientific community disdains "charlatans" making claims to the media before the community has been allowed to scrutinize those claims). Unfortunately, due to their initial attempts failing and Crown Zellerbach deciding to publish a joint patent with the University of Oregon on the medical uses of DMSO, a front-page news story was published in Portland on December 10, 1963. A few days later, on December 18, The New York Times published a front-page article by Robert K. Plumb about DMSO "creating a stir in medical circles in Portland, temporarily spiking Crown

Zellerback stock from $5.50 a share that day to $60.25 and leading to newspapers around the country continually cover this wonder drug for the next two years.

Jacob then presented his work before the faculty at his medical school, where he was predictably met with widespread hostility by his peers (e.g., some of them yelled out, "Liar!" "Quack!" "Charlatan!"), with a few subsequently requesting for his dean to fire him (who fortunately did not). Eventually, in February of 1964, Jacob got his paperpublished in a less popular journal (due to a sympathetic editor intervening)—unfortunately (due to the NYT article) was three months too late.

This was followed by a March publication on DMSO and bursitis, thanks to another sympathetic journal editor, and an April publication in the same journal on DMSO and arthritis and gout. Those three publications, in turn, made some of the scientific community open to DMSO, but they further polarized those who resented Jacob bypassing the scientific community with the popular press (despite the fact he never did that).

While many of the early adopters were cautious, others with minimal experience began engaging in “an epidemic of wild, senseless, irrational experimentation on humans,” further unsettling many of Jacob’s colleagues (who did what they could to get the University to renounce it and stop patients from using it). Jacob in turn, began being scorned by his peers and longtime colleagues and went from being one of the most desirable members for many medical societies to one few would accept (and likewise medical schools completely stopped trying to recruit him and research grants that had previously always been approved without effort became quite hard to get).

One particularly illuminating exchange happened with Dr. Dunphy, Jacob’s friend and immediate superior (they had both been prestigious professors at Harvard before moving to Oregon), who attempted to provide a helpful warning to Jacob by saying, “This smacks of Andrew Ivy.”

Andrew Ivy

Andrew Ivy, at the end of World War 2, was the most famous and influential doctor in America (to the point the American Medical Association [AMA] sent him as their representative to Nuremberg, and he co-wrote the Numerberg code). In 1951, he was introduced to Krebiozen, a promising cancer therapy. He became its leading proponent, but as he was testing it, someone who felt the public needed to know about it leaked a sensational press release, which turned the medical community against him. Following this, the AMA (recognizing its value) threatened the inventors to sell the rights to them, and after they didn't conducted a fabricated study to debunk it in the hopes of bankrupting them and getting ownership of it (which was later proven by examining the actual records of the AMA study and a co-conspirator plus another witness testifying in front of the Illinois legislators about the criminal conspiracy AMA leaders had shared with him).
Note: the AMA used this same playbook against many other promising therapies. For example, here I discussed how the AMA buried ultraviolet blood irradiation as its miraculous results spread through America's hospitals with a doctored study after the inventor would not sell it to the AMA and here I discussed how the AMA's original business model that brought the organization to prominence was using its reputations to monopolize the entire medical marketplace by having the press vilify anyone who did not sell out to them.

Ivy continued to collect data (including miraculous results for key politicians), eventually showing in over 4200 patients that Krebiozen had a 50-70% success rate (depending on the metric evaluated). Nonetheless, the AMA (and then the National Cancer Institute) were allowed to continue with impunity. When Ivy applied for approval to use Krebiozen, the FDA stonewalled them and eventually produced spectrographic data asserting Krebiozen was a common worthless metabolite in the body. Before long, it was revealed the FDA had fabricated that data, leading to Senator Paul Douglas telling the Senate on December 6, 1963: "It is a terrible thing that we cannot really trust either the Food and Drug Administration or the National Cancer Institute."

Nonetheless, the FDA used their newfound authority from the 1962 Kefauver–Harris Amendment on June 7, 1963 to prohibit Krebiozen from being shipped across state lines, leading to many protests in front of the White House, but unfortunately, as they were on the verge of winning over Kennedy, he was assassinated on November 22, 1963 and Johnson could not be persuaded. Unable to get Krebiozen, many of those patients died, and in 1973, Krebiozen was eventually outlawed in Illinois, and not long after (like many of the other alternative cancer treatments of that era), forgotten. Fortunately, William Kronick (a well known television producer) created an impartial program about Krebiozen that documented this forgotten history and the FDA's gross malfeasance throughout it.

Note: Mike Wallace also interviewed Dr. Ivy in 1957 (but I have not been able to find a copy of this TV program). Krebiozen was also featured in national magazines like Pageant, Argosy, and Inside Story.

In the future, I will write a more detailed account of this story. The key point here is that the FDA director was just as nasty to DMSO as he was to Krebiozen and that no amount of political influence could stop the AMA's monopolistic juggernaut (e.g., beyond his personal prestige, Ivy had miraculous results for US Senators with cancer and a Senator who fought for Krebiozen but they were all essentially unable to do anything).

DMSO Gets Caught in the Crossfire

By 1964, Jacob had discovered DMSO treated a myriad of challenging conditions (e.g., poor vision, baldness, many infections, gangrene, disc issues, diseases of the digestive tract from glossitis to hemorrhoids, skin issues, psoriasis of the scalp to athlete's foot and a variety of internal organ disorders).

On March 18, 1964, he and DMSO's stakeholders attended a meeting at the FDA, where Frances O. Kelsey told them they wanted to do everything possible to permit further testing of DMSO, but simultaneously were worried about being overwhelmed by a large number of DMSO drug applications (particularly

since DMSO could be combined with so many other drugs). Yet, once they provided animal data showing animals had no side effects from large doses and that humans had had no side effects from prolonged courses of small doses, the FDA still said the human doses must stop because there was insufficient animal data to warrant them and suggested a month-long dog study before applying for a permit to restart human studies.

Note: At the start of 1964 no fewer than 30 different pharmaceutical companies were approaching Zellerbach for a DMSO license, but rather than go with 1 or 2 as advised, Zellerbach went with 6 of the world's largest companies (Merck, Sharpe and Dohme, E. R. Squibb & Sons, American Home Products, Syntex, Geigy and Schering), leading to a chaotic situation where they all wanted to be the first one to get a product to market and poured millions into it, which created an atmosphere of urgency the FDA had never dealt with before and hence was not comfortable with. Likewise, Rosenbaum had used his personal connections to reach out to numerous pharmaceutical companies and had convinced many of them to make massive investments to bring them to market. Many hence felt that if DMSO had only had a narrow number of uses, it would have almost certainly been approved, but because of how well it worked, the regulatory system simply did not have the ability to handle it.

By spring 1965, the data for the FDA was there (and looked excellent), but due to DMSO having been prematurely released to the press, immense public demand for DMSO was building. For example, in February 1965, Merck had told Jacob they were getting more requests for it than anything else they'd ever developed, and many professional athletes and movie stars were endorsing it. On April 3, 1965, the New York Times published a front-page editorial calling it "the nearest thing to a wonder drug the nineteen-sixties have produced."

By this point, over 100,000 members of the public were using the unapproved drug (e.g., by buying it from chemical supply sources or getting it from doctors who were giving it to patients outside clinical trials—which the FDA also really did not like.

“We knew the FDA was getting edgy,” Jacob says, “but we also felt the data we were getting from the various drug company investigators were solid enough that DMSO was safe and effective. What we didn’t know was the FDA at this time was more concerned with its regulations than it was with finding out the human benefits of the drug.”

Note: in 1965, Merck, Syntex, and Squibb all felt there was enough data for DMSO to become a prescription drug and submitted new drug applications to the FDA, but were all turned down (as was Gibb Pharmaceutical Company’s 1971 NDA). By 1983, the NDAs tossed aside by the FDA included 1,500 medical studies performed on approximately 120,000 patients with a variety of health problems.

As miraculous results (and attacks from their colleagues) continued to mount, Schering’s director invited Jacob and Rosenbaum to a July 1965 symposium on DMSO in Germany, where unlike America, the 150 European participants were incredibly interested and open-minded about DMSO, which Rosenbaum felt helped to explain why their DMSO research was ahead of America’s despite them having started later.

Research continued to grow throughout America on every aspect of DMSO in both humans, plants and animals (e.g, it was shown to have remarkable utility in treating cancer), and on September 8, 1965, Merck sent its investigators a glowing review of the safety and efficacy DMSO from their data over the last 18 months on 4,000 patients (which I have excerpted parts of throughout this series).

Unfortunately, the next day (September 9th), the Wall Street Journal published a headline that quickly went across the world:

DMSO MAY HAVE CAUSED DEATH OF WOMAN MAKERS OF WONDER' DRUG WARN DOCTORS

This death occurred in a Squibb research subject (in Ireland) who had continued to take DMSO after suffering allergic reactions and eventually died from

anaphylaxis. However, despite it never being conclusively linked to DMSO (she was on many other drugs which could have caused the allergy) or this ever happening again (e.g., I reviewed all known DMSO deaths here), for decades afterward the FDA continued to reference her death.

The pharmaceutical companies immediately warned their investigators to watch out for anaphylaxis, but on September 22, 1965, the FDA terminated Zellerbach's IND (and ability to conduct human studies) and charged that the number of doctors testing DMSO throughout the country was far greater than the maximum the FDA had permitted.

Note: since DMSO was "safe" investigators would often use it as a last resort in otherwise futile cases where a patient was expected to die—and in the process discovered DMSO has a wide range of uses they could have never conceived of (e.g., feeding a starving infant through the skin who could not receive oral or IV nutrition or saving the limbs of someone with extreme frostbite). Once the FDA put strict restrictions into place over exactly when and where DMSO could be used, this plethora of discoveries from unusual cases ended.

Then in November, due to a few animal reports that high doses of DMSO could alter the refractory index of the eyes (which at worst could make someone need glasses), the FDA summoned representatives from each company testing DMSO to Washington, where Dr. Joseph F. Sadusk, Jr., (the medical director of the FDA) read them a telegram saying DMSO testing was being suspended, after which the FDA immediately sent out telegrams to the WHO and each embassy stating that DMSO could blind its recipients—successfully halting research globally.

Note: this ban was lifted for small numbers of patients with severe illnesses a year later, and then further lifted for a wider range of less severe illnesses (due to a study providing DMSO's safety), but it was not until September 1979 that the FDA published a regulation abolishing its 1965 regulation banning general

research in DMSO. This freeze essentially destroyed almost all the interest in researching DMSO clinically.

As I showed in this article, the FDA's claim DMSO damaged the eyes was **not at all supported by the existing evidence** (e.g., at the time of their ban, it hadn't been seen in any of the 100,000 people who used it—including 37,000 trial participants from Merck, Squibb, and Syntex). Since that time, DMSO has consistently been shown to improve rather than worsen eyesight. Nonetheless, the press immediately parroted the FDA's line and gratefully thanked the agency for saving us from a thalidomide like disaster which would have caused much of America to go blind (and for decades, FDA officials repeated this concern even when trials designed to detect it all agreed it did not happen).

The investigators were understandably confused since they had no evidence in their research of DMSO affecting the eyes (which many other drugs were known to do) and before long had to start telling all their patients who had come to depend upon DMSO that they could no longer receive it. Doctors like Jacob advised those patients to contact their Congressman, but sadly, the pharmaceutical companies, despite knowing there was no eye risk and having already made a large investment in DMSO, quickly submitted to the FDA's ban (to the point Jacob was requested to stop telling his patients to complain to the government).

Nonetheless, the patients knew what the FDA had done to them and immense protests began against the FDA (alongside a thriving black market for DMSO being created).

Shortly after (late November) FDA agents began showing up to copy Jacob and Rosembaum's records, and as time progressed became more hostile and accusatory to them and bold in what they copied (e.g., going to areas they did not have permission to explore, obtaining personal information of patients, or covertly copying his personal correspondences and then refusing to surrender it once they'd been caught obtaining it). After about a month of this illegal activity, they contacted an attorney, who explained to the agents at their next

visit that they needed an explanation in writing from their Seattle superior to continue, which led to an interaction quite similar to many others the FDA conducted in the ensuing decades:

Two days later one of the inspectors called from Seattle to complain that Rosenbaum was delaying the work of the FDA. Rosenbaum suggested the inspector talk to his attorney and pointed out that Crown Zellerbach and Merck had duplicate records of his DMSO treatments. A few days later both inspectors again appeared in Rosenbaum's office and gave him a slip of paper threatening to invoke a federal regulation unless he surrendered the records.

"What regulation?" Rosenbaum asked. The inspectors said they didn't know.

That was the last Rosenbaum saw of them

While debating whether or not they should hire at attorney, Rosenbaum was contacted by a disgusted FDA agent who shared that:

Two weeks after DMSO testing was stopped, almost every FDA inspector was called back to Washington for a briefing. It was the biggest call-back of inspectors that ever occurred. The inspectors were told that there was serious question as to whether the FDA had been right in stopping DMSO because of toxicity . They were told to go out in the field and find some "pigeons."

The inspectors were interested in proving that the DMSO investigators had been dishonest. They were also very interested in finding the names of any patients who had had side effects or bad results and who would testify to the damage before congressional committees.

The purpose was to try the original investigators in the press.

There was considerable jockeying within the agency for positions of power and for promotions. Everyone was jealous of Dr. Kelsey, who had received a medal for stopping thalidomide. And everyone was in hopes that they had another thalidomide or Krebiozen story to glorify the FDA and win promotions.

He told me the smartest thing I could do was get myself a lawyer," Rosenbaum said.

Rosenbaum had another visit from the friendly FDA agent. "He told me that FDA inspectors, in the guise of having me sign a permit to examine a chart, had me sign a blank sheet of paper," Rosenbaum told me.

He quoted his informant as saying, "The inspectors are down in the office now, laughing and wondering how to use your signature" and "that the inspectors were copying Jacob's personal correspondence, and he gave Rosenbaum a copy of one personal letter of Jacob's which had nothing whatsoever to do with DMSO, Rosenbaum said.

Following this, their lawyer sent a cease and desist letter to the FDA and a request for the FDA's unauthorized photocopies to be returned which received a response directed to Jacob rather than his attorney from James Goddard M.D., the recent head of the CDC who'd just become head of the FDA It stated "very few exceptions, the copies of the documents were pertinent to the FDA investigation of DMSO," that Jacob's constitutional rights had been honored "with very few exceptions" and that he wanted to meet with Jacob to discuss which of the documents Jacob felt should not have been in the FDA's hands.

As it turned out, Goddard had just been appointed head of the FDA and had zealously prioritized getting Congress to expand the FDA's police enforcement powers, which was a political challenge since scientists and doctors had not previously been subject to extensive legal scrutiny. As such, the widespread (black market) distribution of an illegal and dangerous substance across America being abetted by reckless scientific investigators was perfect for his agenda.

Goddard served notice that "we are investigating possible criminal violations." This remark was headlined throughout the United States

In turn, he did all he could to cement that narrative about DMSO in front of a house subcommittee meeting on March 9, 1966 with the support of FDA

officials like Kelsey. This required significantly distorting the actual information (e.g., they cited the eye issue as a justification for their war against DMSO without mentioning it was a small reversible effect that only showed up in certain animals at over 100 times the human dose and alluded to non-existent reports of it causing visual damage in humans) while simultaneously have Goddard, like any other tyrant, try to sound magnanimous:

"I have, however, permitted continued use for a few investigators to administer to specific patients—about 50 having the conditions scleroderma, tic douloureux, Raynaud's phenomena, and multiple sclerosis," Goddard said.

Note: a few days later at the March 14-16, 1966 DMSO research symposium, one of the FDA's doctors (Arthur Ruskin) was asked to explain their Congressional testimony DMSO had already damaged the eyes of 24 patients, to which he acknowledged that while there were a few reports of DMSO patients complaining of eye symptoms, no cause and effect relationship had been established.

Remarkably, Sadusk, the FDA scientist who testified to the dangers of DMSO, also complained about the "very extensive publicity appearing in the popular press, representing DMSO to be a wonder drug for the treatment of a variety of diseases." Then a few minutes later didn't see any issue with glamorizing the FDA using a press release to warn ' 'of the dangers of DMSO." Soon after he left the FDA and not long after published an editorial in the Annals of Internal Medicine explicitly warning against the dangers of FDA overreach and the FDA controlling how doctors practiced medicine (.e.g., by not letting them use a repurposed drug for another use—something which 54 years later resulted in hundreds of thousands of COVID-19 death). Simultaneously, he ironically also complained about experts and the press exaggerating the dangers of birth control pills (they in fact weren't; and in reality those pills are infinitely more toxic than DMSO).

The next day, the pharmaceutical representatives of the companies testing DMSO testified before the committee and acquiesced to Goddard's position.

Remarkably, Jacob was not allowed to testify, and simultaneously, the Telegram he sent in defending DMSO was ignored by the committee.

Note: in private heads of pharmaceutical companies shared with J. Harold Brown (an influential doctor) that they had stopped sending DMSO drug applications to the FDA because they were afraid of embarrassing Dr. Goddard and having their other drugs blocked.

In short, Goddard's ploy worked, and cemented his position as a tough commissioner with the necessary power to keep medical professionals, the drug industry, and the public in line (e.g., by burying Krezbiozen).

A few years later, in January 1968, with a growing disaster having overtaken the nation's introduction of new drugs, the FDA relaxed its rules somewhat, for all drugs but two—LSD and DMSO.

Ten days later, Goddard admonished doctors in a luncheon address at the annual meeting of the American Society of Internal Medicine to practice better medicine and assume their responsibilities ' 'The Food and Drug Administration is a third party in the practice of medicine," he said. He urged his audience to consider the FDA's "recent experience with DMSO."

He was even more hard-boiled with the drug industry and with those who wrote the advertising. He charged industry executives with "excess in advertising," "misleading statements,"an overabundance of information available to the physician," in the industry's free books, periodicals, direct mail letters and other means of reaching the doctors. Some editorial writers charged that Goddard was following the familiar course toward imposing censorship.

And more and more commentators asserted that the role of the FDA, "the third party in medicine," had become that of Big Brother.

Goddard continued to pay his visits to congressional committees, each time with new success . . . and more power.

Goddard in turn, used the public's fear of hallucinogens to greatly enhance the FDA's policing powers through convincing the subcommittee that the FDA's authority should be tied to the recently passed Narcotic Control Act.

"The backbone of our field staff will be composed of criminal investigators," Goddard reported. He said 175 of them—almost all former federal enforcement agents—already had been hired, some as gun toters.

It became evident within the first few months after the FDA had been armed with unprecedented police powers that the agency had scored instant and almost complete success against one "dangerous drug"—DMSO. Most physicians returned their stores of DMSO to the supplier or destroyed them.

To have DMSO on the premises was to court raids by FDA agents and criminal prosecution. To continue to use it in the clinic was to invite malpractice suites as well; complainants could cite the FDA attitude to indicate that the physician was in the wrong.

Note: Goddard's FDA initiated the practice of no-knock raids that had neither a warning nor a warrant, and over the years courts began to throw out those prosecutions (e.g., this frequently happened with GHB).

The FDA soon began targeting doctors to intimidate the entire profession into compliance. For example, after finding some errors (which were likely inconsequential mistakes) in one DMSO's researchers records, without letting him present his side of the story, the FDA charged him with falsifying his records, had both him and his co-workers banned from any future research into new drugs (e.g., the FDA sent a letter to 30 pharmaceutical companies advising them to recall all drugs under his investigations), and vilified him in the press.

Note: this tactic worked because the press would treat news leaked from the FDA as having equal value to something that leaked directly from Congress or the Supreme Court. In turn, this was also a key part of how the AMA was able to monopolize American medicine (as the press would consistently attack any competitor the AMA decried as quackery and most recently, it sensationally

promoted an innumerable amount of anonymous leaks from "important" government officials who said anything negative about Trump).

Following this, public humiliation, the FDA let that doctor present his case (which showed he was not at fault), apologize, and have the FDA notify the pharmaceutical companies a month later so he could resume researching drugs (although henceforth he stopped receiving the critical NIH grants he had depended upon).

Note: one of the most damaging things Fauci later did was weaponize the grant system against America by cutting anyone who did not support his narratives from public funding and diverting our research dollars to creating new unnecessary pharmaceutical products.

Science Fights Back

Over the summer of 1965, work had been in progress to make a DMSO research symposium, and over the summer Jacob had written to every person in the world who had studied DMSO, and by September had collected 100 abstracts for a research symposium. Following the FDA's September DMSO crackdown and the cancellation of Zellerbach's IND (investigational new drug application), they then pressured Zellerbach to pressure Jacob's medical school to cancel the symposium.

However, two weeks later when Jacob's dean informed him of this, he made it clear he did not support this violation of academic freedom and asked him to have Rosenbaum be the official organizer so the symposium would not adversely impact the school.

As the New York Academy of Sciences had a reputation for advancing the best science regardless of whose toes it stepped on, Rosenbaum went to them to negotiate a symposium the following spring. The academy was supportive of this idea (they were already fully aware of the DMSO situation), but indicated there would be a significant number of logistical hurdles to pulling it off, which

the Academy eventually elected to take responsibility for addressing (e.g., they used their special funds to pay for the costly symposium).

"I wondered about this, and I still do," Rosenbaum said years later. "My guess is that the FDA tried to 'persuade the New York Academy to call off the meeting. The officers were not men who can be intimidated."

Note: Dr. Chauncey Leake, one of the most influential and respected figures in the medical education field agreed to chair the program.

At the same time, Jacob desperately wanted his program to be balanced (something I can sympathize with as I always try to show both sides of an argument fairly), but unfortunately, despite his best efforts, could not find a researcher who held a negative opinion towards DMSO or had obtained concerning data on it.

Not yet aware that the FDA's goal was to make an example out of DMSO, Jacob also invited Sadusk to send FDA researchers to the symposium so the science could prevail. In turn, on November 9 (the day before Sadusk gave an FDA order banning all DMSO research) Sadusk replied he would be delighted to oblige, "but rumor has it that the symposium never will be held." However, neither DMSO being outlawed nor the other approaches the FDA took were sufficient to stop the Academy.

Leake [the symposium's chair] then received a call from a drug industry leader whom he chooses not to identify. After the conversation, Leake told Rosenbaum, "My friend asked that we drop plans for the symposium at this time—said it would be very embarrassing to both the drug houses and to the FDA.'

He decided to call Dean Baird [Jacob's dean]. After hanging up, Leake turned to Rosenbaum. "Know what Baird said? He said, 'Chauncey, when have you or I, as deans and educators, ever let political or economic considerations compromise the search for scientific truth?'

Leake didn't talk about it then. As they got up from the dinner table, he said, "Okay, Ed. Let's give the committee our program.

When Leake announced their decision, the committee applauded. "They seemed to have a special interest in this," Rosenbaum said. "It was as though a tenet of scientific morality had been tried—and triumphed."

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: I quoted this because something like that would never happen now.

The 1966 symposium (detailed here) was a success and a wide range of fascinating research was unveiled, much of which transformed the existing practice of medicine. That symposium in turn was compiled into this summary of the studies presented (which I often reference and I believe should be read by anyone seriously interested in DMSO)

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CD Leake, SW Jacob, Biological Actions Of Dimethyl Sulfoxide (DMSO) 1966 New York Academy Of Sciences Symposium (Published in 1967)

88.7MB · PDF file

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Note: the NY Academy of Science's willingness to publish this research is also why many of the articles I cite come from their journal. One of the studies presented there (later published in 1975) contained the results of an ambitious project that tested how DMSO enhanced the efficacy of a variety of anticancer

drugs. Yet, despite consistently proving successful in animals, human trials were halted right before they started by a jurisdictional dispute within the FDA.

At around the same time [as the symposium], Dr. J. Harold Brown presented a report of a double blind-type study of DMSO before the Washington State Medical Society, in which he told his fellow physicians that as far as he was concerned DMSO was so effective a treatment medium for soft-tissue injuries that he had abandoned what he termed "antedated treatment." "I have discontinued all analgesics, muscle relaxants, tranquilizers, corticosteroids and physical therapy," Dr. Brown told the astonished group. "My results with DMSO were dramatic and striking."

Following this, a third international symposium was held in Vienna on November 8 and 9, attracting 150 scientists from twelve countries and covering data from over 10,000 patients (which Stanley Jacob summarized here). There they keynote opened with:

Rarely has a new drug come so quickly to the judgment of the members of the health professions, with so much verifiable data, from so many parts of the world, both experimentally and clinically, as to safety and efficacy

Fortunately, members of the health professions through- out the world are not all bound by the bureaucratic regulations and judgments of the U.S. Food and Drug Administration.

At this conference, the lack of eye toxicity was again confirmed. Still, it was noted that DMSO at concentrations greater than 30% could injure arteries when injected intravenously. At the same time, many of the benefits other investigators found were corroborated (e.g., pain relief, accelerated healing, the treatment of sports injuries, arthritis and scleroderma). Additionally DMSO had been found to:

•Overcome edema and other effects of trauma.
•Carry the heparin through the skin and into the bloodstream (which is very useful due to heparins effects on zeta potential) and the anticancer drug 5-FU.

•Sharpen tests for kidney and liver function.
•Reduce body water and both sodium and potasssium (90% DMSO, topically, increased urine volume ten-fold).
•With another compound, prevent the calcifying effect of metal salts like lead acetate.
•If given to mice ten days before infection, prevented typhus.
•Make tuberculosis lose its resistance to antibiotics.
•Treat pain associated with blood clots.
•In one study, benefit 77% of patients with rheumatoid arthritis and 84% with osteoarthritis.
•Clear benign skin growths of the eyelids and necks by dissolving the oils which cause them.

Scores of scientists had confirmed the majority of the claims Jacob had made; and some had added new and original claims of therapeutic values. Jacob felt vindicated at the end of the symposium. The distinguished scientists clustered around him, shook his hand, congratulated him for what some called a classical contribution to science and medicine.

Following this, another symposium (where these papers were presented) was again held in New York in January 1974 (and covered by the New York Times) and then again in September 1982 (parts of which can be read here). Like the previous conferences, all these reported favorable results for DMSO.

Note: I could not obtain a copy of either the Vienna or Berlin conference or the latter two New York conferences. If any of you are able to access the information and links I provided, please send me a copy so I can review it and add it to this article.

Following this conference, Germany began quietly returning DMSO to the pharmacies, and other countries also disenchanted with the FDA, followed in legalizing DMSO.

Sadly, as strong and consistent scientific evidence of DMSO's safety and efficacy had no relevance in the FDA's decision making process:

As the [1966] New York Academy sessions were drawing to a close, an FDA agent turned to Ann Sullivan of the Portland Oregonian, and said, "DMSO is through."

Ann looked at the man in amazement.

' 'Where did you ever get that idea?' Miss Sullivan asked. '

"My boss told me," the agent answered, according to Miss Sullivan

At the symposium, Jacob was notified that Goddard would see him the next day in Washington. He reported the following:

I met with Dr. Goddard at 5:00 p.m. on the 17th of March, 1966. After a few pleasantries I sat down.

Dr. Goddard looked at me sternly and tapped his hand on the desk, saying, "Dr. Jacob, there are two very serious matters I have to discuss with you The first is you violated the hell out of these regulations. We gave you permission to treat a couple of hundred patients, and before that circus was over 50,000 patients were treated. I just don't know what to do about all of these violations. We have never seen anything like it. One of the things that bothers me, however, is that I can't find a motive. We know you didn't make any money from your activities.

Note: because of how fast and efficient Jacob was at working, he was not only able to fulfill his duties as a professor of surgery and coordinate the global DMSO research battle but also by 1972 had given more than 4000 DMSO treatments—including numerous miraculous results I've detailed in other parts of this series.

The second serious point is your accusation that my inspectors went into your personal correspondence files without permission. That isn't the story they told me.

I then related the story of the inspection. His answer was, "That's 180 degrees off the story my inspectors told me.”

I said, "Dr. Goddard, did you look over all the material that was photocopied?" He said,"Yes, with the exception of 40 or 45 sheets of paper, everything seems relevant." My answer was, "Do you think that there would be anything that was not relevant if I had given them permission?"
Dr. Goddard shook his head and said, "I just don't know what to do about you, Dr. Jacob. Your violations were terrible."

I had the feeling that Dr. Goddard was saying to me, you forget about the correspondence and I'll forget about the violations, although these words were not actually spoken.

Note: From what followed, Pat McGrady determined Goddard had wanted Jacob to submit to the FDA and apologize and was not expecting Jacob to threaten to fight Goddard in court if the science would not be heard. Because of this, he pivoted to finding innumerable ways to harass Jacob.

Goddard’s Vendetta

Following this encounter (and the FDA’s newfound policing powers), there also began being strange noises on the telephones indicating Jacob and Rosenbaum were under surveillance. However, they eventually decided rather than be intimidated and lay low they needed to fight back. Likewise, patients from the around country began writing letters to Congress and the President (or their local news paper editors) protesting the FDA’s actions.

Likewise, Jacob received many letters similar to the comments I’ve received here such as:

I am a victim of arthritis. For many years I had not known what it meant to be free of pain. I experienced that wonderful feeling when I was treated with DMSO and improved greatly in my ability to move about with normal freedom.

I cannot but believe that FDA has usurped power which rightly should be in the hands of medical researchers. It not only deprives victims of disease from blessed relief but it retards the work of dedicated researchers, and our country inevitably will lag behind other countries .

During my career as a medical specialist and medical officer for my country, I have seen many "miracle" drugs—penicillin, streptomycin, para-amino-salicylic acid and isoniazid. Also promazine and chlorpromazine. None of these had the immediate and spectacular results shown by DMSO. Nor did any have the future potential as a solvent and vehicle for other drugs.

My brother Bob was unable to walk and was bedridden when he read about DMSO. He was being treated for hemophilia, but the doctor, not being sure of the drug and its use, would not prescribe it for him. Squibb referred Bob to an orthopedic man. Because Bob couldn't walk, he went to the doctor's office in a wheelchair. After using DMSO daily for three weeks, he was on his feet again and able to go back to work.

Early in 1964 my doctors treated my head with DMSO. The treatments, ten in all, healed the severe head pains which I had endured for more than nine years. Up to this time I had been given many drugs and treatments with no relief at all.

When I think of all the arthritics—including my mother—and when I think of my sitting at the New York Academy of Sciences Conference on DMSO and seeing the vastly successful indications (medical, industrial, agricultural) presented there, I can't believe what has happened to this drug. FDA did not attend that conference to find the truth.

I have wrote the FDA, Dr. J. Goddard, about my case [FOP a terminal and incurable disease] asking them to please release to my doctor some DMSO [as it was only the thing that helped]. Since the ban my ailment has progressed to a much more distressing condition than in 1964, before I started using DMSO. They have made no attempt to try and help my case.

To preserve my life, I was forced to become either an expatriate or a smuggler. Since I could not earn a living abroad, I was compelled to adopt the latter course. It cost me a fortune.

I have been a law-abiding citizen, having been charged with nothing more serious than about six traffic violations during 40 years of driving. Because of the unconstitutional actions of the FDA, I have been forced to violate valid and necessary Federal laws in order to preserve my life. I believe this constitutes a very serious infringement of my constitutional rights, and, as such, is a matter of concern to the ACLU.

I attribute all of my success to DMSO for not having to go through with the amputation of my right leg. For two long years this wonderful drug has been kept away. How many people have lost their limbs during this time? Tying the hands of Dr. Jacob in my estimation is an unforgivable sin. Please, please let DMSO come back to us.

On, October 5 1966, a journalist attempted to solve Jacob's challenges with the FDA by persuading Oregon's Congressmen to organize a conference in Washington where both DMSO advocates (numerous respected physician scientists) and opponents (e.g., Goddard, Ruskin and the HHS Secretary's representative) could debate the issue in front of the press. Unfortunately, the press was not allowed to attend the event, and Goddard aggressively controlled the discussion by discussing DMSO's supposed toxicity and cutting off Jacob whenever he tried to present evidence of its efficacy by stating he was "biased." Jacob in turn didn't challenge Goddard so he could save face.

Jacob gave me this account: "I suggested that some of the differences between the scientific community and the FDA on DMSO could be resolved by the National Academy of Sciences. Dr. Goddard replied that the suggestion was very similar to one advanced by Dr. Andrew Ivy during the Krebiozen matter."

After the event, the press was allowed to meet with Goddard alone, but Jacob was able to briefly talk to them after Goddard left.

Later Pat McGrady (from whom much of this article is sourced) on May 1967 interviewed Goddard for two and a half hours.

Within the first few minutes of our interview, in his impressive presentation, Goddard was inconsistent himself at a time when scientists committing comparable mistakes were wrongly threatened with criminal action and disgrace.

I pointed out that scientists at the New York and Vienna DMSO symposia were almost unanimous in citing the drug's fine therapeutic effects and minimal side effects.

"This is not our information," Goddard said. "I think we hear from different parts of the scientific community and I think this is quite natural. Advocates of a position often tend to go to meetings and present their experiences with a drug.

Goddard reported with a straight face that there was substantial criticism of DMSO at the New York Academy and Vienna symposia. I covered both meetings. His word was hearsay and wrong.

In their interview Goddard also repeatedly discussed the importance of a new study the FDA had discovered which “showed eight out of ten DMSO subjects had developed leukopenia” but could not give specifics of the study (after which after McGrady located the study, he discovered what Goddard said was completely different from what it actually said—and likewise leukopenia, has to my knowledge not been found in any other DMSO study). Following this, Goddard stated that since only 60 humans had been observed for eye toxicity, so it was quite possible DMSO’s eye toxicity hadn’t been caught (when in reality over 600 had been studied for this side effect).

Note: Goddard promised to send McGrady a copy of the FDA’s extensive documentation of DMSO’s toxicity immediately after the meeting but never did.

When asked why they’d frightened investigators around the country to death with their police like tactics Goddard both denied they were “police like,”

insisted the FDA was being merciful by blacklisting the scientists rather than taking them to court (which later the FDA began to do) and stated:

Let's put a little of the responsibility on the people who acted in an irresponsible fashion. We had a tough job of taking the action, that's true. But by the same token, those who acted so irresponsibly caused this action to take place.

Goddard also gave a variety of excuses to explain why patients that were in desperate need of DMSO (and had sent many letters to the FDA) were being denied permission by the agency to continue using it on an experimental basis.

Note: the FDA's ban created numerous compelling cases histories where a seemingly impossible recovery (e.g., from being fully paralyzed) happened while the patient was on DMSO, completely stopped while DMSO was banned, and then resumed when DMSO was restarted a few years later.

One of the most notorious ones happened with the Jack Ames, a wealthy and politically connected banker whose daughter was born with severe neurologic illness that left her with a life of severe disability and anguish nothing helped until he tried DMSO in 1964. Following the ban, regardless of his daughter's suffering (much of what was heart-wrenching to read), when he tried to get the FDA to allow his daughter to resume DMSO, he kept on being stonewalled for "patient protection" (even after he got numerous Congressmen to plead his case).

The enclosed correspondences I am submitting is a sample of the frustrating experiences I have had with the FDA. It is one thing to administer a law and another to completely, for all practical purposes through evasive replies, ignore an individual with an obvious critical problem.

He charged that FDA officials had dodged his telephone calls. He said that DMSO had proved safe and helpful in his daughter's case, and he blamed the FDA's feeling of "vengeance" toward Jacob for its unavailability for seventeen months.

Yet, when asked if he'd made any mistakes, Goddard simply said that he would have handled the vitamin controversy differently. For context, the FDA had wanted to mandate labels on vitamin bottles saying the National Research Council had determined Americans already got enough vitamins from their diet, when in reality they never had and with the public's help forced the FDA to retract that regulation.

When asked why they were being so strict with DMSO when at least 80,000 people had already taken it without a single serious side effects being reported:

Goddard: Not so far as is known . Who followed up on the people? Who checked up on them? There has been reported at least one instance of anaphylactic death.

McGrady: The lady in Ireland?

Goddard: Yes

McGrady: She was taking several things. Are you familiar with the circumstances?

Goddard: Yes

McGrady: And you still say that?

Goddard I say there is one case reported. Now look, this is why facts are needed.

Finally, when asked if the agency's new stringent rules were responsible for the pace of necessary drug approvals slowing to a crawl, Goddard denied it and promised that within six months of receiving an IND for scleroderma, it would be ruled upon and most likely approved…which to this day still has not happened.
Note: Goddard also glossed over the fact the requirements the FDA had put in place for scleroderma studies were unreasonable to the point it was almost impossible to conduct them.

Among the points that struck me as especially noteworthy were Goddard's defense of his police and their methods, his unsmiling reference to the poor, dead "lady in Ireland," his denial of enormous influence over the professions [due to the FDA making public examples out of dissenting physicians], his exculpation of the FDA in the personal and professional reputations it had destroyed, his rape of the—it must be said willing and consenting—press, and his readiness to put the power of the government against aggrieved citizens in costly and time-consuming litigation, his minimizing of the disastrous trend in drug development and his optimistic prediction that things would soon pick up.

Later Grady shares:

Periodically over the years, the FDA has announced that DMSO research will soon resume—or, indeed, that it already is under way. Few centers have the specialists and equipment needed. Consequently, there were very few such studies. When I called this to the attention of FDA officials, they explained, "Well, we can't force doctors to undertake the studies, can we?" Or, "We can't compel pharmaceutical houses to handle DMSO; if they're afraid of a visit from our inspectors, there's nothing we can do about it." Or, always, "We're only enforcing the law."

Finally, since the multitude of animal studies showing DMSO had negligible toxicity and the lack of adverse reports from human volunteers had not persuaded the FDA, a Merck DMSO researcher who'd been forced to stop due to the FDA's ban set up a plan to conduct a comprehensive human toxicology study that he eventually convinced Squibb to support. Squibb then proposed to conduct the study jointly with the FDA, and eventually after two years, convinced the FDA to permit the study.
Note: during this period, the FDA repeatedly promised to test DMSO "properly" and simultaneously said investigators were finding severe toxic effects from DMSO but refused to ever list what they were.

The study began on October 1967, and involved covering prisoners entire bodies in DMSO gel to give them 3-30 times the normal dose of DMSO for

either 14 or 90 days and then continually exposing them to an extensive battery of tests. This study (which I reviewed in detail here) was an unusually comprehensive toxicology evaluation and found DMSO was extremely safe, but nonetheless it did very little to change the FDA's position on DMSO (leading me to assume they had actually agreed to do it in the hope it would have revealed something harmful with DMSO)—rather it took 13 more years for the FDA to lift their harsh restrictions on testing DMSO.

Note: the absurdity of this entire situation is highlighted by Lyndon Johnson (who was president from 1963-1969) reaching out to Jacob in 1971 for guidance on how he could use DMSO.

Oregon's legislators likewise tried to address DMSO in both the House and Senate. For example, they got the Library of Congress to reproduce and translate the scientific papers on DMSO that had been produced oversees and many of their attempts to legalize DMSO (alongside harsh criticisms of the FDA's conduct) can be read here(1967) and here (1968) in the Congressional record (search for DMSO). Some of those remarks included:

Thousands of people in this country are needlessly suffering because of the FDA's arbitrary holdup of clinical testing of DMSO. The holdup is pure futile arrogance on the part of a Government agency.

In thousands of documented cases, suffering has been alleviated, pain reduced, and symptoms have disappeared; but in not one single case had a serious side effect been discovered. Restrictions on its use make companies and doctors alike shrink from even filing an application to test this drug. FDA actions have been so harsh, in fact, that drug companies refuse to make DMSO available in medically acceptable grade. The FDA has been accused of bludgeoning the medical community into submission ... of forcing submission to its orders by blacklisting investigators, threatening scientists with unwarranted court action, conviction by press release and, in general, using questionable methods to control the actions of the medical profession.

Fortunately, Goddard's actions generated more and more pushback from both the public and medical professionals, and just 28 months after he started, he resigned for "personal reasons," (or possibly the challenges his presence was creating during an election year), after which he gave a defiant speech defending his actions before fading into obscurity (and much later dying from a hemorrhagic stroke—ironically one of the conditions DMSO is the most valuable for).

Sadly the FDA's harassment of Jacob did not end with Goddard. For example, after the FDA learned Dr. Jacob had loaned the FDA officer who was overseeing the interstitial cystitis drug application money (that was paid back) to pay for his wife's cancer care, the FDA accused him of bribery and referred him to the DOJ. After pleading not guilty in 1981, a mistrial occurred due to a deadlocked jury in 1982, a second trial occurred in October. On the fifth day of that trial, he not only was acquitted of all charges, but the DOJ dropped them and apologized to him (but did not refund the hundreds of thousands Jacob had to spend defending himself that put him into bankruptcy).

Still, the prosecutors seemed to be aboveboard. I developed respect for both United States attorneys. I had the feeling that they were going through the motions of prosecution but that they almost wish they hadn't gotten involved in the case. Their hearts weren't in it.

Assistant United States Attorney Richard E. Dunne III said that the Justice Department wasn't after Dr. Jacob as a profiteer because of his early financial connection with Research Industries Corporation, the producer of Rimso-50, but the case was pursued because DMSO could be considered the Laetrile (an anti-cancer drug) of the eighties.

Note: laetrile was another promising cancer therapy (with evidence strongly supporting its use) that the FDA and the NCI nonetheless buried.

The Post-Goddard Era

McGrady then met with Goddard's successor Herbert Ley Jr. MD on February 14, 1969, who promised to be more fair and less confrontational than Goddard (e.g., no more FDA shakedowns).

When pressed on DMSO's toxicity, Ley stated he believed the FDA had data on (rare) fatal hypersensitivity reactions that had occurred but could not cite specific instances (when in reality, from millions of people taking DMSO, they hadn't).

I left the Ley interview, as I had the Goddard interview, perplexed that these high officials seemed so lacking in solid information about the most spectacular and the most controversial drug of our time and, as Congressman Wyatt had expressed it, a "persecuted drug."

Not only did the FDA lack data to support its charge that DMSO was forbiddingly toxic but it was proving amazingly uninformed on the results of laboratory and clinical studies At this time, the proceedings of the New York Academy and the Vienna meetings had been published and many papers were being republished in various journals. There also was a strong surge of scientific reports, mainly from abroad, flatly suggesting that DMSO was indeed a "wonder drug," and one without great toxicity.

Note: December 22 1970, after 7 years of waiting, patent 3549770 (for DMSO) was issued to Jacob, Herschler and their respective organizations for a wide range of uses for DMSO that attorneys involved said it represented the broadest approval ever given to a medical advance by the U.S. Patent Office (along with another one to Herschler for DMSO's antimicrobial properties). Despite the detail and demonstration of efficacy in this patent, the FDA still refused to approve DMSO.

At this point in time, when FDA officials were asked questions about DMSO, they would typically reference their "white paper" (which ranged from 2,000-10,000 words) or its abridged "fact sheet." Neither listed an author, or provided any references to verify its claims and was full of overt falsehoods (e.g., "The data disclosed serious toxic signs in some animals, appearing at dose levels which suggested little or no margin of safety in humans") and misleading statements that implied a toxicity and a lack of efficacy which did not actually exist (nor did the FDA actually state was there). However, because of the paper's tone and it being the first thing most patients or doctors who asked about DMSO saw, it many highly reluctant to use DMSO. Likewise, many doctors (who had no direct experience with DMSO) became convinced it had to dangerous based on this paper and stated as such to any patient who raised the subject.

Note: around the same time, a doctor and director of The Arthritis Foundation of Western Washington wrote a handout titled: "DMSO ANOTHER MIRACLE' DRUG EVERYONE SHOULD AVOID NOW" which begrudgingly admitted DMSO worked, but claimed that there was some evidence it caused cataracts in animals (which is not accurate).

By late 1968 (even though DMSO was still being sold medically in Europe), DMSO research had largely stagnated globally due to the FDA's constant stream of white papers warning against it (resulting in a Schering Executive stating:

The expectations we placed in DMSO regarding its use in acute inflammatory conditions of the musculoskeletal system have been fully realized…much to my regret [German] DMSO sales have not come up to my expectations. It may be that DMSO will not regain its original popularity unless completely new fields of application, such as cancer, for example, are opened.

Note: at this time, the number of new drugs brought to the market dramatically declined but industry profits were sustained by selling more and more of the older drugs.

Once Nixon replaced Johnson, Charles C. Edwards became the new FDA commissioner. Edwards soon had a long meeting with Jacob that went in the evening where he conveyed that his hands were tied and he could not take back any of what the FDA had done to DMSO, after which Jacob remarked "You know, Commissioner Edwards is a very good man."

Note: in 1972, Edwards asked the National Academy of Sciences (which typically sided with the FDA) to review all evidence of DMSO, but after two years, they concluded there was insufficient evidence of DMSO's safety or efficacy, and that it needed to remain an investigational drug until "well controlled trials" were completed.

At this point (as best as I can gather) the FDA became a bit less stringent on DMSO use and permitted its use in laboratory research which was done without the intent to treat an illness (e.g., to preserve cells).

Note: many researchers I've spoken told me they were trained to view DMSO as a deadly solvent they could never touch, but none of us could figure out when this started (e.g., it has to be extremely safe if cells can survive and be preserved in high concentrations of it). As best as I can gather, this was likely originated from the mixed messaging from the FDA at this time about DMSO (or may have been done to prevent lab accidents where DMSO caused lab workers to absorb another toxic chemical through their skin). In turn, some PhD's I know told me started using DMSO due the safety they observed with cells in the lab while others (who don't know many DMSO containing pharmaceutical products already exist) are convinced anyone who tells people to use DMSO is a murderer.

Simultaneously, DMSO (which was approved for veterinary use and easily available for industrial uses) began being widely bootlegged and sold throughout the country. For example, in the 1970s, numerous gas stations in the Midwest would have signs advertising "we sell DMSO" without making any medical claims.

At the same time this was happening, immense public criticism was building towards the FDA both for their inability to perform crucial regulatory steps (e.g., taking something bad off the market) and them simultaneously taking things away American's wanted. This in turn led to numerous committees investigating the FDA (which went far beyond Commissioner Lay's Kinslow report) and and key officials like Lay being kicked out in 1969, all of which were encapsulated a series of scathing articles that were published in the New York Times in 1977 (e.g., this, this, this and this one), which included passages such as:

But the agency, a bureaucratic waif that is responsible for overseeing a staggering $200 billion worth of products yearly, is not only whipsawed by the public controversy, it is so demoralized that a number of its top positions long go unfilled, so burdened that it cannot keep up with the explosion of consumer goods and so battered by lawsuits and outside pressures that its power to make its decisions stick is sometimes undermined.

Its bureaucratic problems have been so vexing that in just the last three years the agency has been the target of more than 100 Congressional investigations, 50 highly critical reports by the General Accounting Office and a series of internal inquiries despairing of ever setting the place right.

"The Congressional hearings in the last couple of years just about destroyed the agency," an agency official said privately. "The staff has been torn by dissension and strife, the morale is bad, there's no direction and stagnation has set in."

Indeed, after his departure as Commissioner of the agency in 1969, Dr. Herbert E. Ley said that "what the F.D.A. is doing and what the public thinks it's doing are as different as night and day." He complained further that during his 18-month tenure he had been under "constant, tremendous, sometimes unmerciful pressure" from drug industry officials.

As problems arise the agency becomes embroiled in thousands of cases, some of which develop into national controversies, and at times it seems that the agency lurches from crisis to crisis.

A year ago the Ford Administration was on the verge of releasing an economic-report containing scathing criticism of the agency's utility and effectiveness. The comments were later deleted for unexplained reasons.

Key administrative positions at the agency have sometimes gone unfilled for years and as a result various departments have been allowed to drift and founder through lack of leadership and authority.

Groups of dissident employees have trooped to Capitol Hill to testify against their superiors, plunging the agency into name-calling internal squabbles that remain unresolved.

The internal complaints have also concerned lower level employees, with some agency officials privately describing members of the F.D.A.'s professional staff as “retreads” and “has beens.” In testimony a year ago dealing with low morale at the agency, Dr. J. Richard Crout, director of the Bureau of Drugs, said this about the chaos in which he had found the agency:

“There was an enormous documents room . . . where some people said fights went on and there was absenteeism. There was open drunkenness by several employees, which went on for months. There was intimidation internally. I tell you that in my first year at F.D.A., even lasting longer than that, 1972-73, going to certain kinds of meetings was an extraordinarily peculiar kind of exercise.

“People—I'm talking about division directors and their staffs—would engage in a kind of behavior that invited insubordination. People tittering in corners, throwing spitballs—I'm describing physicians. People who would, let me say, slouch down in a chair, not respond to questions, moan and groan with sweeping gestures, a kind of behavior I have not seen in any other institution as a grown man.”

In summing up hearings of the two subcommittees, Senator Kennedy said last summer: “During the past two years these subcommittees have received testimony from 30 F.D.A. employees about the practices and internal management of the agency.

“These accounts included serious allegations of undue industry influence, improper transfers, details or removals, alteration of files and forced withdrawal of memoranda, bias toward drug approvals, improper manipulative use of advisory committees, disappearance of critical agency action memoranda into what the F.D.A. Commissioner termed ‘a mysterious bottomless pit,’ and incredibly slow moving ineffective enforcement and compliance programs with years elapsing between the discovery of a problem and the initiation of a solution, and inappropriate use of medical officer recommendations.”

Such disputes wear and divide further an agency that in recent years has been accused in lawsuits of incompetence or wrongdoing, has been investigated more than 100 times by Congressional panels and has had its intent challenged by liberals and conservatives. All the while, new products continue to be spewed out by the score, while the agency says it cannot monitor those already on the market.

The 766-page report of the group, headed by Norman Dorsen, a professor at the New York University Law Center, cited detailed cases of harassment of staff by F.D.A. officials, insubordinate behavior by professional staff and inordinate delays in making recommendations on the quality of new drugs.

Fortunately, at the same time the FDA was under intense scrutiny, DMSO’s advocates were able to continue making progress getting it to America.

DMSO in the 1970s

•In the early 1970s, Neurosurgery centers across America were desperately seeking new treatments for the rising incidents of head trauma (e.g., from falls or car accidents since seat belts were not in common use yet) and more than a

dozen head injury centers were being funded by the NIH to find a cure. Since those deaths typically occurred afterward due to brain swelling and there was no good way to lower intracranial pressure, Dr. Jack de la Torre at the University of Chicago proposed trying DMSO in 1971.

However, that March morning, only one thing was on my mind. Will the animal survive a severe brain trauma when given a new drug that had never been tested for that purpose? The odds were not good. We had already tested, as part of being one of seven Head Injury Centers in the U.S., dozens of worthless treatments reputed to benefit this usually lethal injury.

And, we would keep on searching when…on that morning, "looky, looky, look at that…!!" my technician's eyes rolled off the animal as I finished my intravenous administration of the drug. She pointed excitedly to the monitoring charts. The charts were going crazy, instead of cardiac collapse, respiratory arrest, a flat EEG and sure death, the heart rhythm stabilized, breathing returned, at first in gigantic gasps, then in steady, normal, breathing pattern. The electroencephalogram, monitoring brain cell activity, returned in full force and blood flow to the brain, which had ceased in the final stages of the injury, began flowing again and reviving the almost dead brain.

It was, as if the hand of God had somehow touched the animal's forehead. 'I don't believe it', I stammered. But it was true. I felt a tingling in my spine because this reawakening of a virtually dead animal had all the markings of a medical breakthrough.

The drug was dimethyl sulfoxide or DMSO for short, used years earlier as a pain lotion and anti-inflammatory agent.

What we would discover and publish about dimethyl sulfoxide in the next 8 years at the University of Chicago laboratories, would be pharmacological actions of a simple molecule that should have sent shock waves through the field of medical therapeutics as one of the most important drug discoveries of the century in treating devastating brain and spinal cord trauma. Instead, the

discovery, the potential for saving lives and the continued research that should have uncovered other uses for dimethyl sulfoxide and similar agents was quietly laid to rest in the coffers of forgotten medicine. It was a baffling paradox that defied a reasonable explanation and to this day still remains unclear to me.

Jack de la Torre then authored over 200 publications and 6 books, spoke at hundreds of conferences and testified to Congress in 1980 about his experiences. As I showed here, if his work had been listened to, millions of people would have been spared a lifetime of disability (or death) from strokes, spinal cord injuries, and head injuries.

•As covered here, research in South America demonstrated that DMSO with amino acids could treat Down Syndrome and a variety of other developmental disabilities in children. The incredible potential significance of the results prompted the FDA to send a delegation, including Stanley Jacob, and a physician from the NIH and Frederick Grigsby MD, an acting director at the FDA. Dr. Grigsby concluded remarkable improvements had definitely occurred and authored a 1972 report urging preclinical studies be conducted to investigate this potential medical breakthrough. Eventually, his report was referred to the National Institute of Child Health and Human Development Mental Retardation Research Committee, and during their August 4, 1977 meeting, they voted unanimously to begin funding those studies. Unfortunately, months later another committee somewhere in the government's health bureaucracy vetoed the first committee. As a result nothing was ever done to investigate this, despite the lead investigator from Chile (who cared deeply about helping these children) doing everything he could to assist the NIH in conducting those studies.

•Public outcry over the FDA's actions eventually prompted state legislatures to begin bypassing the FDA and legalizing DMSO in their state (e.g., Florida did this in 1977, and Oregon in 1979), which in turn led to many patients from across the nation flocking to these states for DMSO.
Note: I was unable to locate the Oregon law (or the Nevada or Oklahoma ones), but I found the Florida law, a Louisiana law, a Montana law, a Texas law, and

a Washington law that all protected the right of doctors in their state to prescribe DMSO (but not necessarily to publicly advertise that they did that). Additionally, legislators in other states (e.g., Connecticut) tried to legalize DMSO but were not able to get the laws passed. Likewise, at least 6 (unsuccessful) resolutions were introduced to Congress to legalize DMSO.

•In 1978, DMSO was approved for interstitial cystitis (painful bladder inflammation)—which to this day is the only thing it is FDA approved for. This approval was quite unusual, as a nice FDA committee was assigned to it and DMSO was not subject to the impossible standards it had been held to in other trials (instead a trial was composed of patients with chronic interstitial cystitis who had failed all other forms of treatment and their subsequent improvement on DMSO was deemed satisfactory to demonstrate efficacy).

Tragically, after the approval, it was discovered that the trial was poorly conducted (e.g., necessary records were missing, there was never IRB approval for it, informed consent was never obtained). However, after an investigation, the FDA concluded the investigators were careless rather than fraudulent, and the core things necessary for an approval had been done, so the approval was not revoked (as the FDA **does not like going back on any decision it's made**). Later when Senator Kennedy discussed that trial at a hearing, he emphasized that there were a series of collective failures amongst several people involved with this NDA—including the FDA medical officer and the drug sponsor's president (who admitted as such at the hearing).

Because of these embarrassing events, the FDA became even more resistant to DMSO research being conducted, and as such, very little research into new applications of DMSO was conducted henceforth.

•The March 5, 1979, issue of Medical World News reported that at least seven DMSO clinics have opened in Mexico to treat arthritis patients, (e.g., one in Tiajuana in 1979 treated 30,000 Americans who were bussed across the border each day for treatment, and charging $800 for three days of treatment, grossed over 20 million dollars).

Note: one reader shared: "My parents went to Mexico in the early 70s to get DMSO for my grandmother who had debilitating RA. Only thing that brought her relief."

•In September 1979, the FDA published a regulation abolishing its 1965 regulation which had banned general research in DMSO.

The Tides Shift

Mike Wallace (who had previously covered the Krebiozen on his show that preceded 60 Minutes) put together a segment about DMSO which aired on CBS on March 23, 1980 and again on July 6, 1980.

Note: after that show, well-known Governor George Wallace traveled across the country to find pain relief from DMSO administered by Dr. Stanley Jacob on July 1, 1980, and since it worked, the nation became even more aware of DMSO's incredible promise. Likewise, over the years many other TV programs (e.g., 2020 and the Donahue show) also hosted Jacob.

Because of how compelling this segment was (and the fact that DMSO could treat a variety of incurable pain conditions many suffered from) it ignited a national firestorm—which was likely deliberate on Wallace's part as the next day, a Congressional hearing took place to at last address why the FDA was stonewalling DMSO.
Note: after it aired, Jacob's University had to hire 12 phone operators to deal with the influx of calls. Likewise, over the years many celebrities (e.g., Muhammad Ali) came out to Oregon for Jacob's care.

Dmso Congressional Hearing
21.9MB · PDF file
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That entire hearing is fascinating to read through (as it shows how much remains the same to this day). The key points from it included:

• The roadblocks the FDA had put in place for the scleroderma approval were unconscionable, and the bar had long ago been met with adequate evidence from one of the top scleroderma researchers in the country (who testified).

•The FDA (e.g., Director Crout) kept on repeating the "not-controlled" studies line to justify their blockade on DMSO, while admitting their definition of "well-controlled" (needing a double-blind trial) was a regulation they created, not what the law required.

•That the "well-controlled" argument was absurd with DMSO because if there was a sprain or bruising, you would see DMSO's effect within minutes and likewise absurd since the FDA had now rejected IND's supported by 1,300-1,500 studies and over 100,000 patients.

I just wonder how much longer it is going to take before FDA listens to reason—Congressman Don Bonker

•That it was unacceptable the FDA had already dragged out legalizing DMSO for 16 years (especially since some of the representatives there had been working at this that whole time). The FDA of course promised they were treating DMSO fairly and would soon approve it if acceptable evidence was submitted to them—but when confronted with the fact they'd treated the scleroderma and interstitial cystitis applications entirely differently, refused to commit to having a new committee evaluate the scleroderma application.

•Despite not being approved in the US (except recently for interstitial cystitis) DMSO was in many other countries. Those included Canada for scleroderma, China for psoriasis, Great Britain and Ireland for shingles when mixed with idoxuridine, topically for many conditions in Germany, Austria, and Switzerland, through a variety of routes in many parts of South America, and since 1971 in the Soviet Union.
Note: not all of these countries were mentioned in the hearing.

•That many more dangerous drugs remained legal and had never been targeted by the FDA.

•Many compelling cases were presented (e.g., severe spots injuries having miraculous recoveries, fatal head injuries recovering, a child with Down Syndrome whom both her teachers and dentist testified had improved dramatically) along with many of the more typical cases of crippling arthritis or chronic pain experiencing a life changing improvement with DMSO and begging the government to legalize it.

Note: recently a reader who decided to try the DMSO protocol for her two year old Down Syndrome daughter shared a similar story (e.g., in two weeks she became a different child, started to verbalize, started crawling and is getting close to sitting on her own).

•The committee surveyed doctors for professional sport's team doctors, veterinarians, and rheumatologists, and found a significant portion of each group used DMSO and believed it was safe and effective for human use.

•That there was minimal concern DMSO would be abused and overused because the odor it created made patients only take it when they really needed it.

•That the current design of the FDA encourages them to deny drug applications, that the time involved for new drug approval has risen from 2.5 years to 10 years and that in 1958, one new drug needed 430 pages of submissions while in 1968, a new anesthetic require documentation totaling more than 72,000 pages and 176 volumes.

•The vice president of the Arthritis Foundation stated that (despite having testified against Florida legalizing it) they were open towards DMSO, but it was an "unproven remedy" and that it was important to protect the public from quacks (e.g., they'd aggressively criticized DMSO because it caused patients not to use "proven" remedies). When pressed, he admitted they had not done an independent study of DMSO and also stated they wanted to do everything they could to support that independent study being done. However, if you look at their website (45 years later) nothing has changed on this and that study never got done.
Note: as I illustrated here with the National Multiple Sclerosis Foundation,

many "non-profits" for patients with specific diseases are primarily focused on helping pharmaceutical companies produce drugs and in many cases will actively block economical therapies which treat the disease and hence undermine their business model.

Following this hearing, the Inspector General of the Department of Health and Human Services began conducting an investigation into the regulatory procedure DMSO has undergone at the FDA but nothing changed on the FDA's end.

On July 31 1980, a second hearing was held by the Senate. There many of the same themes were echoed (e.g., the FDA containing to stonewall DMSO, the issues with the FDA claiming there still "wasn't enough evidence, the need to balance keeping dangerous drugs off the market with allowing important drugs to enter the market and many compelling DMSO testimonials such as those from professional athletes). Because of that, I will only quote Senator Kennedy's opening statement:

Today, the Senate Health Subcommittee will hear the story of DMSO. It is a sad story, sad because hundreds of thousands of Americans suffering from a variety of painful and often disabling diseases have placed their hopes in this drug, and yet after 18 years we still do not know whether or not those hopes are misplaced. It is a story of failure—failure of the bureaucracy at the Food and Drug Administration to handle the drug appropriately, to expedite a complete and timely review, to detect serious deficiencies in scientific data submitted on the drug's behalf, to satisfy the public that it is doing all it can to develop definitive answers; failure of the private sector to conduct competent and acceptable scientific research on the drug, to adequately monitor the quality of work being done, and to cooperate fully with the FDA investigations of possible wrongdoing. This failure of both Federal and industrial responsibility has had a very high cost: the erosion of public confidence in the ability of government—in this case, the FDA to work, to respond to human suffering, to meet people's needs.

As a result, over 100,000 Americans use DMSO each year. They get it however they can: in some cases legally, in some cases not; in some cases in forms designed for human use, in some cases not. A tiny minority of these people use DMSO for its one legitimately approved purpose, but in most cases they use it for unapproved purposes. Some rub it on their skin; some drink it: some are treated intravenously. By the tens of thousands. Americans are making individual judgments to try DMSO for arthritis, for ankle sprains, for neurological trauma, and for a variety of other reasons. Others are desperate to try it. And many of those who use it believe that they are helped, and tell their friends. and the use of the drug spreads. We will hear some of these case histories this morning, and they are impressive.

•On January 11, 1981 a Florida newspaper report [page 6] discussed a doctor in San Diego stating DMSO saved the lives of 11 people with severe brain injuries who would have otherwise been expected to die.

•On January 15 1981, the New York Times discussed two Johns Hopkins researchers intent on testing DMSO for the treatment of myasthenia gravis because of extremely promising discoveries they'd accidentally made in the lab.

•On February 5, 1981, ABC's Good Morning America had a segment on DMSO (I have not been able to find a copy of) which where David Hartman interviewed both Robert Herschler and Richard Crout (the Director of the FDA's Bureau of drugs). In addition to what I quoted earlier in the market, Herschler stated that DMSO was being stonewalled by a "bureaucratic Mickey Mouse" that was hurting America. Crout in turn objected to this and stated:

It's true that there's been quite a bit of initial inquiry—scientific dabbling—certainly a lot of patients have used DMSO.

There's no question about that! But it hasn't gone through the rigorous, disciplined, controlled kind of evaluation that all the drugs do.

I think there are probably two main reasons. One is that it has really not

attracted the attention of a number of experts. It's not dramatically effective, and a number of people have recognized that. Secondly, I think the manner of its promotion has tended through the years to scare off the establishment in science. Regrettably! A lot of people who ordinarily would be engaged in drug research and study new drugs simply have neglected DMSO.

Those tests are to be done by the promoters or sponsors of the drug. We are in the position of approving the work once it's done. Carrying the ball on behalf of the drug is what the drug companies ordinarily do. And, indeed, some work is going on for DMSO today that is of high quality. We look forward to having those data in a year or so. I think there won't be much change in the coming year from what you see now, but the current fad [for bringing DMSO to the people] will wane and a year or two from now we'll have the data we need.

Then when pressed on if DMSO was dangerous, Crout stated

It's really quite safe when put on the skin. I don't believe I would raise scare tactics about when people put it on and use it for a few days. Anybody who uses it for a month or more in doses of an ounce or more is getting into the unknown. There simply is not much experience with its toxicity there.

•On February 14, 1981, 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 denounced the FDA's absurd embargo on it at a national AMA 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.
Note: Bowen was also the country doctor of a reader's grandmother.

Reagan's advisors had searched for highly qualified scientists who understood the problems with regulations. But they wanted regulators who were people-conscious first, then regulation-conscious. They didn't find them. Neither did George Bush. Instead, David Kessler, M.D., J.D., [1990-1997] has turned out to be the most restrictive enforcer of Gestapo-like rules coming out of the FDA.

•On April 27, 1981 an appeals court upheld a 1978 ruling that the FDA's attempts to stop a doctor from using chelation therapy to treat heart disease (an effective but "off-label" use for EDTA) were not legal as (despite what bureaucrats like Goddard wished) the FDA did not have the statutory authority to determine how doctor's practice medicine. More recently, the FLCCC was able to prove in court that the FDA exceeded their statutory authority by pressuring doctors to not use ivermectin off-label to treat COVID-19.

•In 1986, the band Dead Kennedy's made a song about the government's oppression of D.M.S.O.

•By 1991, over 3,000 clinical studies had been carried out with DMSO involving over 500,000 patients. DMSO has the widest range of therapeutic applications of any single chemical.

•On May 6 1992, 1992 F.D.A. agents, dressed in bulletproof vests, burst into Jonathan Wright's natural clinic during normal business hours and commanded clinic employees to freeze. The agency said the clinic was raided because it made illegal drugs, including "vitamin-mineral concoctions," that were being injected into patients. A patient caught the incident on video, and that video became a national news story (partially because of how highly regarded Dr. Wright was in the natural medicine field).

Note: I periodically reference Jonathan. Wright's work here (e.g., for acid reflux) as he was one of the leaders in natural medicine who was responsible for much of what now exists.

These events in turn, created the legislative pressure to pass the Dietary Supplement Health and Education Act of 1994 (DSHEA) which exempted naturally occurring substances from FDA regulations. As DMSO was a natural substance, this effectively ended the FDA's ability to prohibit the use of DMSO. Sadly, while it is now widely available, most of its uses are entirely forgotten.

Note: in a previous article, I discussed the incredible properties of GHB, a naturally occurring sleep aid that induces restorative sleep that was

transformative for many individuals (e.g., with insomnia, chronic fatigue, fibromyalgia, or a general weakening of the body with age) and widely used by body builders (since was both safe and effective for building muscle).

The FDA targeted it with the same police-state tactics they used against Wright (presumably because it was vastly superior to any sleeping pill on the market and thus would have destroyed that billion dollar market), but gradually were shut down by the courts because they did not have the legal authority for those raids. In turn, to get around the restrictions DSHEA put on them, they created a campaign to portray GHB as a date rape drug (despite the fact it didn't really work for that and there was no evidence of it being used in that way) which the media then amplified into a national hysteria. That in turn, was used to get Congress to pass a law outlawing GHB in America (except for patients with narcolepsy). While abhorrent, this story illustrates how important DSHEA was in preventing the routine abuses committed by the FDA.

Finally, while the FDA still has not approved DMSO (except for 50% DMSO injected directly into the bladder for interstitial cystitis), a variety of pharmaceutical products exist that use DMSO as a "vehicle" or "additive" such as Pennsaid (45% DMSO plus 1.5% diclofenac), a Lupron DMSO implant used for prostate cancer, Onyx (a polymer used to patch ruptured blood vessels) and DMSO preserved umbilical cord blood stem cells.

What Can Be Done?

Based on what happened, I believe the FDA's war against DMSO went through the following stages:

•It began out of laziness (because they didn't want to deal with all the drug applications for DMSO).

•It transformed into a state of fear they would lose control over medicine in the United States (since so many people were using it for everything imaginable).

•It was taken advantage of to justify a power grab.

•This significantly escalated by connecting it to the war on drugs in the 1960s.

•Eventually, there was so much inertia behind the policy that by the time reasonable people took over the FDA, they had no power to reverse the precedent previously put in place (as people in the government will never admit they were wrong).

So, while I believe the pharmaceutical industry would not want DMSO to enter widespread use now (as it would cause them to no longer be able to sell many of their unsafe and ineffective drugs like NSAIDs), the pharmaceutical industry wasn't actually responsible for all of this.

From thinking this over for the last month, I've concluded the following (much of which matches many of those who came before me thought):

1. While I disagree entirely with the conduct of the FDA commissioners discussed here (and many others), I feel all of them did want to do the right thing (e.g., Kessler did a variety of very good things while at the FDA and after he left), but for either personality reasons or the sheer challenge of the task they were confronting, they simply did not act appropriately in their position. In turn, I believe their actions highlight why you simply cannot give people too much power as it will always be misused.

2. Getting a good balance between keeping dangerous products off the market and not cutting the public's access to questionable products they want is a very challenging task—especially if a large lobbyist will immediately vilify that action in the press and get the White House on Congress to pressure the FDA to rescind that action.
Note: the very first FDA commissioner wrote an illuminating book about how despite his best efforts it was impossible for him to protect the public safety by

removing dangerous products from the market (e.g., he felt many of the additives in our food were not fit for consumption).

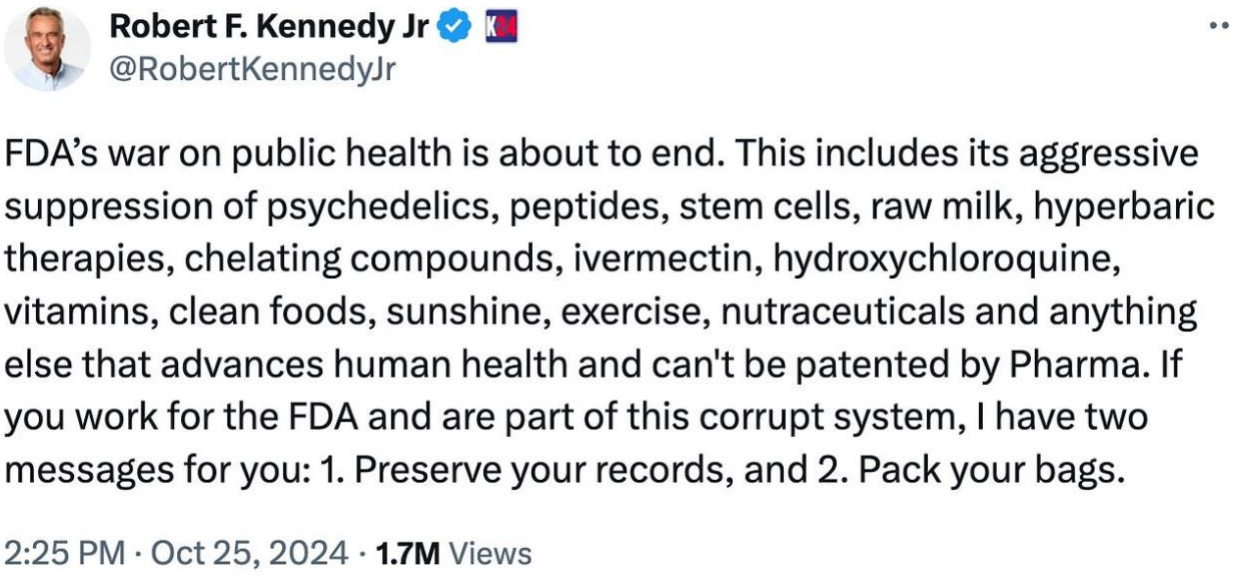
3. Fundamentally, the FDA's task (ensuring all food and drug products on the market are safe and effective) is simply too much for them to do properly. Because of this, a "selective prosecution" type situation is created where the FDA will prioritize its focus on what's the easiest to do (e.g., attacking natural health products that do not have a large corporation behind them or delegating the responsibility for evaluating drugs entirely to a large pharmaceutical company).

4. The FDA's justification for existing (and having all its power) is that it protects the public from harmful substances. The fact they could not do that with the mRNA vaccines (or the HPV vaccines) when it was abundantly clear those vaccines were not safe. They should have never been released. Both indicate that the justification for the FDA's power is gone and that the "selective prosecution" situation it's been forced into (which prevents it from criticizing products from large corporations) makes it impossible for the FDA to do the core function it exists for.

5. Situations like this illustrate why the recent Chevron defense Supreme Court ruling(which took away Federal Agencies ability to have courts support them interpreting ambiguity in Congressional laws as they saw fit). For example, the FDA's declaration that a trial for a drug approval must be double-blind to "well controlled" could now be challenged in court, and likewise, many of its other regulatory overreaches could as well (in addition to those that were so egregious courts already overturned them).

In turn, beyond a protracted battle in the courts, I can see four solutions for the FDA's conduct.

The first is to pray someone with the political support and the will to do it will clean out the agency. I always felt this was impossible, but due to a very unusual confluence of events and many brave people stepping forward to do it, that once in a lifetime opportunity exist.



Really agree with RFK about these—especially since Biden's FDA banned stem cells.

The second is that the FDA cannot be the sole arbiter of efficacy as there are so many therapies that have decades of strong evidence behind them (e.g., ultraviolet blood irradiation, chloride dioxide or DMSO) that the FDA simply will not look at—while in contrast highly dangerous and totally ineffective drugs frequently get approved (e.g., the recent Alzheimer's monoclonal antibodies). Rather, some type of parallel approval track needs to be created (e.g., if a petition gets at least 100,000 signatures, physicians can begin a community based trial for a therapy which then is approved by an entity separate from the FDA that must adhere to objective standards for granting that approval). Put differently, as the years have gone by, the FDA has gotten more and more powers, but simultaneously its failing have magnified. In contrast, passing the DSHEA act (which directly reined in the agency's power) was one of the most useful things Congress has ever done to fix this situation.

The third is that the FDA's responsibility needs to be shifted to safety, not efficacy as efficacy is simply too subjective (i.e., an effective drug can easily be made to look ineffective while an ineffective one can almost always be made to look "effective").

The fourth is that the responsibility for monitoring safety has to be shared with the public (and likely competing AI systems which routinely analyze publicly available datasets). One of the key lessons we have gotten from COVID is that the regulators did not have the ability to accurately monitor a relatively small number of COVID-19 related products (e.g., remdesivir or the vaccines) for safety signals, which in turn means they **absolutely do not have the ability to accurately monitor the thousands of foods and drugs on the market**.

Conclusion

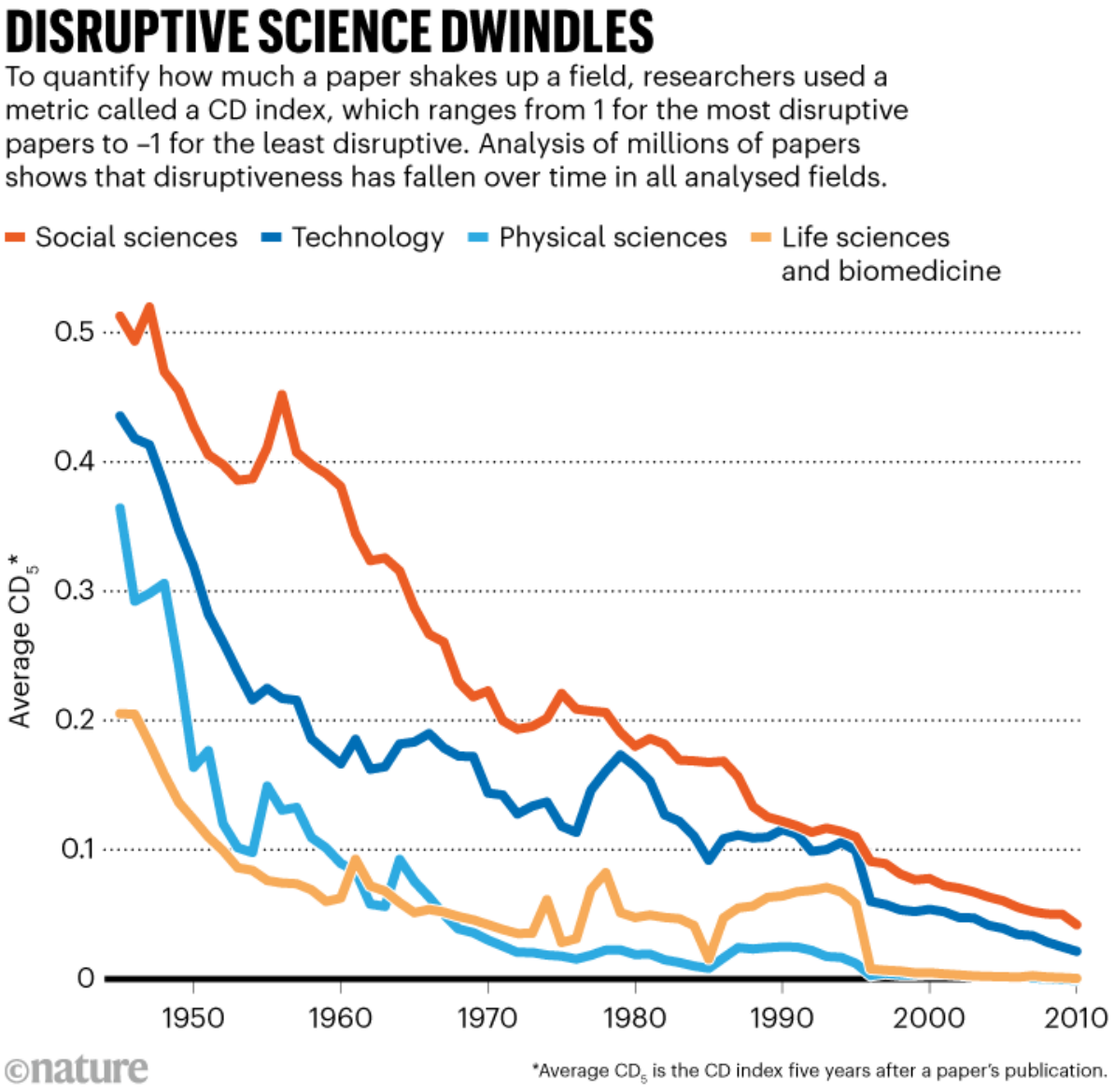
Now the difference between a therapeutic principle and a drug is that a drug is useful in treating a disease or a dozen diseases or even 100 diseases. But a therapeutic principle is an entire new means of treating illness. The basic therapeutic principle of DMSO is that one can treat disease by altering what normally goes into and comes out from cells. Because we are not dealing with a drug in the conventional sense, this is one of the reasons that DMSO is not available today. The people at the FDA, unfortunately, do not understand this concept. I fear that if the situation continues the way it is with people in charge at the FDA and the current division in charge of it, with this group not really understanding this compound, we will not see DMSO available for a fraction of its potential within this century. — Stanley Jacob at the 1980 Congressional Hearing

When I study the history of medicine, I am always struck by the fact many of the most remarkable medical discoveries were found at a time when science and technology was much less advanced than it is now.

This I would argue is in large part due to the fact a very different scientific culture existed in the past; one where people had the freedom to explore unorthodox ideas and those that worked had a real chance to take off.

In contrast, we now exist in a society where anyone who deviates from the established narrative is quickly cut off from their economic livelihood (e.g., dissidents simply cannot get the grants they depend upon for research and

doctors will often lose the ability to practice medicine), and like Goddard envisioned, they are all frightened into compliance.



In turn, much of the science we create now isn't that useful; rather its just small refinements of an existing paradigm (which won't upset anyone) rather than a new therapeutic (or scientific) principle that radically improves our lives.

Note: famous scientists have said that the discoveries they made which changed the entire world would simply not be possible in today's research climate—and given how rare paradigm shifting discoveries are now, I am inclined to believe that (e.g., most of the really useful new ideas I come across now arise from observant colleagues discovering them in practice rather than from large research endeavors) .

Similarly, many doctors believe the biggest mistake their profession made was giving their power away to corporate medicine where they are forced to prioritize how their employer wants them to treat their patients over what's actually it their patient's best interests (e.g., consider what we saw throughout COVID-19). Here, I would argue that shift actually began with Goddard's work to whip the entire medical profession into line, and that what we saw throughout the pandemic was simply the next escalation in a multi-generational plan.

DMSO Transforms The Treatment of Infectious Diseases

How DMSO can treat many challenging infections

A MIDWESTERN DOCTOR

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· PAID

Story at a Glance:

•Dimethyl Sulfoxide (DMSO) is a remarkably safe naturally occurring substance that has a variety of remarkable properties that make it well suited to treating a variety of challenging medical conditions (e.g., pain, injuries, wounds, strokes, spine injuries, autoimmune conditions, cancer, and internal organ diseases).

•DMSO has broad antimicrobial properties, protects the body from microbial toxins (e.g., from C. diff), eliminates antibiotic resistance, and serves as a vehicle that can bring antimicrobials deep into the body and treat otherwise inaccessible infections.

•DMSO significantly enhances the treatment of many common bacterial infections (e.g., of the head, mouth, and skin) and many severe bacterial infections that require hospitalization (e.g., tuberculosis, sepsis, peritonitis, severe lung infections, osteomyelitis). In many cases, this has allowed an individual requiring an amputation of a chronically infected area to instead fully recover.

•DMSO has significant antiviral properties, which have most extensively been studied for herpes and shingles (both of which it excels in treating), but also in a variety of other conditions (e.g., feline panleukopenia, one of the most deadly conditions cats face.

•DMSO has significant value in treating challenging fungal and parasitic infections. Additionally, evidence suggests its utility in treating cancer and autoimmune disorders arise from DMSO's unique antimicrobial properties.

•In this article, we will review the body of evidence showing DMSO's remarkable contributions to the treatment of infectious diseases and provide guidance on how DMSO can be used to treat many of the conditions listed in this article.

Introduction

DMSO is a remarkably safe and naturally occurring substance (provided you use it correctly) that rapidly improves a variety of conditions medicine struggles with — particularly chronic pain. For reference, those conditions included:

Strokes, paralysis, a wide range of neurological disorders (e.g., Down Syndrome and dementia), and many circulatory disorders (e.g., Raynaud's, varicose veins, hemorrhoids), which I discussed **here**.

A wide range of tissue injuries such as sprains, concussions, burns, surgical incisions, and spinal cord injuries (discussed **here**).

Chronic pain (e.g., from a bad disc, bursitis, arthritis, or complex regional pain syndrome), which I discussed **here**.

A wide range of autoimmune, protein, and contractile disorders such as scleroderma, amyloidosis, and interstitial cystitis (discussed **here**).

A variety of head conditions, such as tinnitus, vision loss, dental problems, and sinusitis (discussed **here**).

A wide range of internal organ diseases such as pancreatitis, infertility, liver cirrhosis, and endometriosis (discussed **here**).

A wide range of skin conditions such as burns, varicose veins, acne, hair loss, ulcers, skin cancer, and many autoimmune dermatologic diseases (discussed **here**).

In turn, since I started this series, it struck a cord and has now been seen by millions of people, and I have received over 1400 reports of remarkable responses to DMSO many readers have had (which can be read **here**).

This begs an obvious question — if a substance capable of doing all of that exists, why does almost no one know about it? Simply put, like many other promising therapies, it fell victim to a pernicious campaign by the FDA which kept it away from America despite decades of scientific research, Congressional protest, and thousands of people pleading for the FDA to reconsider their

actions. Consider for example, this 60 Minutes program about DMSO that aired on March 23, 1980:

DMSO and Infectious Diseases

DMSO has a variety of unique properties that make it incredibly well suited to addressing microbial infections (e.g., bacteria, fungi, viruses, and parasites).

These include:

•While non-toxic, it has an antiseptic effect that is harmful to microorganisms, especially the smallest ones (mycobacteria, cell wall deficient bacteria, and viruses). This property appears to be the most beneficial for herpes, shingles, and other complex conditions, which I believe have a microbiological component (e.g., cancer and autoimmunity).

•It can remove the antibiotic resistance of bacteria. This is particularly helpful in widespread problematic infections that have gradually developed a resistance to many existing antibiotics (e.g., tuberculosis) and challenging infections that are not responding to antibiotics (e.g., ones that would otherwise require an amputation).

•It can further increase the sensitivity of already susceptible microorganisms to antimicrobial agents.

•It can deliver antimicrobial agents to areas that are typically difficult to reach (e.g., deep in a bone) and also directly to regions that would otherwise require a systemic application of the medication.

•It can increase circulation to many parts of the body, something which is often critical for resolving illnesses (as a healthy blood supply allows the immune system to enter and heal diseased areas). Likewise, pretreatment with DMSO has been shown to increase the immune system's ability to resist a subsequent infection.

•Much in the same way DMSO protects cells from a wide variety of lethal stressors, it can also protect them from the harmful effects of bacterial toxins (e.g., with the most pertinent applications studied being for sepsis and clostridium difficile). Likewise, it can also mitigate the toxicity of antimicrobial agents taken for a prolonged period.

Many of these properties are exceedingly unusual and can completely transform the practice of medicine. I will now provide much of the data substantiating the above claims.

Note: unless otherwise specified, all pharmaceuticals listed here are antibiotics.

Shingles and Herpes

Since many people struggle with Herpes (HSV-1 or HSV-2) and Shingles (Herpes Zoster), especially the pain which follows shingles (known as post-herpetic neuralgia or PHN), DMSO has been extensively studied for these uses. For instance, as discussed previously, there was a brief boom in DMSO research (during the 1960s and 1970s many pharmaceutical companies realized DMSO was a remarkable drug for them to sell) that was then abruptly shut down by the FDA banning virtually all DMSO research so they would not have to deal with the influx of new drug applications (as DMSO had so many remarkable uses).

Immediately prior to this ban, Merck for example, which had made significant investments in testing DMSO, sent out a guidance to all of their investigators detailing what they had learned after roughly a year of testing and over 4,000 patients which included:

Herpes Zoster has responded most favorably.

DMSO in turn, has been repeatedly found to treat herpes throughout the body (e.g., on the face and the genitals), shingles, and post-herpetic neuralgia.

Note: DMSO has also been found to be quite helpful for aphthae (canker sores).

DMSO alone works for these ailments, but is even more effective when combined with an antiviral, particularly when combined with 5-iodo-2'-deoxyuridine (IDU), an antiviral that has poor penetration into tissues

For example, at a 1980 Congressional Hearing, one researcher, Dr. Scherbel of the Cleveland Clinic (a highly respected dermatologist), was asked if DMSO could be used for shingles. He stated that they'd found acute shingles responds to DMSO alone in a high percentage of patients, that acute vesicular lesions dry up rapidly, and that with the application of DMSO, they never saw post-herpetic neuralgia follow shingles (which is a major complication of the disease).

Note: Stanley Jacob also mentioned that while the FDA was stonewalling DMSO, DMSO plus IDU was an approved topical prescription in England and Ireland. Sadly, it is still not available in North America.

Herpes Simplex

A 1965 study used 1% IDU in 90% DMSO (and 10% distilled water) in 7 patients with severe cutaneous Herpes simplex infection and noted significant improvement in all cases, with the only side effect being slight skin irritation from the solution.

After preliminary research suggested 5% and 10% idoxuridine (IDU), an antiviral when mixed with 100% DMSO showed promise in treating primary herpes in guinea pigs, a 1966 RCT (randomized controlled trial) of 21 patients with recurrent herpes was conducted. It found DMSO halved the durations of herpes, and when given with 5% idoxuridine, cut them into a third (whereas idoxuridine alone did not do anything).

TABLE I.—*Results of Treatment of Herpes Simplex Virus with 5% Idoxuridine in Dimethyl Sulphoxide*

Case No.	5% Idoxuridine in Dimethyl Sulphoxide			Dimethyl Sulphoxide			
	Arrest of Lesion, Dry Crust Only	Complete Healing	Average Normal Duration Without Treatment	Case No.	Arrest of Lesion; Dry Crust Only	Complete Healing	Average Normal Duration Without Treatment
1	1	6	21	3	6	12	14
2	1	5	7	5	1	3	10
6	1	3	11	7	1	3	11
9	1	4	14	8	1	9	10
10	3	4	5	12	6	7	8
11	1	5	7	13	3	5	10
16	1	3	10	14	2	6	6
17	1	2	10	15	2	3	10
				15A	2	4	10
18	1	1	7	19	1	2	10
21	1	2	6	20	2	6	6
Average duration	1·2 days	3·5	9·8		2·45	5·45	9·55
S.D. ..	0·63	1·70	4·78		1·86	3·01	2·25
S.E. ..	0·20	0·53	1·51		0·56	0·91	0·68

Additionally, there were no recurrences within 6 months in the DMSO IDU group (whereas 1.7 on average were expected) and only 4 recurrences happened in the 11 person DMSO only group.

•A 1967 study found DMSO plus 5-IDU was more effective for treating early severe herpes simplex lesions than DMSO alone).

In 1972, a physician reported success using 100% DMSO and 5% IDU to treat severe herpes simplex in 5 patients.

A 1983 study found that DMSO effectively brought acyclovir (ACV) into the skin, caused a moderate reduction in herpes lesions, and dramatically reduced them when combined with acyclovir.

Treatment*	Median Number of Lesions on Day 4 at One of the Treatment Sites (range)
Untreated[s]	29 (17–34)
PEG[mb]	28 (16–44)
DMSO[r]	25 (12–36)
5% ACV/PEG[mb]	23 (6–37)
5% ACV/DMSO[r]	5 (1–23)

Note: DMSO also helps herpes fever blisters, and DMSO with IDU has been reported to be effective in treating HSV whitlow (herpes on the fingers).

A 1990 RCT gave 80% DMSO mixed with 15% IDU to 301 immunocompetent female patients experiencing a recurrence of genital herpes, which reduced the mean duration of pain by 1.3 days and the healing time to loss of crust by 1.7 days. When only classic herpes lesions (vesicle, ulcer, or crust formation) were evaluated, a greater effect was seen (the duration of pain was reduced by 2.6 days and the healing time to normal skin by 2.3 days).

A 2002 cell study found 0.65% DMSO reduced herpes viral replication by 50% (while 1% mostly stopped it) and did so in a manner suggesting it inhibits multiple viral replication points, suggesting that this inhibitory effect was synergistic and that it could affect both early and late stages of an infection. Specifically, DMSO reduces the virus's ability to infect cells, markedly inhibits viral DNA replication, and blocks the transcription of many HSV-1 genes. *Note: this open access study provides a very detailed analysis of how DMSO inhibited each aspect of herpes viral replication.*

Note: while DMSO has not been studied for human viral encephalitis (e.g. from herpes), it has been used as a therapy for equine herpesvirus-1.

Shingles and Post Herpetic Neuralgia (PHN)

In 1967, a German investigator reported DMSO yielded generally good results in 10 of 11 shingles and PHN cases.

A larger 1967 study of 4180 patients included a few shingles patients who had a positive response to DMSO.

	No. of Cases	Maximum Period of Treatment (Months)	Partial Remission of Symptoms	Complete Remission of Symptoms	Failures
3. Herpes zoster	3	1	1	2	0
4. Peripheral neuritis segmental neuralgia	9	2	2	6	1

Two 1970 RCTs showed that both 5% and 40% IDU in DMSO were effective over 4 days of repeated applications in reducing shingles, but that 40% IDU was more effective (as was continuous rather than intermittent treatment). With both 5% and 40% IDU, there was a large reduction in the duration of pain (likely due to DMSO's ability to eliminate pain), whereas, in the 40% IDU group, there was also a significant reduction (30%) in the time the lesions took to begin healing was seen, along with how long the vesicles took to dry (28.6%), and how long it took to complete (35%).

The patients were delighted, for the pain disappeared within a median of two days.

Note: the authors previously tried using IDU without DMSO for herpes simplex and saw no benefit from that treatment.

In 1971, Dr. William Campbell Douglass (a pioneer in the integrative medical field) conducted an unpublished study (presented in this book) that showed shingles was highly responsive to DMSO (73.3% had a good response to treatment and 13.3% had a fair response to treatment), and that the sooner DMSO is used, the better the response will be.

Table 12.1 *DMSO Study on Herpes Zoster (H.Z.) and Postherpetic Neuralgia (P.H.N.)*

					RESULTS			
William C. Douglass, M.D.								
Patient	*Diagnosis*	*Duration*	*Location*	*RX*	*Good*	*Fair*	*Poor*	*Inconclusive or Unknown*
1	Herpes Zoster w/Neuralgia	7 days	T-10	DMSO 90%	X			
2	Post Herpetic Neuralgia	I½ yrs	T-5	DMSO 90%			X	
3	P.H.N.	14 days	T-10	DMSO 90%	X			
4	H.Z. w/Neuralgia	7 days	T-14	DMSO 90%	w/Decadron	X		
5	P.H.N.	4 mo.	T-8	DMSO 70%		X		
6	P.H.N.	14 days	T-12	DMSO 90% w/Decadron		X		
7	P.H.N.	3 wks	T-5	DMSO 50% w/Decadron		X		
8	H.Z.	3 days	5th cranial	DMSO 50% w/Decadron		X		
9	H.Z.	7 days	L-5	DMSO 90% w/Decadron		X		
10	H.Z.	4 days	L-5	DMSO 90%	X			
11	H.Z.	5 days	T-5	DMSO 50% w/Decadron		X		
12	H.Z. w/Neuralgia	7 days	T-6	DMSO 9% w/Decadron		X		
13	H.Z. w/Neuralgia	4 days	C-5	DMSO 50% w/Decadron		X		
14	P.H.N.	6 mo.	T-5	DMSO 90% w/Decadron		X		
15	P.H.N.	30 days	T-4	DMSO 90%	X			
16	P.H.N.	5 mo.	5th cranial	DMSO 50% w/Decadron		X		
17	P.H.N.	5 mo.	T-4	DMSO 90% w/Decadron		X		
18	H.Z.	5 days	L-l	DMSO 90% w/Decadron		X		
19	H.Z.	2 days	T-3	DMSO 90% w/Decadron		X		
20	H.Z.	5 days	T-7	DMSO 90%				X
21	P.H.N.	8 wks	T-12	DMSO 70%	X			
22	Neuralgia Post Traumatic	6 mo.	5th cranial	DMSO 70% w/Decadron		X		
23	H.Z.	1 day	L-4	DMSO 90% w/Decadron		X		
24	P.H.N.	4.5 yrs	Left occipital N.	DMSO 70%	X			
25	P.H.N.	3 yrs	T-8	DMSO 90% w/Decadron				X
26	P.H.N. w/Neuralgia	3 wks	T-10	DMSO 70%	X			
27	H.Z. w/Neuralgia	2 wks	T-7	DMSO 70%	X			
28	Neuritis	1 mo.	Dorsum Rt. Foot	DMSO 70%			X	
29	H.Z. w/Neuralgia	1 wk	T-4	DMSO 70%		X		
30	H.Z. w/Neuralgia	2 wks	T-4	DMSO 70%	X			
31	P.H.N.	18 mo.	L-5	DMSO 70%			X	
32	P.H.N.	4 mo.	L-l	DMSO 90% w/Decadron		X		
33	H.Z. w/Neuralgia	2 days	Ulmar N.	DMSO 90% w/Decadron		X		
34	P.H.N.	2 mo.	C-7	DMSO 70%	X			
35	P.H.N.	2 wks	L-l	DMSO 90% w/Decadron		X		
36	H.Z. w/Neuralgia	1 wk	5th cranial	DMSO 50%		X		
37	P.H.N.	l½ yrs	T-7	DMSO 90% w/Decadron		X		
38	H.Z. w/Neuralgia	6 days	T-10	DMSO 70%	X			
39	P.H.N.	10 days	T-5	DMSO 90% w/Decadron		X		
40	H.Z. w/Neuralgia	2 wks	T-5	DMSO 70%	X			
41	P.H.N.	4 mo.	5th cranial	DMSO 50%	X			
42	H.Z. w/Neuralgia	10 days	T-8	DMSO 90% w/Decadron		X		
43	P.H.N.	3 yrs	5th cranial	DMSO 50%	X			
44	H.Z.	1 wk	T-l	DMSO 90%	X			
45	P.H.N.	3½ yrs	T-l	DMSO 90%		X		

Note: there are other methods to use DMSO to treat herpes which can give an even faster response.

A 1974 RCT of 118 patients with shingles found 100% DMSO and 5% IDU applied every 4 hours for 4 days. It significantly shortened the vesicular phase, healing time, and duration of pain, and it significantly improved post-herpetic neuralgia. Additionally, no greater benefit was seen with 25% IDU, and the only side effects (seen in 2 patients) were transient tender redness in three patients and "urticarial" edema with dermographia.

A 1979 study found that 40% DMSO plus IDU created a small but significant improvement in the healing of shingles.

A 1981 trial gave 46 shingles patients either DMSO or DMSO mixed with 5% IDU. Compared to DMSO alone, DMSO plus IDU significantly reduced the time it took pain to improve, and significantly fewer new vesicles developed.

A 1992 RCT of 171 patients with non-severe shingles (which had been present for less than 4 days) found that compared to acyclovir, 40% DMSO topical mixed with IDU was a superior treatment for how quickly all vesicles dried, how long moderate-intense pain, hyperaesthesia and itching lasted, and how long reducing medications were required, how frequently new vesicles appeared, and in preventing post-herpetic neuralagia.

Note: Stanley Jacob has also reported being able to treat chronic post-herpetic neuralgia (which had been present for over 2 years).

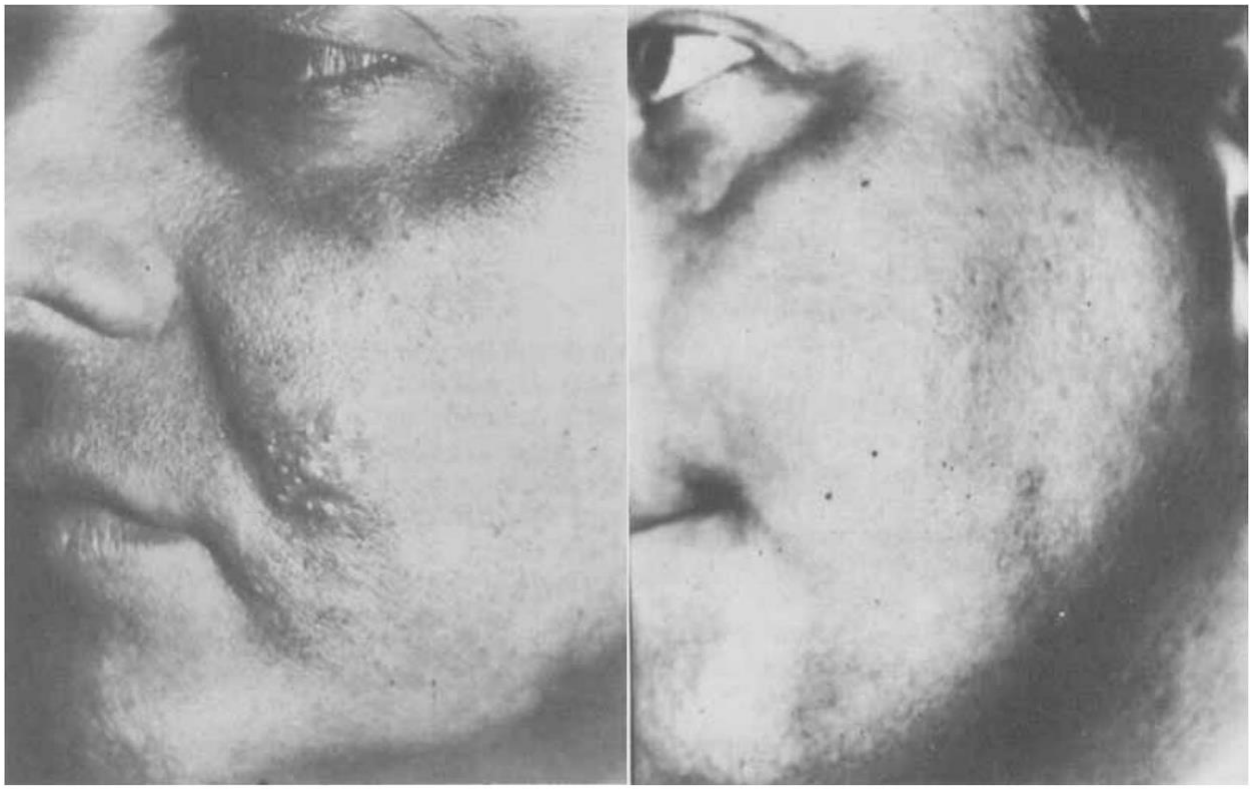
Combined Studies

A 1969 study gave DMSO to 37 patients with herpes simplex, shingles, chickenpox, and smallpox vaccine rashes, all of whom healed in approximately one-third of the normal time. Newer cases healed rapidly, while older herpes simplex cases took longer to heal and tended to recur (although if the recurrence was treated promptly, it healed quickly, and there was no future recurrence). Post-herpetic neuralgia sometimes occurred in shingles patients, but it was

shorter than normal (of the 11, one had it for 3 weeks, one for 7 weeks, and one for 6 months).

A 1975 study reported on 152 patients with a wide range of dermatologic conditions who received a topical DMSO spray (with no side effects except temporary intense pain in two of the recipients).

•Shingles (7)—all 7 had dramatic results within 48 hours (often completely disappearing).
•Herpes simplex (4 on the penis, 4 on the lips, 2 on the cheeks)—all 10 had dramatic results within 48 hours (often completely disappearing).



A case of Herpes 48 hours before and after DMSO

DMSO IDU Studies

A 1977 review determined that adding IDU to DMSO does not create any additional toxicity or side effects compared to DMSO alone.

A 1986 study established that DMSO dramatically increases the penetration of acyclovir and IDU into the skin:

TABLE 1. Penetration of ACV and IDU from different vehicles through human and guinea pig skin in vitro

Drug	Vehicle	Skin penetration (μg/cm² per h)[a]: Human skin	Guinea pig skin
5% ACV	PEG	0.055 ± 0.044	0.047 ± 0.011
	MAC	0.42 ± 0.05	0.36 ± 0.12
	95% DMSO	3.31 ± 0.79	4.10 ± 0.26
5% IDU	PEG	0.01 ± 0.002	0.023 ± 0.006
	MAC	0.36 ± 0.01	0.17 ± 0.05
	95% DMSO	10.39 ± 1.08	3.69 ± 0.33

[a] Values are the mean ± standard error of the mean (n = 3 to 5).

In 1988, investigators determined that the maximum benefit of IDU mixed with DMSO was likely to be at 20% IDU, higher concentrations of IDU did not result in more IDU reaching the area. However, in most studies, 5% or 40% IDU was tested.

DMSO and Bacterial Infections

DMSO has six properties that make it useful in treating bacterial infections.

First, data suggests DMSO increases bacterial cell membrane permeability and concurrently creates changes in the cell indicative of damage to its membrane. In addition to directly eliminating bacteria, it also reduces their ability to

prevent antibiotics from entering them. In turn, existing data shows DMSO has a much greater ability to increase the potency of antibiotics that target structures inside bacteria rather than ones that target their cell wall (e.g., penicillin). *Note: this property is particularly important for tuberculosis as it has a robust external barrier that impairs antibiotic entry.*

Second, by increasing membrane permeability, it can also make bacteria more susceptible to taking up the nucleic acids of lethal bacteriophages (viruses that kill bacteria and have been extensively researched outside of America due to their efficacy in treating a wide range of bacterial infections).

Third, DMSO can often simply dissolve bacteria and cause their contents to leak out.

Fourth, DMSO can interfere with the normal functioning of bacteria. A 1977 study, for instance, found that it interferes with the production of membrane proteins that E. coli (and other bacteria) need for metabolism.

Fifth, as discussed throughout a previous article, DMSO greatly improves circulation (which, when impaired often leads to chronic infections).

Sixth, in the same way DMSO can protect cells from various lethal stressors (discussed here), DMSO effectively mitigates the harmful effects of many bacterial toxins.

Additionally, while many concerns existed that DMSO's anti-inflammatory propertiesmight cause immune suppression, this has not been the case. A 1984 mouse study for example, found that giving DMSO prior to injecting E. coli or L. monocytogenes did not suppress the immune response to it, increase the lethality of either bacteria, or impair the body's clearance of the infection, hence eliminating concerns that it could reduce a needed immune response (as DMSO is anti-inflammatory).

Conversely, DMSO in some instances, has been shown to enhance the immune response. For example:

•The oxidative burst (where highly reactive oxidative chemicals like peroxynitrite are briefly generated) is utilized by immune cells to eliminate invading microorganisms. Unlike many other antioxidants, DMSO enhances the bactericidal properties of it.

•In 1966, it was reported that giving mice oral DMSO 8 days prior to infecting them with typhus made them more resistant to the infection.
Note: the same researcher also repeatedly demonstrated that giving a typhoid vaccine while a latent typhoid infection was present would trigger immune suppression, which would cause acute typhoid to develop.

Common Microbes

DMSO has been extensively tested against common infectious bacteria (e.g., staph, strep, E. coli, pseudomonas), both by itself and in combination with antibiotics (e.g., a 1986 article discussed DMSO's potential for being combined with antibiotic therapies) along with other antimicrobial therapies.

That research and the pertinent data are as follows:

In 1964, Stanley Jacob reported that 20% DMSO had a bacteriostatic effect (growth inhibiting activity that does not kill bacteria) against E. coli, Staph aureus, and Pseudomonas cultures, and that 1% DMSO made resistant tuberculosis more sensitive to antibiotics.

A 1965 study found DMSO's minimal inhibitory concentration (MIC, a common way to assess how potent antibiotics are) was 50% for Staph Aureus and between 30-40% for Staph epidermidis, β-hemolytic strep, Corynebacterium acnes, other Corynebacterium species (normal skin residents), Alcaligenes faecalis, E. coli, and Proteus bacteria, and that applying 90% DMSO to the armpit three times per day for three days eliminated 90% of the bacteria. Additionally, at 20% DMSO was bacteriostatic, and an hour of exposure to 60-75% of DMSO was required to kill those bacteria—all of which led the investigators to conclude DMSO was a low-potency antibiotic.

A 1966 study found that 5% DMSO increased bacterial antibiotic sensitivity, both in antibiotic sensitive strains and in many antibiotic resistant strains. For example, all 4 strains of colistin-resistant pseudomonas became sensitive, while resistant E. coli did not become penicillin sensitive. Additionally, DMSO inhibited bacterial growth by itself.

In 1966, another investigator found DMSO's MIC for S. Aureus was 30%.

A 1967 study tested DMSO's inhibitory effect against various microorganisms, and found at sufficient concentrations that it caused those organisms to dissolve into a sediment.

TABLE 2
BACTERIOSTATIC AND BACTERICIDAL EFFECT OF DIMETHYL SULFOXIDE BY PLATE COUNT METHOD

Test Micro-organism	Plate Count* on Exposure to Varying Concentration of DMSO							
	Control	5%	10%	15%	20%	25%	30%	40%
Pseudomonas aeruginosa	640	640+	380	1	0	0	0	0
Salmonella paratyphoid	1070	1070+	1070+	27	13	10	8	0
Streptococcus (beta - A)	750	640	640	0	0	0	0	0
Staphylococcus aureus	28	32	24	20	5	4	4	0
Canadida albicans	4	4	3	0	0	0	0	0
Streptococcus anginosus F	86	2700	2700	800	70	50	0	0
Streptococcus faecalis	7500	7500	7500	850	240	5	4	0
Escherichia coli	37550	37500	37500	9000	90	0	0	0

*All counts in millions as determined by serial dilution plate count method.

Note: a few other organisms were also tested. For each, DMSO's bacteriostatic concentration was: Aerobacter cloacae (20-30%), Proteus vulgaris (20-30%), Salmonella schottmulleri (10-30%), Strep. pneumoniae (4-5%). Given that Strep. pneumoniae is involved in a variety of challenging conditions, its high sensitivity to DMSO (which was seen at 4% but not 1% DMSO) holds promise for those infections.

A 1967 study reported that for antifungal and antibacterial applications, the effectiveness of dimethyl sulfoxide increases sharply above 70%.

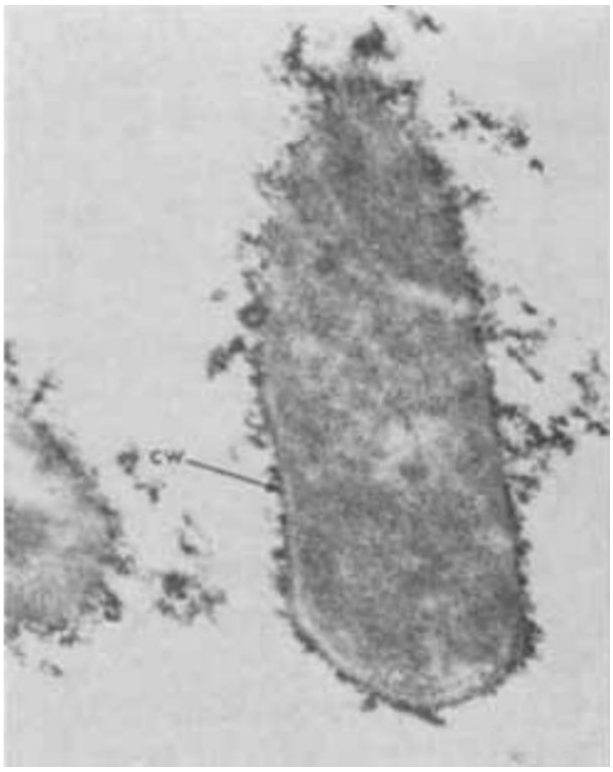
A 1969 study found that 75% DMSO was bactericidal (mainly by causing their internal contents to leak out), while 15% was sufficient to stop bacterial growth.

Table I—Inhibition of Three Species of Bacteria by Various Concentrations of DMSO After 24 hr. at 37°

% DMSO[a]	Average % Inhibition[b]		
	E. coli	*P. aeruginosa*	*B. megaterium*
1	7.63	7.50	14.40
2	18.70	6.70	16.00
3	15.63	26.80	18.70
4	17.25	35.40	25.00
5	23.35	66.90	31.60
6	39.45	71.60	38.17
7	52.70	89.90	43.70
8	68.00	92.17	56.90
9	77.10	92.26	56.90
10	87.15	96.38	81.32
11	87.45	98.07	79.90
12	90.77	98.41	83.07
13	98.16	97.81	90.62
14	99.50	97.53	93.97
15	98.30	97.61	98.30
20	98.50	96.57	100.00

[a] In the presence of 1.6% nutrient broth. [b] Each figure represents the average of two to five experiments.

Figure 5—E. coli *exposed to 75% DMSO for 20 min. 122,500×. Key: CW, cell wall.*



•A 1972 study discussed using DMSO to treat staph infections in young children and a 1973 study discussed using it to treat deep staph infections in young children

•A 1975 study from that DMSO dramatically lowered the minimal inhibitory concentration of streptomycin in resistant E. coli, causing it to go from over 5000 µg/ml to 7.5 µg/ml. The investigators concluded this effect was most likely due to DMSO increasing membrane permeability to streptomycin.

•A 1989 study found that DMSO enhanced the efficacy of iodopiron in eliminating pseudomonas bacteria (demonstrated by electron microscope observations of the damage done to those bacteria), leading the investigators to propose using it to treat burn patients.
Note: this 1986 study also used an electron microscope to evaluate the effect of DMSO on bacteria (in this case Staph aureus).

•When antimicrobial photodynamic therapy (PDT) was used in a 2005 study to treat mice with third-degree burn wounds one day after they had been infected

with Staph aureus, adding DMSO to PDT eliminated 98% of the bacteria, whereas without DMSO, there was only a marginal dose-dependent reduction of the bacteria.

•A 2012 study found that when DMSO was mixed with an antiseptic alcohol (isopropanol) it made it 10-100 times as potent (and in some cases even more) at preventing microbial growth (of common microbes). It also found that DMSO's inhibitory effect rapidly increased with DMSO concentration (with 10% DMSO being sufficient for isopropanol to inhibit all growth).

•A 2018 study tested DMSO against a variety of bacterial strains and found that DMSO exhibited varying degrees of pronounced antibacterial activity.

•A 2024 study found 0.4% DMSO inhibited S. aureus growth, 0.3% inhibited E. coli, 0.2% inhibited C. albicans growth.

DMSO and Head Infections

Since DMSO is effective in eliminating many common microbial infections, it has shown great promise in ENT (ears, nose, and throat) medicine, as many of those diseases result from infections with common bacteria and the inflammatory response to them (particularly since it is often challenging to get antibiotics to the site of the infection—something DMSO helps greatly with).

Note: a significant part of this section and the one on dental infections is from a previous DMSO article.

Much of this was demonstrated in the 1967 publication by an ENT doctor who observed that DMSO would often significantly calm inflammation from an infection in the head (including severe ones that were difficult to treat with antibiotics).

However, the improvement often only lasted for 2-4 hours. However, when he mixed DMSO with an antibiotic, it frequently eliminated the infection in a

dramatic fashion (e.g., the eardrum of an otitis media patient would begin shrinking in 10-15 minutes)—especially if the infection was treated early. Unfortunately, because of how rapidly the symptoms often improved, it often caused patients not to follow up when they needed for subsequent treatments.

Additionally, he also found:

•Because of the marked drying activity of DMSO, a subsequent treatment with a high-fat cortisone ointment was sometimes necessary to use afterward when treating otitis media.

•For irritating nasal infections or inflamed hair follicles, the feeling of tension and pain significantly diminished within half an hour of DMSO and typically, only 2-4 applications were required.

•That infections of the throat (e.g., tonsillitis) required internal applications of DMSO onto the inflamed area (rather than from the outside) and that cases with edema frequently had dramatic results (e.g., edema of the uvula often disappeared within hours).

•Significantly facial injuries (all of which had accompanying hematomas and included 2 traumatic hematotympanums and 2 hematomas of the nasal septum) had excellent responses (e.g., the hematomas and swelling distinctly improved on the first day, and the healing process as a whole was reduced to about half to a third of the average time and the 2 nasal septum hematomas did not require an incision or lead to colliquation).

•Three patients who had lost their smell were treated with DMSO. One had a striking response and immediately regained it; the other two had temporary improvements after each administration of DMSO.

•Many patients with stomatitis apthosa (canker sores) respond well to DMSO. Unlike the other applications, 60% DMSO (applied as a spray) was used.

He then compiled all of his cases:

TABLE 2
SUMMARY OF CASES

Diagnosis	Mode of treatment	No. of patients treated	Complete remission of symptoms	Partial remission of symptoms	Unchanged
Furuncular otitis (and infected eczematous otitis)	DMSO	119	2	16	11
	DMSO + ANTIB.		26	53	11
Otitis media (40 acute, 27 chronic)	DMSO	67	1	–	3
	DMSO + ANTIB.		26	26	11
Furunculosis of the nose (and infected nasal eczema)	DMSO	35	4	3	1
	DMSO + ANTIB.		12	12	3
Tonsillitis and Pharingitis (acute) (acute and chronic)	DMSO	119	4	24	16
	DMSO + ANTIB.		16	48	11
Stomatitis aphthosa	DMSO	34	5	4	2
	DMSO + ANTIB.		8	15	–
Neuralgiform headache	DMSO	109	29	54	26
Temporomandibular arthropathy	DMSO	15	5	8	2
Injuries	DMSO + ANTIB.	13	9	4	–
Various disorders	DMSO	19	2	15	2
90% DMSO		530	149	282	99
Antibiotics were mainly terramycin and erythromycin			28.1%	53.2%	18.7%

Various disorders included: 4 acute facial paralyses (2 improved), 4 herpes simplex (3 improved), 2 chronic Herpes zoster otitis (both rapidly improved), 2 Parotitis (both improved), 2 phlegmons of the mylohyoid (both improved) and 3 anosmnias (all improved).

Note: most of the poor responses in otitis media were in chronic cases. Of the 27, 4 had a "very good" response, 13 had a "distinct improvement" (but generally relapsed in a short time), 10 had "no change" and 1 became worse.

•A similar 1969 Russian study gave DMSO with success to 69 children (37 girls and 32 boys) with otitis media and 17 with maxillary sinusitis. In the otitis media cases, 30-50% DMSO (sometimes mixed with an antibiotic) was poured into a cleaned ear (under slight pressure) and typically passed through the eustachian tube into the nasopharynx (throat). In suppurative otitis media, there

was a rapid cessation of pussy discharge from the ears, a return of hearing, and a normalization of the blood. In purulent inflammation of the maxillary sinus, 30-50% DMSO was given by injection, and cures were achieved in 4-8 days in the majority of cases, with the treatments usually lasting long term.

•Finally, one approach for treating middle ear infections is to puncture the ear drum with a needle and drain it. Since this is quite painful, this doctor decided to try swabbing a drop of DMSO mixed with tetracaine against the ear drum, as DMSO both potentiates local anesthetics and can allow them to pass through the eardrum without needing to puncture it (which would be immensely painful for any child). In turn, at the 1966 annual meeting of the American Academy of Ophthalmology and Otolaryngology, shared that had done this one 107 patients with serous otitis and 50 with purulent otitis media, of whom 80% had no pain, and 20% only had slight pain.

Puncturing a child's ear almost always requires putting them under anesthesia, which makes the procedure more costly and has its own set of complications, so having a way to perform the procedure while avoiding anesthesia would be of great benefit.

Eye Infections

DMSO can help a variety of eye conditions (e.g., macular degeneration or inflammation of the eyelids), and in one 1976 study was combined with antibiotics to successfully treat inflammatory infections of the anterior (front) part of the eye.

Additionally, according to multiple DMSO authors, pink eye (e.g., a virus) will resolve after a few applications of DMSO.

Sinusitis

DMSO has often been observed opening blocked nostrils within a few minutes due to its antibacterial and anti-inflammatory effects, which allow it to reduce

swelling in the sinuses and promote the healing of inflamed tissue. In addition to the previously mentioned studies where it showed benefit for sinusitis:

•A 1967 DMSO study included 7 female patients (aged 43-66) who had had sinusitis for 1 week to 9 months and received DMSO. Of them, 2 had a good response to it, and 5 had an excellent response. Likewise,

•For sinusitis, Merck's 1965 investigator guidelines stated:

A dilute solution to the nasal mucosa has resulted in the discharge of a great deal of infected material from the sinuses and the relief of pain.

•Rhinoscleroma is a rare chronic infection of the upper respiratory tract, particularly the nasal cavity that is caused by Klebsiella rhinoscleromatis and can require drastic surgery. This researcher reported DMSO can dissolve the bacteria's polysaccharide capsule, greatly increasing their sensitivity to antibiotics and a patient's response to antibiotic therapy. That researcher authored a 1968 study which included a series of 25 patients who all were cured by DMSO plus antibiotic therapy, during which diseased mucous tissues began falling away during the second week of treatment (and a combination of DMSO and prednisolone was used to prevent scar tissue from forming in the respiratory tract). Long-continued monitoring of the patients showed no acute ill effects of treatment on the blood, urinary tract, respiratory system, eyes and ears.

•A 1992 Russian study found administering 10% DMSO to the sinuses followed by local oxygenation, within 2 years, 49 out of 52 children had a complete recovery (including all cases of maxillary sinusitis) whereas many controls receiving standard treatments did not.

Note: Stanley Jacob MD (a pivotal DMSO researcher) reported having "excellent results" using DMSO to treat sinusitis.

Dentistry

Many people find DMSO to be an excellent mouthwash or toothpaste, and when DMSO is used on the gums, they are much less likely to bleed (discussed further here). Additionally, DMSO can often relieve pain from a toothache until a dentist is seen, and pain in the oral cavity can be alleviated by swilling the mouth with a DMSO drink solution.

Likewise, some dentists in practice find DMSO (or DMSO combined with an antibiotic) very helpful for pain, infections, and swelling in the mouth, as well as for saving teeth that are starting to loosen from periodontitis. In turn, three authors have reported on dentists using DMSO in their practices:

•Stanley Jacob reported on a Portland dentist who specialized in restorative work and found that applying DMSO after a dental procedure consistently eliminates the pain (from intrapulpal inflammation) that some patients often experience after dental (even in those who have undergone a full day of restorative work.

•Another author reported other dentists use DMSO in a similar manner (e.g., for pain, infections, and swelling issues or after teeth extractions—where it is either applied to the gum or outside on the cheek or on the jaw next to the extraction site) and frequently combine it with other medications (e.g., antibiotics). Additionally, he cited a dentist in New York who applies DMSO to areas that will be x-rayed to prevent the damage the x-ray could cause (as DMSO has been shown to do this).

•Another author reported that pioneering dentists are dropping DMSO into empty tooth sockets after extractions, especially those for wisdom teeth, as it stops post-extraction swelling.

A variety of papers have also been published on DMSO's value in dentistry:

•A 1969 Polish study followed, this evaluated 32 male and female patients (ages 18-45) with periodontal disease. In 13 of the patients, the disease only involved bleeding and swollen gums. In the other 19, the oozing and painful pockets of infection extended deep into the gum, sometimes involving the dental nerve,

bone, and loose teeth. After cleaning and repairing the teeth as much as possible, the patients were treated with DMSO every other day for 7-10 treatments.

Compared to controls, this resulted in "remarkable improvements." Specifically, there was a total elimination of pain, decreased bleeding, and gum adherence to teeth in those patients with superficial disease. At the same time, those with deep infections reported less inflammation and disappearance of painful symptoms, but none of them had very loose teeth firm up.

Note: a preliminary version of this study can be found here.

Following this, many others were also written outside of America:

•The earliest one I know of was conducted in 1968 and showed DMSO improved the pulp of monkey's dental teeth. Three weeks later, that author then published a study that found DMSO improved 75% of pulpitis cases, while DMSO plus oxyphenylbutazone (a drug for gout) or chloramphenicol improved 85% of cases, while placebo only improved 50% of cases, and five months later published another paper on using a DMSO combination for pulpitis. *Note: this author conducted controlled studies on using DMSO for pulpitis for 10 years (e.g., he also published this, this, this, and this study).*

•A 1972 study and a 1973 study by the same authors found DMSO increased the sensitivity of gingival (gum) infections to stretomycin.

•A 1981 study found DMSO mixed with azathioprine treats periodontosis.

•A 1981 study mixed DMSO with oxacillin and ectericide was able to significantly accelerate the healing of a dry socket (an unhealed wound following a dental extraction).

•A 1983 study of 222 people (176 had acute serous limited pulpitis and 46 — chronic fibrous pulpitis) found 70% DMSO placed into cavities was effective in 98.4% of acute cases and 89.3% of chronic cases, and that in most cases, this

benefit persisted. Additionally, of 9 of the 16 cases with chronic fibrotic pulpitis benefitted from DMSO.

•A 1983 study found 15% DMSO mixed with a herbal extract treated periodontal disease.

•A 1986 study found a DMSO containing paste treated deep caries.

•A 1987 study showed how DMSO mixed with indomethacin can treat generalized periodontitis

•A 1987 study found DMSO helps deep caries and acute focal pulpitis

•A 1988 study of adolescent patients found DMSO plus procaine treated chronic parenchymatous parotitis (inflammation of the salivary glands).

•A 1993 study found DMSO plus short-acting insulin and 5% calcium pantothenate (B5) safely treated 42 patients ages 23 to 62 with chronic parenchymatous parotitis.

•A 1998 study found 50% DMSO with 2.5% orthophene stopped type I and type II autoimmune inflammation in the periodontium..

Tuberculosis

Despite over a century of work, Tuberculosis remains the worlds most deadly microbe (e.g., in 2023, it was estimated to have killed 1.25 million people). This is largely due this tiny bacteria's unique characteristics making chronic tuberculosis infections quite challenging to eliminate and its high aptitude for developing resistance to the antibiotics that eliminate it.

Because of this, once the early DMSO researchers realized that DMSO could remove antibiotic resistance, their focus immediately went to tuberculosis (a decision which has also been influenced by the recognition DMSO is more

effective at eliminating smaller bacteria). In turn, a variety of studies have demonstrated DMSO's utility for this challenging infection.

Non-Human Studies:

•According to Stanley Jacob, at a 1966 DMSO symposium, it was reported that pretreating tuberculosis bacteria in 5% DMSO made them 200 times more sensitive to streptomycin.

•A 1974 study of guinea pigs infected with isoniazid resistant tuberculosis found that while all guinea pigs treated only with isoniazid died within 80 days (with tuberculosis throughout their tissues), if a single oral dose of DMSO was given 2 weeks prior to isonizaid, they all survived (and a year later were still alive). This suggested DMSO could remove tuberculosis's resistance to isonizaid. In a followup 1976 study, they then took cultures from tuberculosis patients and found that 5% DMSO made 19 of the 61 isonizaid resistant strains become susceptible to isoniazaid and 19 of the 19 rifampin resistant strains susceptible to rifampin.

•A 1980 study found that DMSO and 5-fluorouracil enhanced the antibacterial effects of isoniazid and streptomycin on tuberculosis bacterial cultures.

Note: DMSO has also been shown to prevent rifampin from degrading for at least 8 months, which suggests it will not disrupt the antibiotic's potency if administered concurrently

•A 1995 study found DMSO combined with a tuberculosis antibiotic (which was washed away prior to applying other antibiotics) made multi-drug resistant tuberculosis (both in test tubes and within macrophages) much more susceptible to other tuberculosis antibiotics (isoniazid rifampicin and streptomycin). Specifically, non-lethal doses of ethambutol and 2-5% DMSO caused a 4-64 fold increase in the sensitivity to other antibiotics (4-16X for rifampicin, 16-33X for streptomycin and 4-16X for isoniazid), while isoniazid and 2.5% DMSO caused an 8 fold increase in susceptibility to other tuberculosis medications.

To quote those authors:

Our data indicate that the agents that modify cell wall permeability can enhance the susceptibility of multiple drug resistant strains to drugs to which they were originally resistant. This could provide a new approach to treating drug resistant tuberculosis.

Note: ethambutol works by inhibiting tuberculosis cell wall synthesis, thereby removing its barrier to other antibiotics entering.

•A 2013 study found 50% DMSO caused an approximately 50% decrease in mycobacterium tuberculosis growth.

Additionally, a 1982 study tested 27 antiobiotic resistant isolates of myobacterium avium-intracellulare, finding that 27% were resistant to rifampin and streptomycin, 81% resistant to isoniazid and ethambutol and 96% resistant to ethionamide. Once 2.5% DMSO was used as well, all the antibiotics affected 26-30% more cultures (except for ethionamide, which only had an 11% increase, going from 96% being resistant to 85% being resistant). Three isolates were inhibited only in the presence of DMSO plus a drug, six isolates demonstrated growth inhibition without any enhanced effect due to DMSO, while the remaining eighteen isolates were sensitive to at least one drug in the presence of DMSO and to different drugs in the absence of DMSO.
Note: tuberculosis is also a mycobacterium, and the antibiotics tested in this study are also used to treat tuberculosis.

Human Studies:

•A 1969 study of 32 patients with destructive pulmonary tuberculosis and endobronchial tuberculosis gave them nebulized streptomycin and penicillin mixed in 10% or 25% DMSO. Of the 32, 14 showed an absence of tuberculosis secretion and most showed improvement (e.g., reduced endobronchitis, perifocal infiltration and lung tissue destruction).

•A 1980 study used DMSO to treat children with pulmonary tuberculosis.

•A 1991 study found nebulized DMSO mixed with rifampin over 1-2 months was an effective treatment for 148 pulmonary tuberculosis and 18 obstructive bronchitis patients (e.g., it healed the destructive cavities caused by tuberculosis), that it could be used alone or to enhance the efficacy of conventional therapies and that DMSO significantly reduced the chronic liver toxicity of rifampin.

Additionally, one complication of the (live) tuberculosis vaccine is that it can cause recipients to form tuberculosis like abscesses (especially if the vaccine comes from a hot lot). A 1994 study of 287 children with either abscesses or regionally inflamed lymph nodes following tuberculosis vaccination who receiving isoniazid (a common antibiotic for tuberculosis) found that locally administering a rifampin DMSO mixture halved their recovery time, reduced the number of isoniazid injections and eliminated the need for other antibiotic therapies.

Bacterial Toxins

One of the primary reasons bacterial infections sicken and kill is because of the toxins they release. DMSO in turn, has been repeatedly shown to mitigate this. For example:

•DMSO has been shown to protect the duodenum from H. pylori induced chronic ulcers.

•In rats, DMSO was shown to create a dose dependent reduction in the fluid secretion and mucosal permeability triggered by C. difficile's toxin (with its maximum inhibition occurring at a 1% concentration). Given how common C. difficile colitis is and how low of a DMSO concentration was needed to create this effect, this application of DMSO has a great deal of promise.

•The shigella bacteria's toxin causes severe diarrhea and bloody stools (and sometimes severe illness) by destroying the cells that line the colon. DMSO was

shown to prevent cellular uptake of the toxin and partially reduce its cellular toxicity.

•Endotoxaemia occurs in response to bacterial lipopolysaccharide (LPS) entering the bloodstream and is one of the most severe and ubiquitous disease processes in horses. A 2008 study of 18 horses found DMSO reduced the fevers that followed artificially induced endotoxemia. This is highly relevant to humans as LPS is highly inflammatory and can create a variety of severe disease states (e.g., sepsis). Unlike many agents, DMSO can protect cells from the damage this toxin causes.

Note: one of the most important characteristics the early adopters of ultraviolet blood irradiation recognized about it was that UVBI could effectively neutralize toxins in the bloodstream (a property which saved a significant number of lives).

Severe Infections

In addition to tuberculosis, DMSO has shown promise in addressing a variety of other life-threatening infections and severe internal infections which often require prolonged hospitalizations. This, in turn, has led to DMSO authors (who've seen many remarkable cases of DMSO being used in this manner) stating that DMSO should be the standard of care for severe infections, particularly those not responding to antibiotic therapy.

Sepsis

•In patients who survive heart attacks (and are brought back to life) they frequently have a variety of complications. In a 1982 study of 42 severely ill patients who had septic complications of post-resuscitation disease, IV DMSO was an effective therapy, even in cases where sepsis came from antibiotic resistant bacteria.

•A 1984 Russian study reported that DMSO was quite useful for critically ill patients with a variety of septic infections and that DMSO accelerated their recovery.

Note: one author cited a case of a septic patient with a severe bladder infection who did not respond to antibiotics but recovered once he began taking one teaspoon of DMSO three times a day.

Lung Infections

•A 1962 article and a 1974 article discussed using DMSO to treat suppurative lung diseases (e.g., chronic infections with pus in the lungs), while a 1981 study also used DMSO to treat bronchopulmonary infections.

•A 1975 study used a DMSO spray containing y-ketophenylbutazone (an anti-inflammatory NSAID), moroxydine (an antiviral) hydrocortisone, lidocaine, n-propylcarbinol, and 1-butanol (which has antibacterial properties) that roughly 2mL of was sprayed it into the mouth and throat each day. It was given to 30 fairly-ill infants (most of whom were 1-6 months old) with respiratory diseases (concurrently receiving ampicillin) until they recovered, which was typically in 1-2 days and never more than 4.

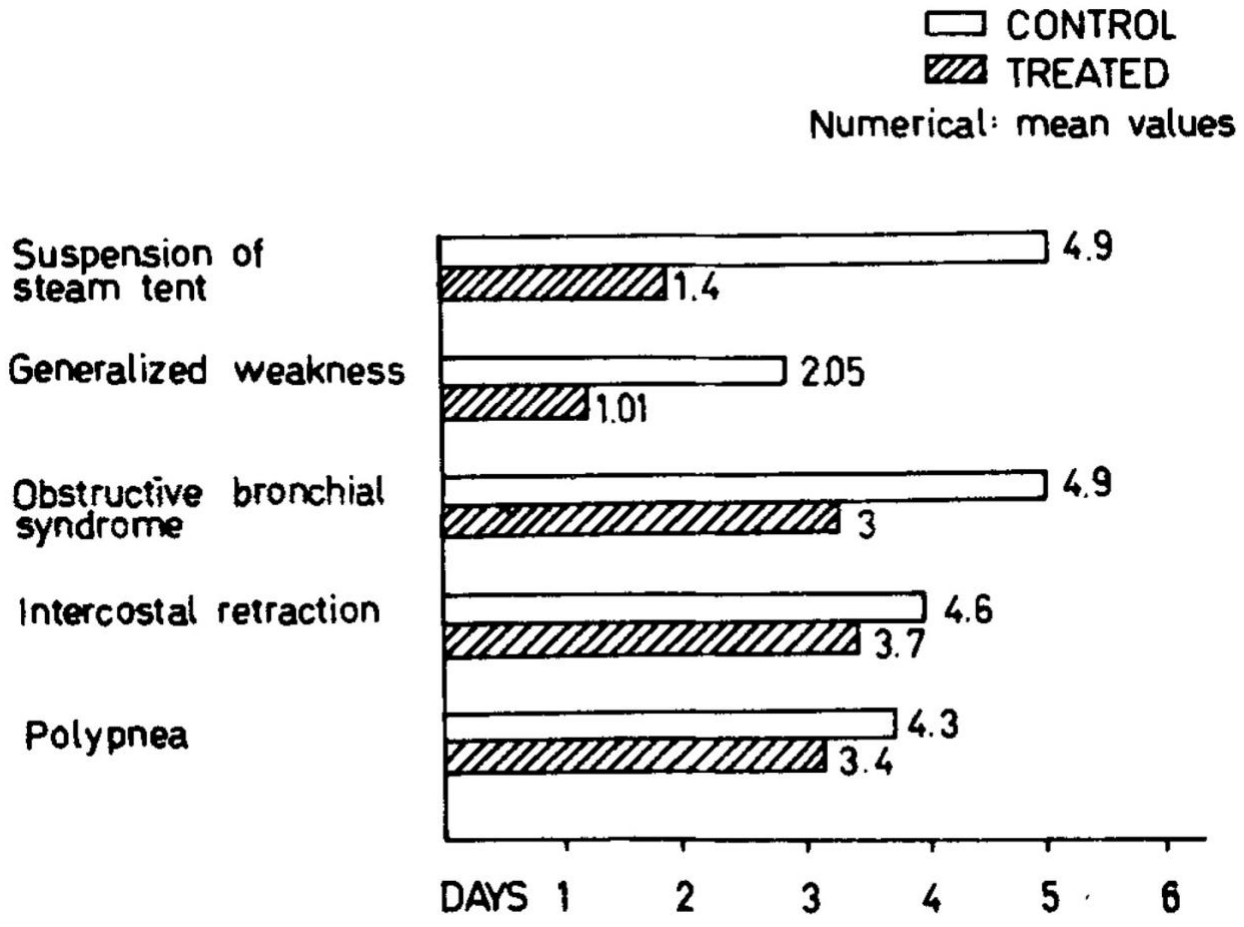
Disease	Number of Control Cases	Number of Cases Treated with DMSO Spray
Bronchiolitis	19	14
plus bronchopneumonia	3	7
plus atelectasia	1	1
plus pneumonitis	5	6
Obstructive bronchiolitis	2	2

There was a significant improvement in the DMSO group (e.g., the rapid breathing and respiratory distress improved within 30 minutes and became practically normal within 24 hours, thick obstructive secretions fluidified so the infant could expel them, steam tents were no longer needed for the infant and

their general condition significantly improved). Likewise, their time to recovery was much faster than the controls.

VARIOUS IMMEDIATE EFFECTS IN THE DMSO SPRAY-TREATED GROUP

Effect	Percent of Group
Sensorial and general improvement	80
Decreased polypnea	76
Decreased intercostal retraction	75
Changes on auscultation	80
Disappearance of cyanosis	1.2 hours (avg.)



The dramatic improvements led to the authors feeling this should be the standard of care for the neonatal intensive care unit.

•A 1978 study used DMSO to treat pleural empyemas (pockets of pus accumulated in the space between the lungs and chest wall).

•A Libyan hospital, in 2020, reported that in the last 10 years, 20% DMSO and ceftriaxone were administered to 31 out of 39 lung abscesses, all of which had a complete recovery and no recurrence over the 6 to 12 months they were followed. In 16 cases, DMSO was given through a chest tube (being used to drain an empyema communicating the abscesses), in two cases it was administered directly into the abscess (via a chest tube), and in 13 cases, it was done through an endotracheal cannula (which resulted in a shorter hospital stay than chest tube administration). Additionally, in 4 of these cases, either decortication or a lobectomy (lung surgery) were also done.

Note: DMSO has also been repeatedly shown to effectively treat Acute Respiratory Distress Syndrome, a challenging lung condition that frequently follows severe infections and often requires ventilation.

Abdominal Infections

•A 1974 study used DMSO and antibiotics to treat peritonitis.

•A 1975 study used DMSO and antibiotics to treat abscesses in the abdominal cavity.

•A 1978 study used DMSO in the treatment of purulent peritonitis. Its author then conducted a 1981 study that found injecting DMSO mixed with kanamycin into the peritoneum caused it to concentrate in the peritoneum (e.g., increasing its concentration 3-8 times, and delaying its diffusion into the rest of the body so that it was retained 10-13 hours longer there), particularly in animals with peritonitis (inflammation of the abdominal lining). Given what I know about DMSO, I find this effect surprising. Still, it makes quite valuable for the treatment of peritonitis (a dangerous infection that, with hospital care, kills 13.16% for patients under 50 years and 33.33% of patients over 50 years).

Note: the above author also evaluated DMSO's effect on the absorption of penicillin from the abdominal cavity and the specific DMSO sensitivity of the bacteria causing peritonitis.

Additionally, cutting off the blood supply to the small intestine will rapidly cause the tissue there to die and often rupture (leading to fatal peritonitis). In rats, giving IV DMSO to rats after 30-60 minutes of the intestinal blood supply being cut off, resulted in 28 out of 29 not developing gangrene, and within 24 hours, there was no evidence of ischemic damage to the intestines.

Meningitis

•A 1978 study found DMSO was an effective treatment for meningococcal infections.

•A 1987 study used DMSO combined with a nuclease to treat meningitis or meningoencephalitis caused by an acute viral respiratory infection.

Osteomyelitis

For a variety of reasons, infections of the bones can be quite challenging to treat and often become chronic. Fortunately, DMSO addresses many of those reasons, and over the years, a lot of compelling data has emerged for this application:

•A 1976 study of 132 children with acute osteomyelitis found mixing 33% DMSO with antibiotics was a highly effective therapeutic method.

•A 1980 study gave 129 newborns with epiphysial and meta-epiphysial osteomyelitis DMSO and hyperbaric oxygen therapy (HBOT), which improved their general condition, normalized serum laboratory values, reduced bone destruction, and accelerated bone regeneration. Identical results were achieved in a 1978 study of acute and chronic osteomyelitis, a 1979 study of 43 children with chronic osteomyelitis, and a 1981 study of 54 children with acute septic osteomyelitis (where reduced tissue edema was also seen).

•A 1986 study reported that DMSO (in conjunction with antibiotics) markedly improved chronic osteomyelitis due to an improved white blood cell response to the infection.

Surgery

For example, a surgeon colleague recently shared this story with me:

I had a horribly contaminated foot wound on myself down to muscle from a rusty lid of my sewer system ~5cm long. I washed it out, sewed it up, and used the DMSO along the wound edge. It took care of the pain and the wound has healed at least twice as fast as I would've expected. It's been 'fun' to experience.

This in turn, touches upon three of the major issues encountered in surgery:

•Surgical wounds (or burns) become infected before they seal and heal.

•Infections deep within the body need to be cut open so the infection can be drained or removed (or have antibiotics directly applied to it).

•Infected tissues must be removed (e.g., amputated) because the infection within them can't be reached or addressed.

Fortunately, DMSO is uniquely suited to address each of these (e.g., in this article, I discussed how many studies and reader testimonials show DMSO is a remarkable therapy for burns and wound healing, and here I reviewed the wealth of evidence that DMSO is a highly effective therapy for surgical scar healing).

Likewise, as I've shown, DMSO makes reaching a deep infection within the body possible without surgery. Numerous studies, in turn, demonstrate that DMSO can prevent and treat those infections. For example:

•A 1978 surgical study used DMSO in combination with antibiotics to treat inflammatory infiltrates.

•A 1984 study used DMSO to treat surgical wound infections.

• An 1985 study found that injecting DMSO after severe mechanical trauma reduces the risks of a subsequent infection, while a 1984 study found that DMSO plus antibiotics prevent open wounds in the hands from developing purulent infections.

•A 1990 study of 33 patients with phlegmons (inflamed areas under the skin) throughout the body found that a dressing with DMSO and silver nitrate, when compared to those receiving standard treatments, reduced the time required to begin a surgical repair by 2-2.5 times.

•Authors of a 1998 Russian paper stated that they routinely apply DMSO to surgical wounds as it accelerates healing and provides general infection control. This is congruent with the studies mentioned earlier in this article that show DMSO improves the healing of surgical wounds.

Likewise, there are numerous cases of DMSO being able to prevent an invasive surgery or amputation, such as a 1969 case report of a patient with a chronic Scedosporium apiospermum infection (a challenging fungus that did not respond to antifungals of the time and often requires amputation) complicated by bacterial osteomyelitis declined a foot amputation and was offered an experimental DMSO treatment (where the antifungals were dissolved in 60% DMSO). The patient fully recovered with no side effects, but had a recurrence 4 months later (at which point an amputation was done).

In turn, one author shared numerous cases of severe infections that required surgery but instead were treated with DMSO such as:

•An 8 year old girl and recent immigrant who vommitted daily from what was discovered to be internal bleeding and an intestinal blockage due to a severe fungal infection. After anti-fungal medications were tried without success,

surgery was planned to remove the colonized intestines. As a last resort, she drank DMSO with diluted aloe vera, and three days later the vomiting disappeared (so she stopped). After it came back a week later, she then resumed treatment for 2 weeks and had no further recurrences.

•A patient who had an infection under the scalp who was told it would require a partial surgical removal of part of the scalp the expose the infected area and remove it, but the patient was able to completely eliminate the infection by applying DMSO to the scalp.

•A 43 year old man who had a crushing injury to his foot that would not heal and became infected. As the infection spread (as it did not respond to antibiotics) and an amputation was considered, IV DMSO and antibiotics were tried, leading to an immediate improvement and then a full recovery of the affected food.

•A 36 year old man who developed chronic osteomyelitis from stepping on a nail which did not heal and eventually led to an amputation being considered, but rapidly healed with DMSO plus antibiotics.

Note: that author also recounted how veterans used a DMSO lotion to treat jungle rot, a challenging polymicrobial ulcer that persisted for years and did not respond to conventional treatments (which led one doctor to believe it was the best treatment for the condition).

Other Bacterial Infections

DMSO has also helped with a variety of other infections (and as I've discussed throughout this series, the inflammatory complications of many infections (such as sterility). These include:

Skin Infections:

Note: many other studies also show DMSO's value in treating skin infections (e.g., it's extremely useful for a wide variety of chronic ulcers, as they often become infected due to their poor supply).

•A 1967 study gave 23 leprosy patients with tuberculoid markings who had been on dapsone for 6 months to 5 years were given either dapsone, isoniazid, or paraaminosalicylic acid mixed in 70% DMSO. In almost all patients, a rapid, marked and relatively equal improvement occurred, suggesting the improvement was due to DMSO rather than the antibiotic.

•A 1988 study used DMSO and methyluracil to treat erysipelas (a form of cellulitis), and likewise a 1981 article used DMSO to treat this condition.

•A 1980 study discussed DMSO's use in treating suppurative wounds (wounds discharging pus) and a 1987 study discussed its use for treating suppurative-inflammatory diseases of the skin and subcutaneous tissue. Likewise, a 1962 studyused DMSO, papaya enzyme and nitrofurazone to treat suppurative wounds.

Orchitis and Epididymitis

In 1986, a Russian physician reported that ochiepididymitis (inflammation of the testicles and where sperm are stored), a condition which can cause sterility (and follows certain infections), had an excellent response if DMSO was used as an adjunctive therapy.

Veterinary Infections

Note: there are a large number of veterinary infections which has been treated with DMSO, so many studies are not included in this section (as I did not want to make the article too long).

•A 1967 study treated 9 cats with feline panleukopenia, a virus which has a high mortality rate (e.g., over 90% in kittens) and hence is one of the primary cat vaccines. Those cats were treated with 4ml injections of 90% DMSO alongside

vitamins, antibiotics and IV fluids. There was a rapid improvement in the cats, and two-thirds survived (60% of those less than six months old and 75% of those over 6 months). In contrast, after 12 subsequent cats were treated with only the standard of care, all died.

Note: according to this author, in September 1992, at the Pharmacological and Biological Therapies panel of the newly created National Center For Complementary and Alternative Medicine, it was reported that DMSO had shown promise for treating human HIV.

•A 1971 study injected either the Sindbis or Calovo virus into mice, and after 10 minutes injected either 40% DMSO or normal saline into their abdomen. DMSO (if a virus had also been injected) was found to increase the anti-viral interferon released by the mice by 2-16 times, and to significantly reduce their susceptibility to the virus.

•A 1985 study found DMSO mixed with antibiotics was an effective treatment for poultry affected by colibacillosis (an E. coli infection).

•A 2002 study of Rhodococcus equi (isolated from pulmonary infections in young horses) found DMSO increased its sensitivity to kanamycin, amikacin, and streptomycin) and chloramphenicol. However, no benefit was seen for a few other antibiotics (e.g., penicillin).

•A 2004 study found that DMSO roughly halved the amount of antibiotic (gentamicin, ciprofloxacin, or norfloxacin) that was required to treat bovine mastitis from pseudomonas aeruginosa and dramatically decreased the amounts required for antibiotic resistant strains.
Note: many other studies (reviewed here) such as a 1967, another 1967, a 1972, a 1974, and a 1992 one all found bovine mastitis was significantly improved by the combination of DMSO and an antibiotic, including in resistant strains.

•A 2006 case report discussed using IV DMSO mixed with acyclovir to treat a horse with myeloencephalopathy (dangerous brain and spinal cord inflammation) from equine herpesvirus-1.

Fungal Infections

DMSO has some antifungal properties. For example:

•At low concentrations (1%) DMSO alone showed no inhibitory activity against the common skin fungi, while some (but not all) evidence existed that 10% and 60-70% DMSO demonstrated fungicidal activity.

•A 2013 study used DMSO and antifungal agents on six different Candida species. It found 0.5-1% DMSO had an antifungal effect, but the inhibitory effect (with or without concurrent antifungals) varied significantly.

Likewise, DMSO can effectively bring antifungals to many parts of the body. DMSO for instance was shown to significantly increase the amount of ketoconazole that entered the brain, which is useful in fungal infections of the central nervous system, as there are fairly few antifungals which can pass through the blood brain barrier (and likewise it can be used to bring other drugs such as cancer therapies or antibiotics to the brain). Additionally, when tested with other substances that it could bring into the brain, DMSO was not observed to alter the cells lining the blood brain barrier or the brain tissue.

Note: there is some evidence suggesting DMSO is unable to bring molecules larger than 70,000 Da through the blood brain barrier.

Because of this, DMSO's primary commerical use has been to bring antifungal medications into infections, and in doing so, has frequently produced remarkable results in both animals and humans (e.g., consider the previously mentioned foot that was saved from amputation).

•A 1965 study found DMSO's MIC for micosporum (the fungus that causes ringworm) was 30%, while 50% was not sufficient to eliminate T.

mentagrophytes (the fungus that causes athlete's foot). When 90% was applied to the space between the toes twice a day for two weeks in to 8 athlete's foot patients with a verified fungal infection, it improved the symptoms of the infection, but only eliminated the infection in 2 of the 8. They then mixed 90% DMSO with 2% thiabendazole (an antiparasitic with antifungal activity) and applied it in the same manner once a day for 14 days to 16 patients, all had an excellent response, and the fungus was eliminated in 13 of the 13 patients. *Note: many since then have stated DMSO is an excellent treatment for athlete's foot.*

•Griseofulvin is an anti-fungal that is primarily taken orally because it has poor absorption through the skin.

A 1971 study found DMSO mixed with griseofulvin transported active griseofulvin through the unbroken skin of guinea pigs (which could be recovered from inside the skin and used as an antifungal in cultures). This topical mixture appeared to treat trichophyton mentagrophytes (ringworm) infections, but it was hard to be certain given the condition's tendency to spontaneously recover. Additionally, they found at high concentrations, DMSO inhibited fungal growth.

Following this, 11 cats infected with *Microsporum canis* (microsporum is a fungus that causes ringworm in pets and humans), often having quite severe infections were given either nothing, topical griseofulvin, topical DMSO, oral griseofulvin, or the DMSO griseofulvin DMSO combination. The first three did nothing, griseofulvin cured the cats in 21-42 days (typically around 30), while the topical DMSO griseofulvin combination fully treated the cats in 5-10 days (typically under a week). The primary issue the investigators ran into was the mixture would harden after every 3-4 days (requiring it to be remixed) which they believed was due to the binders present in commercial preparations.

Note: a 1974 study also used a 5% griseofulvin DMSO mixture to treat a microsporum (ringworm) infection in the glabrous skin (e.g., the hands and feet).

•A 1977 study found DMSO (in combination with lidase) was a highly effective treatment for actinomycosis of the face and neck.

•A 1991 guinea pig study found that applying ultrasound to topical amphotericin B (a powerful antifungal) increased its penetration into the skin, but a larger effect was seen when DMSO was applied to the skin prior to amphotericin B being applied (without ultrasound).

•A 1997 study gave 30% topical DMSO ointment mixed with 1% itraconazole (an anti-fungal) to 9 horses with fungal infections of their corneas (one of whom had 2 affected eyes) every 4 hours, with 8 of the 10 eyes recovering, with treatment lasting between 16 to 53 days (on average 34.6). These results suggested this is a promising treatment for that condition.

Parasites

There is also some data DMSO can treat parasites (e.g., 3% DMSO has been shown to significantly inhibit the growth of Trypanosoma cruzi (which causes Chagas disease). However, its primary value is bringing an anti-parasitic medication to the region of infection (as parasites can often burrow quite deep into the tissues).

For example, two different 1966 studies (this study and this 25 person RCT) found that DMSO plus an anti-parasitic (e.g., 2% topical thiabendazole in 90% DMSO) was an effective treatment for hookworm infections in the skin. DMSO can also be combined with anti-parasitic medications to reach challenging parasitic infections deep within the body. For example, a 1984 case report discussed DMSO treating a complex amoeba infection of the liver. *Note: in the 25 person RCT, DMSO alone provided no benefit.*

Cancer and Autoimminity

One of DMSO's widely recognized properties is that it causes cancerous cells to revert to normal. In researching that, I came across a fascinating study that

tested cancer patients for pleomorphic bacteria (something many previous pioneers of successful but suppressed alternative cancer therapies like Rife and Naessens also believed caused many cancers). While difficult to culture, pleomorphic bacteria were eventually isolated from the blood of some of them, in the blood of some of those who had been around those who had recently died from cancer for a prolonged period:

TABLE 1
CULTURES OBTAINED FROM PATIENTS' BLOODS

Total	Normals		Contacts*		Non-cancer		Cancer		Hodgkins or Lymphoma		Leukemia	
	+	neg.	+	neg.	+	neg.	+	neg.	+	neg.	+	neg.
59 Bleedings	0	5	6	2	6	4	3	20	4	2	6	1†
Number Patients Tested 53	5		7		10		18		6		7	
Number Patients Positive 24	0		5		6		3		4		6	

*Three of these positives were from patients who were contacts with leukemia cases. In one case of a cancer contact, two cultures were obtained from the same patient.

†Chronic leukemia in contrast to six acute leukemias.

There were 59 bleedings in 53 patients because multiple samples had to be obtained from a few of them.

Likewise, 17 tumors were directly sampled, of which 16 yielded cultural specimens, with the negative coming from a granulomatous nodule. Additionally, one tumor had to be sampled twice as the initial specimen did not produce the bacteria. Finally, in some cases, the organisms were found directly within sampled cells.

Note: the morphology of the bacteria [is extensively described in the paper](), but essentially matches what many other pleomorphic researchers have found over the years.

They tested three different agents on the bacteria, ethambutol (an antibiotic), lysozyme (an enzyme present in many mucosal secretions that protects the body from invading organisms), and DMSO. They found lysozyme did a bit, but DMSO did much more.

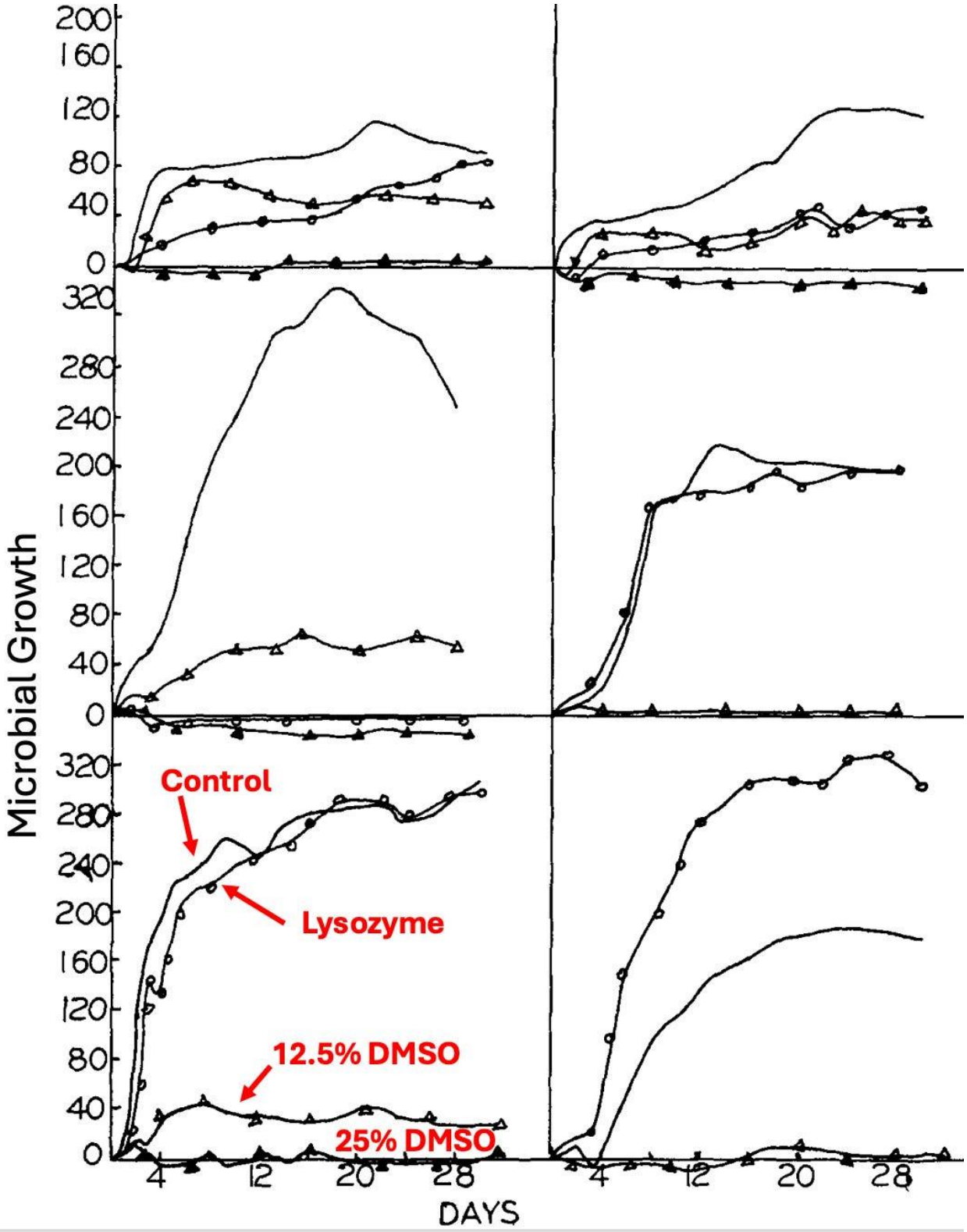
TABLE 3
CULTURES USED FOR GROWTH CURVES AND EFFECT OF LYSOZYME AND DMSO ON GROWTH

Figures	Group	Number of Culture and Symbol on Growth Curves		Source	Diagnosis	Estimated Per cent Inhibition with Lysozyme		Estimated Per cent Inhibition with DMSO			
						570 μ/ml		12.5%		25.0%	
						TSB	vonB	TSB	vonB	TSB	vonB
8	Top Set	200	○	Blood-rat	Sarcoma		25		100		
		3500	△	Blood	Contact-Ca. Rectum	0		0			
		4200	●	Blood	Ca-Breast	100		75		100	
		6900	▲	Blood	Heart Attack						
	Middle	2200	○	Liver	Normal-accident		Tr		50		90
		3700	△	Breast	Ca-Breast	25		100			
		4100	●	Gall Bladder	Cholicystitis		50		50		100
		5100	▲	Breast	Ca-Breast					100	
		8600	□	Saliva	Normal						
		X500	■	Blood	Leukemia			25		100	
		X600	◎	Blood	Contact-Leukemia			25		100	
	Bottom	1000	○	Air						100	
		1600	△	Culture	Staphlococcus						
		5100	●	Breast	Ca-Breast	75		25		100	
		7800	▲	Blood	Polycythemia	0		25		100	
		8200	□	Mandible	Suicide						

9	Top Set	100	●	Rat	Sarcoma	100			75		100
		X200	△	Blood	Leukemia	S	25	100	50	100	100
	Second Set	4600P	●	Blood	Contact-Ca	0		100			
		X400	△	Blood	Contact-Leukemia			100			
	Third Set	2400	○	Larynx	Ca-larynx						
		2700	△	Blood	Hodgkin ?					75	
		4000W	▲	Breast	Ca-Breast	100		50			
		4500	●	Ovary	Ca-Ovary	50		75		100	
		8900	•	Blood	Ca-Thyroid	25	0	50	0	100	90
		X100	□	Blood	Leukemia	50	75	25	75	100	100
		X300	▬	Blood	Leukemia	S	0	75	50	100	100
	Fourth Set	1300	○	Air		50					
		4900	△	Node	Ca-Lymphoma			100			
	Fifth Set	5300	○	Node	Fibrosarcoma	0		50			
		3300	△	Blood	Bleeding						
	Sixth Set	4700	○	Breast	Benign Tumor						
		5500	△	Node	Ca						
10	Top Set	7400	○	Blood	Hodgkins	Tr		75			
	Middle Set	7700	○	Blood	Hemangioma						
		9200	△	Blood	Leukemia	25		100			
		8400y	●	Blood	Ca-Face	0		50		100	
		9300	▲	Breast-Mouse	Bittner Factor	Tr		50		100	
	Bottom Set	3200	○	Spine	Spinal Fusion	0		75		100	
		3600	△	Breast	Ca-Breast	S		100			
		4600w	●	Blood	Contact-Ca	S		100			
		4000y	▲	Breast	Ca-Breast	S		90			

TSB = Trypticase soy broth. von B = von Brehmer medium. S = stimulated growth.

They also provided a series of growth curves that were illustrative of the effects of DMSO (one of which I annotated so you can identify what each symbol represents).


Microbial Growth
DAYS
Control
Lysozyme
12.5% DMSO
25% DMSO
0
40
80
120
160
200
240
280
320
4
12
20
28

Note: when DMSO was added to fresh leukemic blood samples, it, completely inhibited the dancing motion of particles free in the blood or attached to the periphery of the crenated red blood cells (another common pleomorphic observation), but did not damage the red blood cells at all.

The pleomorphic model of bacteria (discussed further here) essentially states that bacteria can significantly change their morphology (to the point they are almost unrecognizable from their original form), that these changes are often done in response to their environment, and that some forms are relatively harmless to the body, while others cause disease. In turn, since things that kill bacteria often transform them into ones that are more pathogenic, a longtime belief within certain schools of natural medicine is that the goal should be to change the terrain of the body to encourage a benign morphology of bacteria rather than trying to kill them all off.

Note: some of these schools also believe this applies to viruses and fungi, and that, in some cases, they can transform from one type to another (e.g., a bacteria becoming fungal).

A large group of modern researchers studied this subject for decades (e.g., hundreds of research studies they conducted are summarized in this wonderful textbook by Lida Mattman). Five of their key observations were:

•Antibiotics will often fail to kill every bacteria present and then trigger those that survive to enter a primitive survival state known as a **"cell wall deficient"** (CWD) form resembling a mycoplasma. This process in turn, was most commonly triggered by antibiotics that attack bacterial cell walls (which characterizes many commonly used antibiotics).

•CWD bacteria are very hard to detect (most standard microbial methods will determine that no organisms are there when CWDs are present).

•When conditions are more optimal for survival, CWD organisms can revert to the active form and cause an infection that had been eliminated with antibiotics

to suddenly and inexplicably recur (which, for example, we frequently see with urinary tract infections).

•Once present, CWD bacteria will often enter cells and cause chronic inflammation because the immune system will attack cells with the CWD bacteria.

•Many different unexplained autoimmune disorders (e.g., sarcoidosis) have characteristic CWD bacteria present that can be repeatedly identified from their inflamed tissue (the textbook cites an exhaustive amount of data substantiating this).

•While standard antibiotics are ineffective in treating CWD infections, non-standard ones (e.g., erythromycin or minocycline) often are, but the sensitivity to those antibiotics is highly variable depending on the causative organism.

In practice, we find 10-15% of chronic illnesses (including blood clots and cancers) have a pleomorphic etiology, but rather than try to eliminate those organisms with antibiotics (which always have side effects), we instead give signaling products derived from healthy bacteria that cause the pathologic bacteria to transform into a non-harmful form, which in those applicable cases, frequently yields remarkable results (e.g., this approach is very useful for lupus and many cancers). Likewise, I believe this model explains a longstanding belief within natural medicine that giving antibiotics for an acute infection often transforms it into a chronic illness down the road.

Note: ultraviolet blood irradiation is also quite effective at eliminating these organisms and the diseases they cause. For example, a case report discussed a cohort of 5 family members who had a variety of chronic diseases (e.g., Crohn's disease, asthma, complex regional pain syndrome, hypothyroidism, type 1 diabetes mellitus, and lymphangiomatosis) and found that 4 had a MAP (mycobacterium paratuberculosis) infection. Two patients received antibiotics and UVBI, and then experienced a resolution of their autoimmune symptoms.

As I discussed recently, DMSO is well-known for being able to treat a wide variety of autoimmune disorders. In that article, I highlighted my suspicion that this cancer may partially explain that. This is due to the fact many that rheumatologic drugs also function as antibiotics, antibiotics suited to eliminating CWD bacteria also function as rheumatologic drugs (which is also essentially the case for ultraviolet blood irradiation), and that many autoimmune conditions, with the appropriate techniques, have had CWD bacteria isolated from them. In turn, I suspect DMSO's increased toxicity to smaller microorganisms (possibly due to their lack of a cell wall) may make it uniquely suited to eliminate these microbes (while simultaneously not harming the body).

Lastly, Individuals with chronic fatigue syndrome often find relief from DMSO, which some have attributed to its antiviral properties (e.g., towards Epstein Barr). This for example, is a letter Stanley. Jacob received from a patient:

I am the victim of a rare chronic systemic virus infection, which is not recognized by a majority of the medical profession. In 1965, 1 had an acute attack of encephalitis, hepatitis, and asthmatic bronchitis so severe that mental and speech coherence were impaired and I scarcely hoped to live through the night.

The internist who had accepted me three months earlier gave me prednisone, which resulted in immediate improvement. But before the course was completed, serious symptoms of encephalitis recurred. I felt I had nothing to lose, as the next attack would almost certainly be fatal.

I tried DMSO strictly on my own responsibility. Results were truly dramatic. All symptoms diminished, and after an absence of six weeks I returned to work. Laboratory tests showed equally dramatic chemical improvement in liver and white cell count

I attribute all of my success to DMSO for not having to go through with the amputation of my right leg. I was told by several professional men I would not be able to stand the pain otherwise, and they were right. The pain was so

excruciating, so severe that I bounced my head on the wall. I had to crawl instead of walking, and I took 1 5 to 20 painkiller pills a day.

Note: Readers have also reported to me (e.g., here, here, and here) that DMSO helped their chronic fatigue.

Treating Infectious Diseases With DMSO

In my writing this article, it is my sincere hope that it:

•Will inspire physicians to begin combining DMSO for challenging to-treat infections (as it opens up a new door to medicine and provides a way for doctors within a fairly conventional paradigm to treat many illnesses they struggle with).

•Provide you with the tools you can use to help your own health to deal with these challenging infections.

Fortunately, due to the multifaceted and systemic benefits of DMSO, many who used the guidance previously have already reported that DMSO also helped with a challenging infection they had. As such, in the final part of this article I will cover:

•General instructions for using DMSO (e.g., doses, sources, and updates) and disease specific recommendations.

•Non-pharmaceutical alternatives to antibiotics that can be mixed with DMSO to eliminate infections.

•Some of our other preferred approaches for treating the diseases discussed in this article (e.g., shingles, candida, or upper respiratory tract infections).

•Thoughts on some of the popular alternative antimicrobials (e.g., chlorine dioxide and many others few know about).

(material behind paywall deleted)

Conclusion

I sincerely hope you've been enjoying this series. When I started it, it was my goal to make a usable and comprehensive reference on the topic that could use this unique historical moment we are in to effectively persuade the public to begin looking into the Forgotten Sides of Medicine. To my great surprise, that seems to have happened (and I am truly grateful for all the support you have given to making that dream come true), but simultaneously, I greatly underestimated how much work this would be (e.g., in this article, due to time constraints, I was forced to skip many of the studies on DMSO and infectious diseases).

In the remaining parts of the series, I am planning to:

•Cover DMSO's uses for cancer (e.g., how it can mitigate the harms of chemotherapy and radiation, increase the potency of chemotherapy, cause cancers to revert, and serve as a vehicle to bring non-toxic but effective anticancer therapies into tumors).

•Cover the various ways DMSO can be mixed with a variety of other therapeutic agents (which as this article shows, opens up many fascinating possibilities).

•Review the methods that can be used to reduce DMSO's odor.

•Compile and synthesize all the reports I have received from readers about using DMSO.

•Publish a series of abridged summaries of the series that will be more accessible to everyone.

While that is still a lot to do, it’s a great relief to see there is a light at the end of the tunnel (at which point after a brief break, I will dive into ozone).