DMSO CANCER TREATMENT:

MIRACLE OR SCAM?

WHAT YOU NEED TO KNOW ABOUT DMSO

BEFORE DECIDING YOUR

CANCER TREATMENT STRATEGY

Research Summary

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This research summary is comprised of a set of the best sources of information about DMSO that is available on the internet. The purpose of putting this information together here is to save you the trouble of filtering out the truly good information about DMSO from the overwhelming amount of marketing hype, propaganda, disinformation, and other blather that is widespread on this topic.

This summary consists of several reports that I have included in their original form, with links to the source material in case you want to explore it further. Explanations range from easy reading to in-depth scientific perspective. I encourage you to read all of it, or at least read what you can and skim through the rest.

My perspective is that DMSO verges on being a scientific and medical miracle. I have used it in my own university research laboratory and I have used it for medical purposes for myself and my family.

The FDA requires that I offer a medical disclaimer, as follows: No information in this summary is meant to be medical advice of any kind. It is not meant to diagnose or treat any medical condition.

This disclaimer is not the only ridiculous requirement handed down by the FDA. I will just leave it at that and depend on your intelligence to figure out the truth.

All the best in natural health,

Dr. D

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DMSO: Many Uses, Much Controversy

Source: http://www.dmso.org/articles/information/pmuir.htm

Abstract

Dimethyl sulfoxide (DMSO), a by-product of the wood industry, has been in use as a commercial solvent since 1953. It is also one of the most studied but least understood pharmaceutical agents of our time--at least in the United States. According to Stanley Jacob, MD, a former head of the organ transplant program at Oregon Health Sciences University in Portland, more than 40,000 articles on its chemistry have appeared in scientific journals, which, in conjunction with thousands of laboratory studies, provide strong evidence of a wide variety of properties. (See Major Properties Attributed to DMSO) Worldwide, some 11,000 articles have been written on its medical and clinical implications, and in 125 countries throughout the world, including Canada, Great Britain, Germany, and Japan, doctors prescribe it for a variety of ailments, including pain, inflammation, scleroderma, interstitial cystitis, and arthritis elevated intercranial pressure. Yet in the United States, DMSO has Food and Drug Administration (FDA) approval only for use as a preservative of organs for transplant and for interstitial cystitis, a bladder disease. It has fallen out of the limelight and out of the mainstream of medical discourse, leading some to believe that it was discredited. The truth is more complicated.

DMSO: A History of Controversy

The history of DMSO as a pharmaceutical began in 1961, when Dr. Jacob was head of the organ transplant program at Oregon Health Sciences University. It all started when he first picked up a bottle of the colorless liquid. While investigating its potential as a preservative for organs, he quickly discovered that it penetrated the skin quickly and deeply without damaging it. He was intrigued. Thus began his lifelong investigation of the drug.

The news media soon got word of his discovery, and it was not long before reporters, the pharmaceutical industry, and patients with a variety of medical complaints jumped on the news. Because it was available for industrial uses, patients could dose themselves. This early public interest interfered with the ability of Dr. Jacob--or, later, the FDA--to see that experimentation and use were safe and controlled and may have contributed to the souring of the mainstream medical community on it.

Why, if DMSO possesses half the capabilities claimed by Dr. Jacob and others, is it still on the sidelines of medicine in the United States today?

"It's a square peg being pushed into a round hole," says Dr. Jacob. "It doesn't follow the rifle approach of one agent against one disease entity. It's the aspirin of our era. If aspirin were to come along today, it would have the same problem. If someone gave you a little white pill and said take this and your headache will go away, your body

temperature will go down, it will help prevent strokes and major heart problems--what would you think?"

Others cite DMSO's principal side effect: an odd odor, akin to that of garlic, that emanates from the mouth shortly after use, even if use is through the skin. Certainly, this odor has made double-blinded studies difficult. Such studies are based on the premise that no one, neither doctor nor patient, knows which patient receives the drug and which the placebo, but this drug announces its presence within minutes.

Others, such as Terry Bristol, a Ph.D. candidate from the University of London and president of the Institute for Science, Engineering and Public Policy in Portland, Oregon, who assisted Dr. Jacob with his research in the 1960s and 1970s, believe that the smell of DMSO may also have put off the drug companies, that feared it would be hard to market. Worse, however, for the pharmaceutical companies was the fact that no company could acquire an exclusive patent for DMSO, a major consideration when the clinical testing required to win FDA approval for a drug routinely runs into millions of dollars. In addition, says Mr. Bristol, DMSO, with its wide range of attributes, would compete with many drugs these companies already have on the market or in development.

The FDA and DMSO

In the first flush of enthusiasm over the drug, six pharmaceutical companies embarked on clinical studies. Then, in November 1965, a woman in Ireland died of an allergic reaction after taking DMSO and several other drugs. Although the precise cause of the woman's death was never determined, the press reported it to be DMSO. Two months later, the FDA closed down clinical trials in the United States, citing the woman's death and changes in the lenses of certain laboratory animals that had been given doses of the drug many times higher than would be given humans.

Some 20 years and hundreds of laboratory and human studies later, no other deaths have been reported, nor have changes in the eyes of humans been documented or claimed. Since then, however, the FDA has refused seven applications to conduct clinical studies, and approved only 1, for intersititial cystitis, which subsequently was approved for prescriptive use in 1978.

Dr. Jacob believes the FDA "blackballed" DMSO, actively trying to kill interest in a drug that could end much suffering. Jack de la Torre, MD, Ph.D., professor of neurosurgery and physiology at the University of New Mexico Medical School in Albuquerque, a pioneer in the use of DMSO and closed head injury, says, "Years ago the FDA had a sort of chip on its shoulder because it thought DMSO was some kind of snake oil medicine. There were people there who were openly biased against the compound even though they knew very little about it. With the new administration at that agency, it has changed a bit." The FDA recently granted permission to conduct clinical trials in Dr. de la Torre's field of closed head injury.

DMSO Penetrates Membranes and Eases Pain

The first quality that struck Dr. Jacob about the drug was its ability to pass through membranes, an ability that has been verified by numerous subsequent researchers. DMSO's ability to do this varies proportionally with its strength--up to a 90 percent solution. From 70 percent to 90 percent has been found to be the most effective strength across the skin, and, oddly, performance drops with concentrations higher than 90 percent. Lower concentrations are sufficient to cross other membranes. Thus, 15 percent DMSO will easily penetrate the bladder.

In addition, DMSO can carry other drugs with it across membranes. It is more successful ferrying some drugs, such as morphine sulfate, penicillin, steroids, and cortisone, than others, such as insulin. What it will carry depends on the molecular weight, shape, and electrochemistry of the molecules. This property would enable DMSO to act as a new drug delivery system that would lower the risk of infection occurring whenever skin is penetrated.

DMSO perhaps has been used most widely as a topical analgesic, in a 70 percent DMSO, 30 percent water solution. Laboratory studies suggest that DMSO cuts pain by blocking peripheral nerve C fibers. Several clinical trials have demonstrated its effectiveness, although in one trial, no benefit was found. Burns, cuts, and sprains have been treated with DMSO. Relief is reported to be almost immediate, lasting up to 6 hours. A number of sports teams and Olympic athletes have used DMSO, although some have since moved on to other treatment modalities. When administration ceases, so do the effects of the drug.

Dr. Jacob said at a hearing of the U.S. Senate Subcommittee on Health in 1980, "DMSO is one of the few agents in which effectiveness can be demonstrated before the eyes of the observers....If we have patients appear before the Committee with edematous sprained ankles, the application of DMSO would be followed by objective diminution of swelling within an hour. No other therapeutic modality will do this." Chronic pain patients often have to apply the substance for 6 weeks before a change occurs, but many report relief to a degree they had not been able to obtain from any other source.

DMSO and Inflammation

DMSO reduces inflammation by several mechanisms. It is an antioxidant, a scavenger of the free radicals that gather at the site of injury. This capability has been observed in experiments with laboratory animals and in 150 ulcerative colitis patients in a double-blinded randomized study in Baghdad, Iraq. DMSO also stabilizes membranes and slows or stops leakage from injured cells.

At the Cleveland Clinic Foundation in Cleveland, Ohio, in 1978, 213 patients with inflammatory genitourinary disorders were studied. Researchers concluded that DMSO brought significant relief to the majority of patients. They recommended the drug for all

inflammatory conditions not caused by infection or tumor in which symptoms were severe or patients failed to respond to conventional therapy.

Stephen Edelson, MD, F.A.A.F.P., F.A.A.E.M., who practices medicine at the Environmental and Preventive Health Center of Atlanta, has used DMSO extensively for 4 years. "We use it intravenously as well as locally," he says. "We use it for all sorts of inflammatory conditions, from people with rheumatoid arthritis to people with chronic low back inflammatory-type symptoms, silicon immune toxicity syndromes, any kind of autoimmune process.

"DMSO is not a cure," he continues. "It is a symptomatic approach used while you try to figure out why the individual has the process going on. When patients come in with rheumatoid arthritis, we put them on IV DMSO, maybe three times a week, while we are evaluating the causes of the disease, and it is amazing how free they get. It really is a dramatic treatment."

As for side effects, Dr. Edelson says: "Occasionally, a patient will develop a headache from it, when used intravenously--and it is dose related." He continues: "If you give a large dose, [the patient] will get a headache. And we use large doses. I have used as much as 30 ml IV over a couple of hours. The odor is a problem. Some men have to move out of the room [shared] with their wives and into separate bedrooms. That is basically the only problem."

DMSO was the first nonsteroidal anti-inflammatory discovered since aspirin. Mr. Bristol believes that it was that discovery that spurred pharmaceutical companies on to the development on other varieties of nonsteroidal anti-inflammatories. "Pharmaceutical companies were saying that if DMSO can do this, so can other compounds," says Mr. Bristol. "The shame is that DMSO is less toxic and has less int he way of side effects than any of them."

Collagen and Scleroderma

Scleroderma is a rare, disabling, and sometimes fatal disease, resulting from an abnormal buildup of collagen in the body. The body swells, the skin--particularly on hands and face--becomes dense and leathery, and calcium deposits in joints cause difficulty of movement. Fatigue and difficulty in breathing may ensue. Amputation of affected digits may be necessary. The cause of scleroderma is unknown, and, until DMSO arrived, there was no known effective treatment.

Arthur Scherbel, MD, of the department of rheumatic diseases and pathology at the Cleveland Clinic Foundation, conducted a study using DMSO with 42 scleroderma patients who had already exhausted all other possible therapies without relief. Dr. Scherbel and his coworkers concluded 26 of the 42 showed good or excellent improvement. Histotoxic changes were observed together with healing of ischemic ulcers on fingertips, relief from pain and stiffness, and an increase in strength. The investigators noted, "It should be emphasized that these have never been observed with

any other mode of therapy." Researchers in other studies have since come to similar conclusions.

Does DMSO Help Arthritis?

It was inevitable that DMSO, with its pain-relieving, collagen-softening, and anti-inflammatory characteristics, would be employed against arthritis, and its use has been linked to arthritis as much as to any condition. Yet the FDA has never given approval for this indication and has, in fact, turned down three Investigational New Drug (IND) applications to conduct extensive clinical trials.

Moreover, its use for arthritis remains controversial. Robert Bennett, MD, F.R.C.P., F.A.C.R., F.A.C.P., professor of medicine and chief, division of arthritis and rheumatic disease at Oregon Health Sciences University (Dr. Jacob's university), says other drugs work better. Dava Sobel and Arthur Klein conducted their own informal study of 47 arthritis patients using DMSO in preparation for writing their book, Arthritis: What Works, and came to the same conclusion.

Yet laboratory studies have indicated that DMSO's capacity as a free-radical scavenger suggests an important role for it in arthritis. The Committee of Clinical Drug Trials of the Japanese Rheumatism Association conducted a trial with 318 patients at several clinics using 90 percent DMSO and concluded that DMSO relieved joint pain and increased range of joint motion and grip strength, although performing better in more recent cases of the disease. It is employed widely in the former Soviet Union for all the different types of arthritis, as it is in other countries around the world.

Dr. Jacob remains convinced that it can play a significant role in the treatment of arthritis. "You talk to veterinarians associated with any race track, and you'll find there's hardly an animal there that hasn't been treated with DMSO. No veterinarian is going to give his patient something that does not work. There's no placebo effect on a horse."

DMSO and Central Nervous System Trauma

Since 1971, Dr. de la Torre, then at the University of Chicago, has experimented using DMSO with injury to the central nervous system. Working with laboratory animals, he discovered that DMSO lowered intracranial pressure faster and more effectively than any other drug. DMSO also stabilized blood pressure, improved respiration, and increased urine output by five times and increased blood flow through the spinal cord to areas of injury. Since then, DMSO has been employed with human patients suffering severe head trauma, initially those whose intracranial pressure remained high despite the administration of mannitol, steroids, and barbiturates. In humans, as well as animals, it has proven the first drug to significantly lower intracranial pressure, the number one problem with severe head trauma.

"We believe that DMSO may be a very good product for stroke," says Dr. de la Torre, "and that is a devastating illness which affects many more people than head injury. We

have done some preliminary clinical trials, and there's a lot of animal data showing that it is a very good agent in dissolving clots."

Other Possible Applications for DMSO

Many other uses for DMSO have been hypothesized from its known qualities and have been tested in the laboratory or in small clinical trials. Mr. Bristol speaks with frustration about important findings that have never been followed up on because of the difficulty in finding funding and because "to have on your resume these days that you've worked on DMSO is the kiss of death." It is simply too controversial. A sampling of some other possible applications for this drug follows.

DMSO has long been used to promote healing. People who have it on hand often use it for minor cuts and burns and report that recovery is speedy. Several studies have documented DMSO use with soft tissue damage, local tissue death, skin ulcers, and burns.

In relation to cancer, several properties of DMSO have gained attention. In one study with rats, DMSO was found to delay the spread of one cancer and prolong survival rates with another. In other studies, it has been found to protect noncancer cells while potentiating the chemotherapeutic agent.

Much has been written recently about the worldwide crisis in antibiotic resistance among bacteria (see Alternative & Complementary Therapies, Volume 2, Number 3, 1996, pages 140-144) Here, too, DMSO may be able to play a role. Researcher as early as 1975 discovered that it could break down the resistance certain bacteria have developed.

In addition to its ability to lower intracranial pressure following closed head injury, Dr. de la Torre's work suggests that the drug may actually have the ability to prevent paralysis, given its ability to speedily clean out cellular debris and stop the inflammation that prevents blood from reaching muscle, leading to the death of muscle tissue.

With its great antioxidant powers, DMSO could be used to mitigate some of the effects of aging, but little work has been done to investigate this possibility. Toxic shock, radiation sickness, and septicemia have all been postulated as responsive to DMSO, as have other conditions too numerous to mention here.

DMSO in the Future

Will DMSO ever sit on the shelves of pharmacies in this country as a legal prescriptive for many of the conditions it may be able to address? Will the studies we need to discover when this drug is most appropriate ever be done? Given the difficulties the drug has run into so far and the recent development of new drugs that perform some of the same functions, Mr. Bristol is doubtful. Others, however, such as Dr. Jacob and Dr. de la Torre, see the FDA approval of DMSO for interstitial cystitis and the more recent

FDA go-ahead for DMSO trials with closed head injury as new indications of hope. The cystitis approval means that physicians may use it at their discretion for other uses, giving DMSO a new legitimacy.

Dr. Jacob continues to believe that DMSO should not even be called a drug but is more correctly a new therapeutic principle, with an effect on medicine that will be profound in many areas. Whether that is true cannot be known without extensive a publicly reported trials, which are dependent on the willingness of researchers to undertake rigorous studies in this still-unfashionable tack and of pharmaceutical companies and other investors to back them up. That this is a live issue is proved by the difficulty the investigators with approval to test DMSO for closed head injury clinically are having finding funds to conduct the trials.

In 1980, testifying before the Select Committee on Agin of the U.S. House of Representatives, Dr. Scherbel said, "The controversy that exists over the clinical effectiveness of DMSO is not well-founded--clinical effectiveness may be variable in different patients. If toxicity is consistently minimal, the drug should not be restricted from practice. The clinical effectiveness of DMSO can be decided with complete satisfaction if the drug is made available to the practicing physician. The number of patient complaints about pain and the number of phone calls to the doctor's office will decide quickly whether or not the drug is effective."

It may be premature to call for the full rehabilitation of DMSO, but it is time to call for a full investigation of its true range of capabilities.

DMSO - The Magic Bullet For Cancer

Source: http://cancertutor.com/Cancer/DMSO.html

Introduction

Have you ever heard of a "P.E.T. Scan?" When using a PET Scan a technician will give a cancer patient a solution of radioactive glucose (i.e. a radioactive tracer or tagged glucose). Since cancer cells consume 15 times more glucose than normal cells, the cancer cells will absorb 15 times more of this radioactive glucose than normal cells. The result is that when they do the PET Scan the cancer cells show up in the X-Ray. Orthodox medicine thus knows how to target cancer cells. If orthodox medicine were truly interested in curing cancer, don't you think they would look for ways to "tag" glucose in such a way that the glucose targeted cancer cells and killed them? In other words, don't you think orthodox medicine would look for a way to target cancer cells with the intent to kill the cancer cells rather than simply have them show up on an X-Ray? Such a cancer treatment does exist!! But rather than use glucose it uses DMSO (Dimethylsulfoxide). Essentially:

1) The DMSO "binds" to (i.e. chemically attaches to) certain kinds of chemotherapy drugs, then
2) The DMSO (which always targets cancer cells) will target the cancer cells, and
3) The DMSO will drag the chemotherapy into the cancer cells, and
4) The chemotherapy (which is now able to target cancer cells) will kill the cancer cells.

Normally, chemotherapy targets "fast-growing" cells, meaning normally chemotherapy does NOT target cancer cells. But wih this treatment chemotherapy targets only cancer cells. Only very small doses of chemotherapy are needed and there are no side-effects from the chemotherapy since all of the chemotherapy targets cancer cells.

There was actually a medical doctor who used this DMSO / chemotherapy treatment (i.e. which I call "DMSO Potentiation Therapy"). But rather than give that medical doctor the Nobel Prize for curing cancer, the FDA raided his office and shut him down permanently.

A Brief Introduction to DMSO

The orthodox medical community claims to be looking for a "magic bullet" that helps chemotherapy target cancer cells. Why is finding a "magic bullet" so important? Chemotherapy does not target cancer cells, and because of this, chemotherapy:

1) Kills far more normal cells than cancer cells, and
2) Damages and toxifies many of the normal cells that do survive.

Thus, if a substance could be found that helps chemotherapy target cancer cells, FAR LESS chemotherapy would be needed and the patient would have VIRTUALLY ZERO SIDE-EFFECTS from chemotherapy. This is both because less chemotherapy would be

needed and because only the cancer cells would be affected by the chemotherapy, meaning normal cells would not be damaged and killed by chemotherapy!!!!!

In addition to all of this, if such a substance were found and used the "true cure rate" for orthodox medicine would rise from 3% to above 90%!! Most cancer patients die because of the complications of surgery, radiation and chemotherapy. Because of the way chemotherapy works, doctors cannot give enough chemotherapy to cure cancer because the patient would die from the side-effects BEFORE the cancer was cured. A "magic bullet" would solve all of these problems.

If such a "magic bullet" were used FIRST by orthodox medicine, meaning the cut/burn/slash treatments were avoided (except in rare cases where there is imminent danger from a tumor blocking fluids or pressing against something), a 90% true cure rate would be easy to achieve. In fact, with alternative medicine, for those people who know what they are doing, a 90% cure rate, by those who avoid orthodox medicine, is very easy to achieve. Orthodox medicine could do the same thing if they found and used a magic bullet.

But the fact of the matter is that the leaders in the medical community have absolutely no interest in finding a "magic bullet." A "magic bullet" would cost the drug companies hundreds of billions of dollars, patients would have less hospitalization, less doctor visits, etc. The fact is, no one wants a "magic bullet" to be found. The evidence that this is true is that two "magic bullets" are already known to exist, but no one is using them except for a handful of doctors.

Insulin Potentiation Therapy

For example, in the 1940s it was discovered that cancer can be treated with insulin. Soon after it was found out why. Insulin helps certain kinds of chemotherapy target the cancer cells by making it much easier for the chemotherapy to get inside of cancer cells!! This led to the development of Insulin Potentiation Therapy (IPT).

"Beyond these metabolic effects of insulin here, what is further considered to be operative is that at least some of the ten thousand fold increase in the cytotoxic effect of methotrexate [a chemotherapy drug] is due to an increased intracellular concentration of the drug due to insulin's physiological action in altering cell membrane permeability. It is thought that this effect exists on account of the insulin receptors on the cancer cell membranes, and that these facilitate the transmembrane transport of the chemotherapeutic drug into the intracellular compartment of these breast cancer cells."

http://weeksmd.com/articles/cancer/Insulin_potentiation_therapy.html

In the early days of IPT a person had to be put into an insulin coma in order for IPT to be effective. This is no longer the case, but the orthodox medical community still ignores this treatment.

DMSO

No later than 1968, it was discovered that there was another product that could target cancer cells, but this product actually bound to the chemotherapy. In this article (which will be linked to below):

"Haematoxylon [a dye] Dissolved in Dimethylsulfoxide [DMSO] Used in Recurrent Neoplasms [i.e. cancer cells or tumor cells]," by E. J. Tucker, M.D., F.A.C.S., and A. Carrizo, M.D. in International Surgery, June 1968, Vol 49, No. 6, page 516-527
it was shown that DMSO targeted cancer cells!! Is it any wonder that the referee of the article stated:

"In spite of my criticisms, there are some parts of this study which do interest me very much. The fact that the Haematoxylon [a color die, which allowed the researchers to see which cells absorbed the DMSO and haematoxylon] and D.M.S.O. solution had a particular affinity for neoplasms [i.e. cancerous cells], and did not stain other tissues in animals could be most significant."

In other words, these researchers had discovered something that could bind to chemotherapy and then target cancer cells. They had found a second "magic bullet"!! The combination of DMSO and Haematoxylon was being used as a cure for cancer in this study. The combination performed very, very well. However, it was unfortunate that chemotherapy was used in many of the cases. Since DMSO binds to some types of chemotherapy (which was probably not known at the time), it is not know whether the success of the treatment was caused by the DMSO/chemotherapy combination or the DMSO/haematoxylon combination.

In any case, even though both DMSO and haematoxylon are purely non-toxic and purely natural (both come from trees), this is not a treatment that should be used at home. It can cause severe internal bleeding in some cases. It is far beyond the scope of this article to get into the use of this treatment.

The point is that the "magic bullet" had been found, which this website calls "DMSO Potentiation Therapy (DPT)." Obviously, further research using DMSO and chemotherapy, or DMSO and haematoxylon, never happened.

Why don't you ask your oncologist why research on the magic bullet discovered in 1968 was not followed up on!! You might mention the scientific study discussed above.
In later studies DMSO was found to be a superb potentiator of Adriamycin, Cisplatin, 5 Fluorouracil, and Methotrexate, and others. For more information about DMSO and chemotherapy see the excellent book (which talks about both IPT and DMSO being combined with chemotherapy):

Treating Cancer With Insulin Potentiation Therapy, by Ross A. Hauser, M.D. and Marion A. Hauser, M.S.

Absolutely nothing has been done about these discoveries for almost 40 years!! The complete article discussing DMSO and Haematoxylon can be found at:

The Original DMSO and Haematoxylon Journal Article

You might ask your oncologist why your chances of survival are only 3% (ignoring all of their statistical gibberish such as "5-year survival rates" and deceptive terms like "remission" and "response"), when your chance of survival would be over 90% if they used DMSO with very small doses of chemotherapy.

It would be better for medical doctors to treat cancer patients with the right treatment than to have patients treat themselves at home. Medical doctors can diagnose better, treat better, watch for developing problems better, etc. Unfortunately, doctors are using treatments that have been chosen solely on the basis of their profitability rather than their effectiveness.

DMSO is a highly non-toxic, 100% natural product that comes from the wood industry. But of course, like IPT, this discovery was buried. DMSO, being a natural product, cannot be patented and cannot be made profitable because it is produced by the ton in the wood industry. The only side-effect of using DMSO in humans is body odor (which varies from patient to patient).

The FDA took note of the effectiveness of DMSO at treating pain and made it illegal for medical uses in order to protect the profits of the aspirin companies (in those days aspirin was used to treat arthritis). Thus, it must be sold today as a "solvent." Few people can grasp the concept that government agencies are organized for the sole purpose of being the "police force" of large, corrupt corporations.

While it is generally believed that orthodox medicine and modern corrupt politicians persecute alternative medicine, this is not technically correct. What they do is persecute ANY cure for cancer, it doesn't matter whether it is orthodox or alternative. The proof of this is IPT and DMSO, which can both be combined with chemotherapy. It appears that orthodox medicine persecutes alternative medicine only because there are far more alternative cancer treatments that can cure cancer than orthodox treatments.

Another substance that targets cancer cells is being researched at Purdue University and other places: folic acid. This too will be buried unless it can lead to MORE PROFITABLE cancer treatments.

But alternative medicine is not interested in combining DMSO with chemotherapy. DMSO will combine with many substances, grab them, and drag them into cancer cells. It will also blast through the blood-brain barrier like it wasn't even there.

DMSO has been combined successfully with hydrogen peroxide (e.g. see Donsbach), cesium chloride, MSM (though it may not bind to MSM), and other products.

(Note: The issue has come up several times whether it would be a good idea to mix DMSO with full-strength chemotherapy. This question generally comes up when someone wants to take cesium chloride and DMSO with their chemotherapy. The theory would lean against such advice, however, in actual practice many patients on chemotherapy have also taken DMSO. It does not seem to cause a problem, but whether the DMSO binds to the chemotherapy would depend on which chemotherapy was being used. DMSO does not bind to every type of chemotherapy, only certain kinds (the exact kinds are not totally known because the FDA forced all research on DMSO to stop).

DMSO Potentiation Protocol

DPT and IPT

DMSO Potentiation Therapy (DPT) is generally not used by itself. When it is used, it is generally used in combination with Insulin Potentiation Therapy (IPT). These two treatments are very synergistic because the DMSO binds to chemotherapy and the insulin opens up the membranes of the cancer cells.

The result of combining these two treatments is that there is a double effect on the chemotherapy targeting the cancer cells and getting inside the cancer cells.
The book Treating Cancer With Insulin Potentiation Therapy, mentioned above, discusses which kinds of chemotherapy bind to DMSO and it talks about which kinds of chemotherapy work best with insulin.

DMSO and MSM

DMSO and MSM, when used together, have been shown to cause cancer cells in vitro to revert back to being normal cells. The only way this can happen is if they kill the microbe(s) inside of the cancer cell and/or completely reverse the anaerobic metabolism. However, the only treatment designed to take advantage of this discovery is still an experimental treatment. It is not experimental due to toxicity, it is perfectly safe to use, it is only experimental in the sense that no one knows yet how to convert what was discovered in the lab into an actual cancer treatment.

It is also not known whether MSM actually helps the DMSO revert cancer cells into normal cells. DMSO, by itself, has been shown to revert many types of cancer cells into normal cells.

Cesium Chloride / DMSO Protocol

DMSO is generally used in alternative medicine with liquid ionic cesium chloride. See: Cesium Chloride Protocol

DMSO helps cesium chloride get inside of cancer cells, though cesium chloride is perfectly capable of doing this by itself. What DMSO is really used for is to get the

cesium chloride through the skin, into the blood stream. Neither cesium chloride nor DMSO should be taken orally, thus it is a perfect marriage to mix the two together and let the DMSO carry the cesium chloride through the skin.

DMSO is especially effective with brain cancer patients because of how quickly it gets past the blood-brain barrier, but it can be used productively with any type of cancer. In a case study, one brain cancer patient had a tumor in his brain pressing against one of his optic nerves. When he mixed DMSO with the cesium chloride he could literally feel the cesium chloride and DMSO getting into his tumor within 15 minutes. He could feel it because his tumor was pressing against an optic nerve.

DMSO should be used only as a topical application to the skin, but NOT near where any dense concentrations of cancer cells are and NOT touching any surface cancer cells. DMSO will penetrate the skin and help get the cesium chloride, and many other alternative cancer treatments, into the cancer cells.

If you use DMSO you may get a rash. Just spray some water on the rash and it will go away. The rash is caused by the DMSO dehydrating the skin.

DMSO should not be taken orally unless it is mixed with at least 8 ounces (i.e. 1 cup) of water or some type of juice. Even seventy percent DMSO (actually it is 99.9% pure DMSO, mixed with 30% distilled water) could cause dehydration in the digestive tract unless it is mixed with enough water or juice! DMSO should never be taken orally for more than a short time. Even when taken with enough liquids it will cause stomach problems!

It is highly advised that the Cesium Chloride / DMSO Protocol be used under the direction of an expert, either by telephone or in a clinic setting. For all practical purposes, the FDA and AMA have shut down the use of cesium chloride and DMSO in a clinic setting inside the U.S. Thus, in the U.S. there is no choice but to use a vendor who is an expert in safely using the protocol. The Cesium Chloride / DMSO Protocol goes into this issue in more depth, but keep this critical issue in mind!

Note: Due to the FDA harassment of DMSO (and by the way, a lot of research on DMSO has been suppressed), vendors of DMSO cannot sell it for medical reasons. Thus, when you visit a web site that sells DMSO it will be sold as a "solvent." Do not be concerned, DMSO is an all natural product and is absolutely nontoxic at recommended dosages.

DMSO Protocol and Safety Warnings

DMSO is an amazing product. Unfortunately, there are some strong warnings that go with its use. Do not be alarmed by these safety warning, they are easy to implement. First, pregnant women, women who may be pregnant, women who may become pregnant, or women who are nursing, should not use DMSO - period! Even though

there is no evidence that DMSO causes birth defects, the similarity between early fetal cells and cancer cells is so great that it is better to err on the side of caution.
Second, do NOT let it come into contact with your eyes. Again, there is no evidence this will cause problems, but it is better to err on the side of caution.

Third, do NOT use plastic, latex or rubber gloves, or any other kind of gloves, when handling DMSO. The DMSO may bind to the gloves and take the substance into your cells causing severe illness. A technician who was working with the scientists who originally discovered DMSO became very sick from handling the newly discovered DMSO with lab gloves. While some surgical gloves may be of such quality that they can be used to handle DMSO, if you use any type of gloves you do so at your own risk. However, these rules create a problem. It is highly advised to use gloves when administering DMSO on the skin or else the hands will become very wrinkled. Fortunately, there are simple tests to see if the DMSO is binding to the gloves and creating a danger.

If the person rubbing the DMSO onto the skin of a cancer patient wants to use a plastic, latex or rubber glove, there are two simple ways to test if the DMSO is binding to the plastic, latex or rubber. First, you can soak one finger tip of the glove in DMSO for 24 hours. If there is no damage to the glove after the test it is OK to use. Or you can pour some DMSO into the inside finger tip of the glove for 24 hours. Then turn the glove inside-out and see if there is any damage where the DMSO was. If not, it is OK to use.
Fourth, do NOT let the DMSO come into contact with any type of clothing or anything else.

In short, it should go straight from the bottle, into a mixing glass (made of glass, wood, ceramic or metal) and then the mixed product should be put on the skin, but not above or touching any cancer cells.

The following substances are always safe to use with DMSO: GLASS, WOOD, CERAMIC or METAL containers.

Rigid plastic containers are generally safe to use as well, such as spray bottles. In fact, spray bottles, of glass, rigid plastic or metal, are the preferred way of administering DMSO. Of course, it will still need to be spread by hand.

Having said all of that DMSO is a superb product and very safe to use if you take reasonable precautions.

The DMSO can be purchased as a liquid, gel or cream. The rules are the same for each.
Important Notes About Purchasing DMSO

It is very important that the DMSO you purchase has not had anything added to it to make it unsuitable for human consumption. Most commercial vendors in the U.S. do sell "food grade" DMSO, meaning it is safe for human consumption. However, I should emphasize that DMSO vendors cannot advertise their product is for human

consumption because the FDA, as part of their effort to destroy alternative medicine, has outlawed DMSO for human consumption. Vendors must sell DMSO as a "solvent." The way you can tell whether it is food grade, is this: if the vendor also sells DMSO cream/gel in a jar, and has safety warnings, then all of their DMSO is food grade unless otherwise stated.

This is a key issue especially for those outside of the U.S. Every country has different laws and different procedures for the manufacture of DMSO. Outside of the U.S. the DMSO vendors probably do not sell the DMSO cream in a jar, thus you will have to ask them, or look for documentation, that it is safe for human consumption.

Here is an important comment about DMSO:

"The first quality that struck Dr. Jacob about the drug was its ability to pass through membranes, an ability that has been verified by numerous subsequent researchers. DMSO's ability to do this varies proportionally with its strength--up to a 90 percent solution. From 70 percent to 90 percent has been found to be the most effective strength across the skin, and, oddly, performance drops with concentrations higher than 90 percent. Lower concentrations are sufficient to cross other membranes. Thus, 15 percent DMSO will easily penetrate the bladder.

In addition, DMSO can carry other drugs with it across membranes. It is more successful ferrying some drugs, such as morphine sulfate, penicillin, steroids, and cortisone, than others, such as insulin. What it will carry depends on the molecular weight, shape, and electrochemistry of the molecules. This property would enable DMSO to act as a new drug delivery system that would lower the risk of infection occurring whenever skin is penetrated."

Cesium and DMSO Protocols

Source:

http://www.thewolfeclinic.com/supplements/ionic_cesium_plus_with_rubidium.html

CESIUM CHLORIDE (With Rubidium) PROTOCOL

Although Cesium Chloride is a safe and effective protocol for the treatment of cancer it should be done under the supervision of a Health Care provider familiar with the procedure. It is important that you have blood tests done to evaluate electrolytes such as potassium, magnesium, calcium, sodium and uric acid every 14 to 30 days. An imbalance in one of these electrolytes can cause health problems or make the treatment ineffective. Detected early, imbalances can be corrected to avoid complications and ensure an effective treatment. Radiology tests should be repeated every 60 to 90 days to confirm results.

Understanding How Cesium Chloride Works

For a variety of reasons, sufficient oxygen sometimes cannot get into normal cells. When the level of oxygen a normal cell becomes too low, the normal cell will convert to becoming anaerobic.

A Nobel Prize in Medicine was awarded for proving that cancer cells are anaerobic. This means that when the cells do not burn oxygen, they convert to fermenting glucose to acquire energy.

In the absence of oxygen, the cell reverts to producing lactic acid through fermentation which makes the cell acidic. This destroys the ability of DNA and RNA to control cell division and thus the cancer cells begin to multiply unchecked. The cancer appears as a rapidly growing mass; this is due to the higher acidity of the cell which allows the cancer cells to thrive and expand.

Cesium Chloride can have the following effects:

- Enters the cell; making it alkaline
- limits the intake of glucose into the cell (thus starving the cell),
- prevents the production of lactic acid and this the cancer cell cannot proliferate

Ionic cesium chloride works by making cancer cells highly alkaline, typically 8.0 and above, thus killing the cancer cell. Cesium chloride not only kills cancer cells, it immediately stops the metastasis of the cancer, can shrink tumor masses within weeks, and almost always stops the pain of cancer within 12 to 36 hours.

H. Nieper in Hanover, Germany and by H. Sartori in Washington, DC as well as by a

number of other physicians studied effects of Cesium Chloride. Their observations were that most pain associated with cancer disappears within 12 to 36 hrs. In very few cases, there was a pain medication withdrawal circumstance that required a longer period of time to alleviate the symptoms.

The Cesium Chloride Protocol directly targets the acidic cancer cells while normal cells are not affected by the Cesium Chloride.

The Pattern of Taking the Cesium Chloride and Potassium

If you have symptoms from taking Cesium Chloride, call The Wolfe Clinic for further instruction.

Symptoms can include:

• numbness in the face: lips, chin or nose
• an extreme muscle weakness, such as in the legs
• very dry and scaly skin, which may split open or cause extreme itchiness
• Increased urination

A person should note that some of these symptoms are also symptoms of an excessive level of potassium in the blood.

ALL patients on cesium chloride should drink plenty of hexagonal or structured water in order to protect the kidneys. This is especially important for those who take more than 3 grams a day of cesium chloride.

Note: The cesium chloride, rubidium and potassium should ALWAYS be taken with food.

DMSO: Nature's Healer

Source: http://www.emmessar.com/chemical/company/p1.htm

(Excerpted from book by Dr. Morton Walker, DMSO: Nature's Healer)

The following information is provided for educational purposes. A qualified medical practitioner should always be consulted in the matter of receiving treatment advice for an illness.

Background

DMSO - dimethyl sulfoxide - is a simple by-product of the wood industry and is a solvent that can be produced in industrial or pharmaceutical grade. DMSO has variously been called a 'miracle' compound capable of relieving pain, diminishing swelling, reducing inflammation, encouraging healing and restoring normal cell function. One of the most well known and exotic properties of this solvent is its ability to penetrate living tissue and transport other medicines in their integral state deep into the body. For this reason, DMSO has been used by many in the treatment of burns and sprains, sports injuries, paralysis, arthritis, scleroderma and many of the degenerative diseases.

American doctor, Stanley W Jacob has worked with DMSO for many years and is considered one of the foremost authorities on the substance in the world. He states the following with regard to the therapeutic potential of DMSO: "We've barely scratched the surface [of DMSO's capabilities], for this is a new principle in medicine. We've only had three new principles in our century - the antibiotic principle, the cortisone principle, and now the DMSO principle - and the DMSO principle is the only one of our generation. Despite all the controversy, my guess is that history will record it this way."

When US Governor George Wallace travelled across the country to find pain relief from DMSO administered by Dr Jacob, the reputation of this painkilling solvent got a tremendous boost2. Wallace had been confined to a wheelchair since he was wounded in a 1972 assassination attempt while campaigning for the Democratic nomination for President at Laurel, Maryland. Wallace's discomforture was located in his flank, a condition which reportedly disappeared by faithfully dabbing DMSO over the affected area.

DMSO Goes Public

On 23rd March 1980 and again on 6th July of that year, the popular television program 60 Minutes reported on DMSO. In a presentation entitled "The Riddle of DMSO", presenter Mike Wallace covered the anecdotal patient history of the solvent and interviewed its main critics at the FDA. As a result of the broadcast, which reached the homes of 70 million viewers, the switchboards at Dr Jacob's office and others associated with the program were immediately swamped with up to 10,000 people figuratively crying, "Save me! Save me from my pain!" Pain victims sought out other

physicians around the United States who were known to prescribe DMSO. They arrived in droves. Telephones in the offices of doctors and pharmacies in Florida, Oregon, Louisiana and Nevada rang busily for several days following the Sunday evening broadcast of 60 Minutes. A subsequent wire service report about the FDA's refusal to approve DMSO appeared around the country in Tuesday's newspapers. In his program footnote, presenter Mike Wallace stated, "Tomorrow morning in Washington, the House Committee on Ageing begins an inquiry into why DMSO is not available to all Americans for any appropriate ailment, including plain and simple pain." The numbers of letters and telephone calls that came into congressional offices enquiring about the cause of DMSO unavailability were massive. A sampling of the letters sent to just one congressman, Claude Pepper of Florida, are found in chapter 4 of my book.

DMSO - Bane of the Establishment

Dimethyl sulfoxide has had a battered thirty-year history completely out of proportion to its true track record. Officially, DMSO has never been approved for widespread medicinal use because medical authorities declare that the quality of medical trials and research on the substance has not been up to statutory requirements. Dr J Richard Crout, the chief FDA opponent to DMSO, reported that double-blind tests3 were mandatory before approval would be forthcoming from his agency. Yet researchers cannot conduct double-blind tests on DMSO because of the distinctive odour produced by the product after application. Within a few minutes of putting it on your skin, you can taste it on your tongue; it penetrates the skin and runs through the bloodstream so effectively. The alternative reason for not approving dimethyl sulfoxide, according to some DMSO proponents, could also be a simple question of economics: DMSO, painkiller extraordinary, is a common by-product of the wood industry and cannot be patented to great profit by the pharmaceutical industry. Ironically, even drug companies have had their DMSO INDs turned down4.

The Medical Community Divided

Because of the general public outcry about its ban in the United States, and of course because of Mike Wallace and his 60 Minutes, DMSO has become a household word and medical-political cause célèbre. Those doctors among us who have been using the drug for twenty-six to twenty-eight years never dreamed that it would become a focal point in the continuing battle between individual freedom and the power of government. My colleagues and I have been criticized, ridiculed and even persecuted in some medical circles for promoting and using DMSO. But I, and others like me, have come to the conclusion, having observed establishment thinking for forty years, that the only way a truly revolutionary treatment principle can be brought to the patient is by appealing to the general population through the information media. It is for this reason that I wrote the book, DMSO - Nature's Healer.

In spite of the rumours, DMSO has not been found unsafe for humans. Any side effects are merely minor irritations. DMSO stops bacterial growth. It relieves pain. As a vasodilator, the drug enlarges small blood vessels, increasing the circulation to an area.

It softens scar tissue and soothes burns. DMSO's anti-inflammatory activity relieves the swelling and inflammation of arthritis, bursitis, tendinitis, and other musculoskeletal injuries. DMSO has been found to benefit human body cells, tissues and organs in ways not yet properly understood by medical science. For this reason, I believe DMSO is the 21st century's newest healing principle with a very wide range of usefulness. It represents an entirely different way of treating diseases.

DMSO and Cancer

Cancer seems to respond well to DMSO. At Mount Sinai Hospital in New York City, Charlotte Friend MD has turned cancerous cells into harmless, normal ones in the test tube by putting them in touch with the DMSO solutions. DMSO is routinely used by alternative cancer clinics in Mexico to transport laetrile intravenously into the body. Because of extremely promising clinical results, research is still ongoing on a privately funded basis into DMSO's potential role in the breaking up of tumours and the killing of metastatic cancer cells in its own right. Yet the United States Food & Drug Administration and the UK Medicines Control Agency continue to forbid the advertising and retailing of DMSO for any medicinal purposes save one: for the treatment of the rare urinary bladder condition, interstitial cystitis.

As reported in the Journal of Clinical Oncology in November 1988, twenty cancer patients with extravasation of anthracycline (destructive secretions from tissues of the toxic chemotherapeutic agent anthracycline onto the recipient's skin with the potential to form cancerous ulcers) were treated on a single-arm pilot study with topically-applied 99% DMSO and observed for three months with regular examinations and photographs. DMSO was topically applied to approximately twice the surface area affected by the extravasation and allowed to air dry. This was repeated every six hours for fourteen days. In no patient did extravasation progress to cancerous ulceration or require surgical intervention, as is usual with this toxic chemotherapeutic agent for cancer. The authors of this report suggest that ulceration was statistically likely to have occurred in at least 17% of these patients. The only side effects reported from DMSO usage included a burning feeling on applications, subsequently associated with itch, redness, and mild scaling. Six patients reported a characteristic breath odour associated with oysters. The oncologists stated that topical DMSO appears to be a safe and effective treatment for the cancer-related condition, anthracycline extravasation5.

Numerous drugs dissolved in DMSO retain their therapeutic activity and their specific properties over a long period of time. DMSO not only maintains but strengthens and multiplies the action of the drugs dissolved in it, thus permitting the administration of lower doses than normally required to obtain a satisfactory response. In organ banks around the world, organs and tissues are stored and preserved in DMSO so that they are available for transplanting and grafting. Tissues such as red blood corpuscles for transfusions and semen for artificial insemination are preserved in this manner.

As a penetrating carrier of drugs, DMSO is unsurpassed. It easily carries necessary pharmaceuticals to any part of the body for therapeutic effect. It passes through cellular

membranes and tissues. It is for this reason, among many others, that DMSO is properly described less as 'a drug' by those intimate with it, more as a new and little understood therapeutic principle. As Dr Jacobs reported to an assembly of the American College of Advancement in Medicine, DMSO is more effective when used in conjunction with other medications which it can deliver throughout the body with spectacular ease. This can occur even when DMSO is applied topically, and the other medication ingested orally or intravenously.

For instance, DMSO will carry hydrocortisone or hexachlorophene into the deepest layers of the skin, producing a reservoir that remains for sixteen days and resists depletion by washing the skin with soap, water or alcohol. DMSO mixed with hydrogen peroxide 9% solution has proven highly effective in the treatment of oral and genital herpes when applied topically to the affected areas. Periodic outbreaks of the virus have been known in many cases to cease altogether with regular application.

An interesting observation is that the application of DMSO to one affected joint or area often leads to pain relief in some other location. DMSO has systemic effects. It is a depressant to the central nervous system and, of course, it reaches all areas of the body when absorbed through the skin and into the bloodstream.

Perhaps the effect DMSO has had on the lives of countless thousands may be summed up by the case of Ruth Lewis of Sarasota, Florida. Ruth, aged sixty-four, was in so much pain from rheumatoid arthritis that she couldn't walk without the aid of a four-legged walking device. Pain had been her constant companion for over twenty years. When she recently sustained a back injury, she was told by her physicians to have at least six months total bed rest.

Realising that this could spell the end of her walking days for ever, the determined Ruth had her son and husband physically carry her into the Douglass preventative medicine clinic in Marietta, Georgia to undergo a course of treatment with DMSO.

"I had previously experienced many months of severe pain in my hips and legs, visiting specialists, diagnostic clinics, hospitalisation in traction and other procedures," said Ruth. "When I entered the doctor's office for DMSO treatment, I was unable to put both feet on the ground. After two-and-a-half weeks of intravenous DMSO treatment, I walked out of that office without any help whatsoever - no cane - no support at all.

"I had not been able to close my right hand completely for over a year. It even kept me awake at night with severe pain. But after the IV, topical and oral DMSO treatment, I can now close my hand tightly. The arthritis has not returned.

"I cannot put into words what this drug has done for me. I highly recommend it. I saw many people come and go during my stay; all walked out well."

Pharmacology of DMSO

Source: http://www.emmessar.com/chemical/company/p2.htm

Abstract

A wide range of primary pharmacological actions of dimethyl sulfoxide (DMSO) has been documented in laboratory studies: membrane transport, effects on connective tissue, anti-inflammation, nerve blockade (analgesia), bacteriostasis, diuresis, enhancements or reduction of the effectiveness of other drugs, cholinesterase inhibition, nonspecific enhancement of resistance to infection, vasodilation, muscle relaxation, antagonism to platelet aggregation, and influence on serum cholesterol in emperimental hypercholesterolemia. This substance induces differentiation and function of leukemic and other malignant cells. DMSO also has prophylactic radioprotective properties and cryoprotective actions. It protects against ischemic injury. (1986 Academic Press, Inc.)
The pharmacologic actions of dimethyl sulfoxide (DMSO) have stimulated much research. The purpose of this report is to summarize current concepts in this area. When the theoretical basis of DMSO action is described, we can list literally dozens of primary pharmacologic actions. This relatively brief summary will touch on only a few:

(A) membrane penetration
(B) membrane transport
(C) effects on connective tissue
(D) anti-inflamation
(E) nerve blockade (analgesia)
(F) bacteriostasis
(G) diuresis
(H) enhancement or reduction of effectiveness of other drugs
(I) cholinsterase inhibition
(J) nonspecific enhancement of resistance of infection
(K) vasodilation
(L) muscle relaxation
(M) enhancement of cell differentiation and function
(N) antagonism to platelet aggregation
(O) influence on serum cholesterol in experimental hypercholesterolemia
(P) radio-protective and cryoprotective actions
(Q) protection against ischemic injury

Primary Pharmocological Actions

A. Membrane Penetration

DMSO readily crosses most tissue membranes of lower animals and man. Employing [35S] DMSO, Kolb et al, evaluated the absorption and distribution of DMSO in lower animals and man. Ten minutes after the cutaneous application in the rat, radioactivity was measured in the blood. In man radioactivity appeared in the blood 5

minutes after cutaneous application. One hour after application of DMSO to the skin, radioactivity could be detected in the bones.

Denko22 and his associates applied 35S-labeled DMSO to the skin of rats. Within 2 hour a wide range of radioactivity was distributed in all organs studied. The highest values occurred in decreasing order in the following soft tissues; spleen, stomach, lung, vitreous humor, thymus, brain, kidney, sclera, colon, heart, skeletal muscle, skin, liver, aorta, adrenal, lens of eye, and cartilage.

Rammler and Zaffaroni have reviewed the chemical properties of DMSO and suggested that the rapid movement of this molecule through the skin, a protein barrier, depends on a reversible configurational change of the protein occurring when DMSO substitutes for water.

B. Membrane Transport

Nonionized molecules of low molecular weight are transported through the skin with DMSO. Substance of high molecular weight such as insulin do not pass through the skin to any significant extent. Studies in our laboratory have revealed that a 90% concentration of DMSO is optimal for the passage of morphine sulfate dissolved in DMSO.77 It would have been expected that 100% would provide better transport than 90%, and the reason for an optimal effect at 90% DMSO remains unexplained. It is of course well known that 70% alcohol has a higher phenol:water partition coefficient than 100% alcohol.

Elfbaum and Laden conducted an in vitro skin penetration study employing guinea pig skin as the membrane. They concluded that the passage of picrate ion through this membrane in the presence of DMSO was a passive diffusion process which adhered to Fick's first law of diffusion. It is demonstrated by diffusion and isotope studies that the absolute rate constant for the penetration of DMSO was approximately 100 times greater than that for the picrate ion. Thus, the two substances were transferred through the skin independently of each other. The exact mechanisms involved in the membrane penetrant action of DMSO have yet to be elucidated.

Studies on membrane penetration and carrier effect have been carrier effect have been carried out in agriculture, basic biology, animals, and man. In field tests with severely diseased fruit, Keil55 demonstrated that oxytetracycline satisfactorily controlled bacterial spot in peaches. Control was significantly enhanced by adding DMSO to the antibiotic spray. DMSO was applied to 0.25 and 0.5% with 66 ppm of oxytetracycline. This application gave control of the disease similar to that produced alone by 132 ppm of oxytetracycline and suggested the possibility of diluting the high-priced antibiotic with relatively inexpensive DMSO. There is no good evidence in animals that 0.5% DMSO has significant carrier effects. It could well be that Keil's results were attributable to a carrier effect, but the possibility should always be considered that when DMSO is combined with another substance a new compound results which can then exert a greater or lesser influence on a given process.

Leonard studied different concentrations of several water-soluble iron sources applied as foliage sprays to orange and grapefruit trees whose leaves showed visible signs of iron deficiency. The application of iron in DMSO as a spray was followed by a rapid and extensive greening of the leaves, with a higher concentration of chlorophyll.

Amstey and Parkman evaluated the influence of DMSO on the infectivity of viral nucleic acid, an indication of its transmembrane transport. It was found that DMSO enhanced polio RNA infectivity in kidney cells from monkeys. Enhancement occurred with all DMSO concentrations from 5 to 80% and was optimal at 40% DMSO, with a 20-minute absorption period at room temperature. A significant percentage of nucleic acid infection was absorbed within the first 2 minutes.

Cochran and his associates concluded that concentrations of DMSO below 20% did no influence the infectivity of tobacco mosaic virus (TMV) or the viral RNA. With concentrations between 20 and 60% the infectivity of TMV and TMV RNA varied inversely with the DMSO concentration.

Nadel and co-workers suggested that DMSO enhanced the penetration of the infectious agent in experimental leukemia of gunea pigs. Previously Schreck et al. had demonstrated that DMSO was more toxic in vitro to lymphocytic leukemia than to lymphocytes from normal patients.

Djan and Gunberg studied the percutaneous absorption of 17-estradiol dissolved in DMSO in the immature female rat. These steroids were given in aqueous solutions subcutaneously or were applied topically in DMSO. Vaginal and uterine weight increases resulting from estrogen in DMSO administered topically were comparable to results obtained in animals in which the drugs were administered in pure form subcutaneously.

Smith reported that a mixture of DMSO and diptheria toxoid applied frequently to the backs of rabbits causes a reduction of the inflammation produced by the Shick test, indicating that a partial immunity of diphtheria has been produced.

Finney and his associates studied the influence of DMSO and DMSO-hydrogen peroxide on the pig myocardium after acute coronary ligation with subsequent myocardial infaction. The addition of DMSO to a hydrogen peroxide perfusion system fascilitated the difffusion of oxygen into the ischemic myocardium.

Maddock et al. designed experiments to determine the usefulness of DMSO as a carrier for antitumor agents. The agents were dissolved in 85-100% concentrations of DMSO. One of the tumors studied was the L1210 leukemia. Survival time without treatment was approximately 8 days. The standard method of employing Cytoxan intraperitoneally produced a survival time of 15.5 days. When Cytoxan was applied topically in water, the survival time was 12.6 days, and topical Cytoxan dissolved in DMSO resulted in survival time of 15.3 days.

Spruance recently studied DMSO as a vehicle for topical antiviral agents, concluding that the penetration of acyclovir (ACV) through guinea pigs skin in vitro was markedly greater with DMSO than when polyethylene glycol (PEG) was the vehicle. When 5% ACV in DMSO was compared with 5% ACV in PEG in the treatment of herpes infection in the guinea pig, ACV DMSO was more effective.

The possibility of altering the blood-brain diffusion barrrier with DMSO needs additional exploration. Brink and Stein10 employed [14C]pemoline dissolved in DMSO and injected intraperitoneally into rats. It was found in larger amounts in the brain than was a similar dose given in 0.3% tragacanth suspension. The authors postulated that DMSO resulted in a partial breakdown of the blood-brain diffusion barrier in vitro.

There is conflicting evidence as to whether dimethyl sulfoxide can reversibly open the blood-brain barrier and augment brain uptake of water-soluble compounds, including anticancer agents. To investigate this, 125[-Human serum albumin, horse-radish peroxidase, or the anticancer drug melphalan was administered iv to rats or mice, either alone or in combination with DMSO. DMSO administration did not significantly increase the brain uptake of any of the compounds as compared to control uptakes. These results do not support prior reports that DMSO increases the permeability of water-soluble agents across the blood-brain barrier.

Maibach and Feldmann studied the percutaneous penetration of hydrocortisone and testosterone in DMSO. The authors concluded that there was a threefold increase in dermal penetration by these steroids when they were dissolved in DMSO.

Sulzberger and his co-workers evaluated the penetration of DMSO into human skin employing methylene blue, iodine, and iron dyes as visual tracers. Biopsies showed that the stratum corneum was completely stained with each tracer applied to the skin surface in DMSO. There was little or no staining below this layer. The authors concluded that DMSO carried substances rapidly and deeply into the horny layer and suggested the usefulness of DMSO as a vehicle for therapeutic agents in inflammatory dermatoses and superficial skin infections such as pyodermas.

Perliman and Wolfe demonstrated that allergens of low molecular weight such as penicillin G potassium, mixed in 90% DMSO, were readily carried through intact human skin. Allergens having molecular weights of 3000 or more dissolved in DMSO did not penetrate human skin in these studies. On the other hand, Smith and Hegre had previously recorded that antibodies to bovine serum albumin developed when a mixture of DMSO and bovine serum albumin was applied to the skin of rabbits.

Turco and Canada have studied the influence of DMSO on lowering electrical skin resistance in man, In combination with 9% sodium chloride in distilled water, 40% DMSO decreased resistance by 100%. It was postulated that DMSO in combination with electrolytes reduced the electrical resistance of the skin by facilitating the absorption of these electrolytes while it was itself being absorbed.

DMSO in some instances will carry substances such as hydrocortisone or hexachlorophene into the deeper layers of the stratum corneum, producing a reservoir. This reservoir remains for 16 days and resists depletion by washing of the skin surface with soap, water, or alcohol.

C. Effect on Collagen

Mayer and associates compared the effects of DMSO, DMSO with cortisone acetate, cortisone acetate alone, and saline solutions on the incidence of adhesions following vigorous serosal abrasions of the terminal ileum of Wistar rats. Their technique had developed adhesions in 100% of control animals in 35 days. The treatments were administered daily as postoperative intraperitoneal injections for 35 days. The incidence of adhesions in different groups was DMSO alone: 20%, DMSO-cortisone: 80%, cortisone alone: 100%, saline solution: 100%.

It has been observed in serial biopsy specimens taken from the skin of patients with scleroderma that there is a dissolution of collagen, the elastic fibers remaining intact. Gries et al. studied rabbit skin before and after 24 hour in vitro exposure to 100% DMSO. After immersion in DMSO the collagen fraction extractable with neutral salt solution was significantly decreased. The authors recorded that topical DMSO in man exerted a significant effect on the pathological deposition of collagen in human postirradiation subcutaneous fibrosis but did not appear to change the equilibrium of collagen metabolism in normal tissue. Urinary hydroxyproline levels are increased in scleroderma patients treated with topical DMSO. Keloids biopsied in man before and after DMSO therapy show histological improvement toward normalcy.

D. Anti-Inflammation

Berliner and Ruhmann found that DMSO inhibited fibroblastic proliferation in vitro. Ashley et al. reported that DMSO was ineffective in edema following thermal burns of the limbs of rabbits. Formanek and Kovak31 showed that topically applied DMSO inhibited traumatic edema induced by intrapedal injection of autologous blood in the leg of a rat.

DMSO showed no anti-inflammatory effect when studied in experimental effect when studied in experimental inflammation induced in the rabbit eye by mustard oil in the rat ear by croton oil.

Gorog and Kovacs demonstrated that DMSO exerted minimal anti-inflammation effects on edema induced by carrageenan. These authors also studied the anti-inflammatory potential of DMSO in adjuvant-induced polyarthritis of rats. Topical DMSO showed potent anti-inflammatory properties in this model. Gorog and Kovacs have also studied the anti-inflammatory activity of topical DMSO, in contact dermatitis, allergic eczema, and calcification of the skin of the rat, using 70% DMSO to treat the experimental inflammation. All these reactions were significantly inhibited.

The study of Weissmann et al. deserves mention in discussing the anti-inflammatory effects of DMSO. Lysosomes can be stabilized against a variety of injurious agents by cortisone, and the concentration of the agent necessary to stabilize lysosomes is reduced 10- to 1000-fold by DMSO. The possibility was suggested that DMSO might render steroids more available to their targets within tissues (membranes of cells or their organelles).

Suckert has demonstrated anti-inflammatory effects with intra-articular DMSO in rabbits following the creation of experimental [croton oil] arthritis.

E. Nerve Blockade (Analgesia)

Immersion of the sciatic nerve in 6% DMSO decreases the conduction velocity by 40%. This effect is totally reversed by washing the nerve in a buffer for 1 hour.89 Shealy99 studied peripheral small fiber after-discharge in the cat. Concentrations of 5-10% DMSO eliminated the activity of C fibers with 1 minute: activity of the fibers returned after the DMSO was washed away.

DMSO injected subcutaneously in 10% concentration into cats produced a total loss of the central pain response. Two milliliters of 50% DMSO injected into the cerebrospinal fluid led to total anesthesia of the animal for 30 minutes. Complete recovery of the animal occurred without apparent ill effect.

Haigler concluded that DMSO is a drug that produced analgesia by acting both locally and systemically. The analgesia appeared to be unrelated to that produced by morphine although the two appear to be a comparable magnitude. DMSO had a longer duration of action than morphine, 6 hr vs 2 hr, respectively.

F. Bacteriostasis

DMSO exerts a marked inhibitory effect on a wide range of bacteria and fungi including at least one parasite, at concentrations (30-50%) likely to be encountered in antimicrobial testing programs in industry.6

DMSO at 80% concentration inactivated viruses tested by Chan and Gadenbusch. These viruses included four RNA viruses, influenza A virus, influenza A-2 virus, Newcastle disease virus, Semliki Forest virus, and DNA viruses.

Seibert and co-worker studied the highly pleomorphic bacteria regularly isolated from human tumors and leukemic blood. DMSO in 12.5-25% concentration caused complete inhibition of growth in vitro of 27 such organisms without affecting the intact blood cells. Among the intriguing possibilities for the use of DMSO is its ability to alter bacterial resistance. Pottz and associates78 presented evidence that the tubercle bacillus, resistant to 2000Ýg of treptomycin or isoniazide, became sensitive to 10Ýg of either drug after pretreatment with 0.5-5% DMSO.

Kamiya et al. found that 5% DMSO restored and increased the sensitivity of antibiotic-resistant strains of bacteria. In particular, the sensitivity of all four strains of Pseudomonas to colistin was restored when the medium contained 5% DMSO. The authors recorded that antibiotics not effective against certain bacteria, such as penicillin to E. coli, showed growth inhibitory effects when the medium contained DMSO. Ghajar and Harmon studied the influence of DMSO on the permeability of Staphylococcus aureau, demonstrating that DMSO increased the oxygen uptake but reduced the rate of glycine transport. They could not define the exact mechanism by which DMSO produced its bacteriostatic effect.

Gillchriest and Nelson have suggested that bacteriostasis from DMSO occurs due to a loss of RNA conformational structure required for protein synthesis.

G. Diuresis

Formanek and Suckert studied the diuretic effects of DMSO administered topically to rats five times daily in a dosage of 0.5 ml of 90% DMSO per animal. The urine volume was increased 10-fold, and with the increase in urine volume, there was an increase in sodium and potassium excretion.

H. Enhancement or Reduction of Concomitant Drug Action

Rosen and associates employed aqueous DMSO to alter the LD50 in rats and mice when oral quaternary ammonium salts were used as test compounds. In rats, the toxicity of pentolinium tartrate and hexamethonium bitartrate was increased by DMSO, while the toxicity of hexamethonium iodide was decreased.

Male has shown that DMSO concentrations of upward to 10% lead to a decided increase in the effectiveness of griseofulvin.

Melville and co-workers have studied the potentiating action of DMSO on cardioactive glycosides in cats, including the fact that DMSO potentiates the action of digitoxin. This effect, however, does not appear to involve any change in the rate of uptake (influx) or the rate of loss (efflux) of glycosides in the heart.

I. Cholinesterase

Sams et al. studied the effects of DMSO on skeletal, smooth, and cardiac muscle, employing concentrations of 0.6-6%. DMSO strikingly depressed the response of the diaphragm to both direct (muscle) and indirect (nerve) electrical stimulation, and caused spontaneous skeletal muscle fasciculations. DMSO increased the response of the smooth muscle of the stomach to both muscle and nerve stimulations. The vagal threshold was lowered 50% by 6% DMSO. Cholinesterase inhibition could reasonably explain fasciculations of skeletal muscle, increased tone of smooth muscle, and the

lower vagal threshold observed in these experiments. In vitro assays show that 0.8-8% DMSO inhibits bovine erythrocyte cholinesterase 16-18%.

J. Nonspecific Enhancement of Resistance

In a study of antigen-antibody reactions, Reattig showed that DMSO did not disturb the immune response. In fact, the oral administration of DMSO to mice for 10 days prior to an oral infection with murine typhus produced a leukocytosis and enhanced resistance to the bacterial infection.

K. Vasodilation

Adamson and his co-workers applied DMSO to a 3-1 pedicle flap raised on the back of rats. The anticipated slough was decreased by 70%. The authors suggested that the primary action of DMSO on pedicle flap circulation was to provoke a histamine-like reponse. Roth has also evaluated the effects of DMSO on pedicle flap blood flow and survival, concluding that DMSO does indeed increase pedicle flap survival, but postulating that this increase takes place by some mechanism other than augmentation of perfusion. Kligman had previously demonstrated that DMSO possesses potent histamine-liberating properties.

Leon has studied the influence of DMSO on experimental myocardial necrosis. DMSO therapy effected a distinct modification with less myocardial fiber necrosis and reduced residual myocardial fibrosis. The author reported that neither myocardial rupture nor aneurysm occured in the group treated with DMSO.

L. Muscle Relaxation

DMSO applied topically to the skin of patients produces electromyographic evidence of muscle relaxation 1 hour after application.

M. Antagonism to Platelet Aggregation

Deutsch has presented experimental data showing that 5% DMSO lessons the adhesiveness of blood platelets in vitro. Gorog has shown that DMSO is a good antagonist to platelet aggregation as well as thrombus formation in vivo. Gorog evaluated this in the hamster cheek pouch model.

N. Enhancement of Cell Differentiation and Function

It has been shown that dimethyl sulfoxide induces differentiation and function of leukemic cells of mouse, rat, and human. DMSO was also found to stimulate albumin production in malignantly transformed hepatocytes of mouse and rat and to affect the membrane-associated antigen, enzymes, and glycoproteins in human rectal adenocarcinoma cells. Hydrocortisone-induced keratinization of chick embryo cells74 and adriamcycin-induced necrosis of rat skin were inhibited by DMSO.

Furthermore, modification by DMSO of the function of normal cells has been reported. DMSO stimulates cyclic AMP accumulation and lipolysis and decreases insulin-stimulated glucose oxidation in free white fat cells of [the] rat. It also enhances heme synthesis in quail embryo yolk sac cells.

Leukemic blasts can be induced by external chemical agents to mature to neutrophils, monocytes, or RBCs. The phenotype of leukemic cells thus results from both internal genetic aberrations and the response of leukemic cells to their external environment. When human myeloid leukemia cells are exposed in vitro to a variety of agents (e.g.vitamin A or dimenthyl sulfoxide) the blasts lose their proliferative potential, the expression of oncogene products is sharply decreased, and after 5 days the leukemic cells become morphologically mature and functional neutrophils. Some patients with myeloid leukemias have responded to therapy designed to induce maturation in vivo. The induced maturation of leukemic cells is a new therapeutic tactic-alternative to cytotoxic drug therapy-wherein leukemic cells are destroyed by transforming them into neutrophils.

O. Influence on Serum Cholesterol in Experimental Hypercholesterolemia

Rabbits given a high cholesterol diet with 1% DMSO showed one-half as much hypercholesterolemia as control animals.

P. Radioprotective and Cryoprotective Actions

M.J. Ashwood-Smith has written a comprehensive review of these actions.

Q. Protection against Ischemic Injury

De la Torre has advanced a scheme based on both investigated and theoretical actions of DMSO on the biochemical events generated after an ischemic injury. He previously proposed this hypothetical model to help conceptualize how DMSO, or similar drugs, mights affect the pathochemical balance that results in lack of tissue perfusion following trauma.

The biochemical and vascular responses to injury appear to have a cause and effect relationship that can be integrated in terms of substances that either increase or decrease blood flow. The substance's effect can be physical, i.e. reduce or increase the vessel lumen obstruction, or chemical, i.e. reduce or increase the vessel lumen diameter (vasoconstriction/vasodilation).

Platelets, for example, can induce both conditions. Obstruction of the vessel lumen can result from platelet adhesion (platelet buildup in damaged vessel lining) or platelet aggregation. Platelet damage moreover can cause vasoconstriction or vasospasm by liberating vasoactive substances locally with the blood vessel or perivascularly, if penetrating damage to the vessel has occurred. There are two storage sites within

platelets that contain most of these vasoactive substances. The alpha granules contain fibrinogen, while the dense bodies store ATP, ADP, serotonin, and calcium, which can be secreted by the platelet into the circulation by a canalicular system.5 Thromboxane A2 has also been shown to be manufactured in the microsomal fraction of animal and human platelets. All these vasoactive substances (with the exception of ATP) can cause significant reduction of blood flow by physical or chemical reactivity on the vasculature.

DMSO can antagonize a number of these vasoactive substances released by the platelets, which could consequently induce vasoconstriction, vasospasm, or obstruction of vessel lumen. For example, a study has shown that DMSO can inhibit ADP and thrombin-induced platelet aggregation in vitro. It may presumable do this by increasing the evels of cAMP (a strong platelet deaggregator) through inhibition of its degradative enzyme, phosphodiesterase. DMSO is reported to deaggregate platelets in vivo following experimental cerebral ischemia. This effect may be fundamental in view of the finding that cerebral ischemia produces transient platelet abnormalities that may promote microvascular aggregation formation and extend the area of ischemic injury.

The biochemical picture is further complicated by the possible activity of DMSO on other vasoactive substances secreted by the platelets during injury or ischemia. For example, the release of calcium from cells from cells or platelets and its effect on arteriolar-wall muscle spasm may be antagonized by circulating DMSO. Collagen-induced platelet release may also be blocked by DMSO.

The following effects of DMSO are likely to be involved in its ability to protect against ischemic injury.

DMSO and PGTX System

Little is known about the actions of DMSO on the prostanoids (PG/TX). Studies have reported that DMSO can increase the synthesis of PGE1, a moderate vasodilator.61. PGE1 can reduce platelet aggregation by increasing cAMP levels and also inhibit the calcium-induced release of noradrenalin in nerve terminals, an affect that may antagonize vasoconstriction and reduction of cerebral blood flow.

DMSO, it will be recalled, also has a direct effect on cAMP. It increases cAMP presumably by inhibiting phosphodiesterase, although an indirect action on PGI2-induced elevation of platelet cAMP by DMSO should not be ruled out. Any process that increases platelet cAMP will exert strong platelet deaggregation.

It has also been reported that DMSO can block PFG2 receptors and reduce PFE2 synthesis. Both these compounds can cause moderate platelet aggregation and PFG2 is known to induce vasoconstriction.60 The effects of DMSO on thromboxane synthesis are unknown. It could, however, inhibit TXA2, biosynthesis in much the same way as hydralazine or dipyridamole42 since it shares a number of similar properties with these agents: specifically, their increase of cAMP levels.

DMSO and Cell Membrane Protection

The ability of DMSO to protect cell membrane integrity in various injury models is well documented.

Cell membrane preservation by DMSO might help explain its ability to improve cerebral and spinal cord blood flow after injury. DMSO could be preventing impairment of cerebrovascular endothelial surfaces where PGI2 is elaborated and where platelets can accumulate following injury. The effects of DMSO may be two-fold: reduction of platelet adhesion by collagen, and reduction of platelet adhesion by protecting the vascular endothelium and ensuring PGI2 release.

DMSO, Hydroxyl Radicals, and Calcium

Although many hormones, chemical transmitters, peptides, and numerous enzymes can be found in mammalian circulation at any given time, it is the hydrozyl radicals that have drawn attention by playing an important role in the pathogenesis of ischemia.

Free radicals can be elaborated by peroxidation of cellular membrane-bound lipids where oxygen delivery is not totally abolished, as in ischemia and hypoxia, or when oxygen is resupplied after an ischemic episode.

One of the significant sites where hydroxyl radicals can form following ischemia is in mitochondria. DMSO is known to be an effective hydroxyl radical scavenger. Since it has been shown that DMSO can improve mitochondrial oxidative phosphorylation, it has been suggested that DMSO may act to neutralize the cytotoxic effects of hydroxyl radicals in mitochondria themselves.96 Oxidative phosphorylation is one of the primary biochemical activities to be negatively affected following ischemic injury. DMSO has also been reported to reduce ATPase activity in submitochondrial particles, an effect that can lower oxygen utilization during cellular ischemia.

It has been proposed that DMSO may reduce the utilization of oxygen by an inhibiting effect on mitochondrial function. In one experiment the energy loss due to inhibition of oxidative activity after brain tissue was perfused with DMSO was compensated for by an increase in glycolysis.

It seems probable that the neutralizing action of DMSO on hydroxyl radical damage following injury could diminish the negative outcome of ischemia. However the formation of hydroxyl radicals is dependent on time and oxygen availability, but the development of ischemia is immediate and its reversal may depend on more prevalent subsystems such as the PG/TX and platelet interactions. Maintaining the balance of these subsystems appears more critical in predisposing the outcome of cerebral ischemia.

Another interesting effect of DMSO is on calcium. When isolated rat hearts are perfused with calcium-free solution followed by reperfusion with a calcium-containing solution, a massive release of creatine kinase (indicating cardiac injury) is observed. This creatine

kinase level increase is accompanied by electrocardiographic (EKG) changes and ultrastructural cell damage. DMSO has been reported to significantly reduce the release of creatine kinase and prevent EKG and ultrastructural changes if it is present during reperfusion of the isolated rat heart with a calcium-containing solution. Moreover, examination of the heart tissue by electron microscopy showed that DMSO-treated preparations lacked the mitochondrial swelling and contraction band formation otherwise induced by the reentry of calcium. These findings are supported by another investigation showing that DMSO can block calcium-induced degeneration of isolated myocardial cells. This protective effect by DMSO on myocardial tissue may be critical during ischemic myocardial infarction when evolutionary EKG changes, serum creates kinase levels are elevated, and myocardial necrosis can develop rapidly.

DMSO2 is not an effective cryoprotective agent; however, Herschler has recorded that DMSO (dimethyl sulfone) is a natural source of biotransformable sulfur in plants and lower animals. Jacob and Herschler have reported a number of unique properties possessed by DMSO. Since DMSO is oxidized to DMSO2 in vivo, scientists should include DMSO as a control in basic biologic studies on DMSO in plants and animals.

DMSO As A Solvent

Source: http://www.emmessar.com/chemical/company/p3.htm

To exist, life must have a space in which to exist. Water is that space. All life, at least on this planet, is water based. The atoms and molecules which conduct the life process react with each other in water as the solvent. It is hard to imagine life without water. However, life might be possible in the presence of another solvent with qualities equal or superior to water. It may be that water is the solvent used by life on earth simply because it is here in much greater quantities than any other solvent.

A "solvent" is a carrier solution meaning that it has the capacity to accommodate other atoms and molecules in such a way that they are in "solution." What it means to be in solution is that the atoms and molecules are separated from each other by the solvent. When atoms and molecules are thus separated, they are said to be "carried" by the solvent, or "in solution."

For example, water is an excellent solvent for salt. If you put a teaspoon of table salt in a glass of water and stir, soon you are unable to see the salt. It has gone into solution, i.e., the atoms of sodium and chloride are separated from each other and held apart by dihydrous oxygen (water).

Industrial chemists are always interested in finding new and more effective solvents. The perfect solvent, in an industrial sense, is that solvent which has the ability to put almost anything into solution in high concentration, is cheap, safe and smells good. Dimethyl sulfoxide (DMSO), except for the smell good apart, is just such a solvent. Dimethyl sulfoxide (DMSO) was first synthesized in 1866 by the Russian scientist Alexander Saytzeff. Dr. Saytzeff reported his findings in a German chemistry journal in 1867. From there DMSO languished unnoticed in obscurity for 81 years! After World War II, chemists began to take note of the remarkable versatility of DMSO. They noticed it could dissolve almost anything and carry it in solution.

In the 1960s, medical research with DMSO showed it could not only dissolve substances, but it could also penetrate human skin and carry the dissolved substances along with it! This is remarkable, because human skin is impenetrable to most substances.

It was also shown to relieve pain and swelling, relax muscles, relieve arthritis, improve blood supply and slow the growth of bacteria. It relieves the pain of sprains and even of broken bones. It enhances the effectiveness of other pharmacological agents. If you apply DMSO to a bruise, the bruise dissolves and disappears in a matter of minutes! If you apply it to the jaw after wisdom tooth removal, all pain and swelling is prevented! The pain of acute gout can be handled with the application of 5 cc of seventy percent DMSO in water four times each day. Application to a fever blister results in rapid resolution of this problem. DMSO also relieves the pain of minor burns and if applied

soon after the burn happens, will decrease the tissue damage suffered. DMSO speeds all healing, approximately doubling or tripling all healing responses.

All applications should be done with a cotton swab allowing sufficient time after the solution is painted on to allow for absorption through the skin before covering with clothes. Remember, DMSO is a powerful solvent, and it will take the dye right out of your clothes and deposit it in your skin where you will have to wait for it to grow out. The skin of the face, neck and intertriginous zones (where skin rubs against skin) are highly sensitive to DMSO and should be exposed only to dilute solutions of fifty percent (half and half with distilled water) or less. Any skin irritation associated with the application of DMSO can be treated topically with aloe vera gel.

In the states in which it is legal to do so, doctors experienced with DMSO treat the symptoms of cancer, atherosclerosis, Parkinson's disease, multiple sclerosis and arthritis with an intravenous push of up to 20 cc of a 25% solution of DMSO. An alternative method is to put 50-100 cc in 500 cc of saline or five percent dextrose, and drip it in over a two- to three-hour period with or without EDTA. Only doctors who are trained and experienced in this form of therapy should administer it.

DMSO, although it is not approved by the FDA for anything except an obscure bladder condition (interstitial cystitis), is widely used in sports medicine. Professional sports in particular are obligated to use DMSO to get their athletes recovered from injury and back on the playing field. Each team knows the competition will use it, and this would mean a tremendous advantage for the other team, if it were to be ignored. Combine that with the fact that DMSO is as safe as it is effective (unlike large-dose steroid injections, which were once commonly used in professional sports) and its use becomes mandatory in professional sports medicine.

When you consider the fact that DMSO is not a new and patentable drug, is cheap, safe and effective, and knowing what you should know about the medical establishment in the U.S., you could predict with your eyes closed that there is a propaganda campaign against DMSO. The FDA has done nothing except drag its feet in DMSO research since October 25, 1963 when the first research application to study DMSO was filed with that agency.

Despite the rejection of DMSO by the American medical establishment, this simple solvent is far from finished. Legally, it can only be sold as a solvent, but sufferers of osteoarthritis and rheumatoid arthritis are using it with regularity, usually having heard of it from a friend and fellow arthritis sufferer. Only medical grade — never industrial grade — should be used on the human body due to the acetone and acid contaminants present in the industrial grade product. Grocery stores which specialize in organically grown foods and health food stores are the most likely places to find medical grade DMSO. A bottle will cost you only a few dollars and will save hundreds, even thousands of dollars in doctor and pharmacy bills. No wonder the medical establishment is lined up against it!

The only medical grade DMSO is available from Terra Pharmaceuticals, in Buena Park, California. It is distributed through Research Industries, of Salt Lake City, Utah. Once obtained from Terra Pharmaceuticals distributors slap on their own brand name. Rimso and Domoso are a couple of the brand names. Because of FDA regulations, even the medical grade DMSO container must bear the words "Not For Medical Use."

Veterinarians have no such restrictions. The government will allow a five million dollar race horse to be bathed in DMSO but tries to restrict your personal use!

One particularly pleasant form of DMSO, which is in a lemon scented salve base, comes from Dr. James Critchlow of Phyne Pharmaceuticals in Scottsdale, Arizona. You can reach him by calling (800) 345-3391.

Many legislative battles have been fought to bypass the FDA and legalize DMSO. Sen. Mark Hatfield of Oregon and Rep. Wendell Wyatt, also of Oregon, both have introduced bills into the U.S. Senate and the U.S. House of Representatives, respectively, to legalize DMSO. Since these bills were introduced, the FDA has been under legislative investigation of its regulatory procedures. Some state legislatures have legalized the prescribing of DMSO, effectively bypassing the FDA. These states are Florida, Louisiana, Montana, Nevada, Oklahoma, Oregon, Texas and Washington.

So, how does DMSO work? For one thing it neutralizes hydroxyl radicals. "So what?" you say? It turns out hydroxyl free radicals are the predominant cause of pain and inflammation in arthritis. Although DMSO is not known to cure cancer, it is true hydroxyl free radicals are present in cancer and in atherosclerosis. Hydroxyl radicals also are known to be produced in lipid peroxidation, which is thought to be the source of many degenerative diseases.

It also turns out DMSO is more "liquid" than water, and it can therefore penetrate to places in the body nothing else can reach so fast. DMSO substitutes for water and moves rapidly through cell membranes. It has been called "water's alter ego." This ability probably is what makes DMSO so unique as to be an entirely new therapeutic principle.

DMSO changes the water structure within the cell. Water exists in two basic structures, one more highly organized and one less organized. It may be that DMSO shifts the equilibrium between these two states of water toward the more organized form and thus speeds up the living processes of the cell, allowing healing to happen in a much accelerated fashion.

The problem with DMSO is that it is so versatile and is such good treatment for so many conditions, it has fallen into the snake oil trap. It is too good to be believed. In the Old West, peddlers of snake oil would come to town and lecture the local folks on snake oil. This stuff was said to be "good for what ails ya!" These con artists would sell a load of snake oil and then hit the road, never to be seen again. This didn't prevent the next super-salesman from coming to town and repeating the process. Eventually, snake oil

got a bad name and took along with it any therapy which has a wide range of uses. DMSO, like hydrogen peroxide and EDTA, is almost too good to believe.

To be fully accepted, a therapy must have the general support of doctors. We have given over to these people the responsibility to know the difference between legitimate medicine and quack medicine. What we fail to take into consideration is that doctors are business people and, as such — and correctly so — they are interested in the bottom line. Income minus expenses equals profits. Profits allow the business of medicine to go forward. If you go out of business, it doesn't matter how pure your motives are, you cannot do good for many people.

DMSO, like hydrogen peroxide and EDTA, are not big money makers. So doctors, with some exceptions, do not spend much time learning about or recommending them. People who benefit from these therapies are those who take the time to educate themselves and who think for themselves. Thinking for oneself is not exactly the national pastime.

Besides the great relief provided for sufferers of osteoarthritis, rheumatoid arthritis, burns, sprains, back and neck problems, there are more exotic uses for DMSO. Studies demonstrate that it protects against the tissue damage induced by radioactivity! It serves as an excellent antifreeze, preventing tissue damage ordinarily caused by freezing conditions. It controls the swelling of the brain and spinal cord following traumatic injury. If given intravenously within ninety minutes of a stroke, it prevents much of what would become permanent damage to the central nervous system. Applied topically, repeatedly, it will flatten a raised keloid scar. It also prevents the contracture of scar tissue following burns. It has an antibacterial, antiviral and antifungal effect.

Some cancer researchers believe it has a useful place in the treatment of many cancers in that it potentiates other forms of therapy. It decreases the need for insulin in 25% of juvenile onset diabetics. Other uses of DMSO include: tic doloreaux, headache, various skin diseases including herpes, cataracts and glaucoma, retinal degeneration, scleroderma, shingles, bunions, calluses, fungus toenails and asthma. These comments only scratch the surface of the possible medical uses of DMSO.

Despite this, the FDA refuses to approve the use or prescription of DMSO for anything other than interstitial cystitis in all but eight of our fifty states! All of this in spite of the fact that DMSO is safer than aspirin. Many people have died from taking aspirin. Not one person has ever died from DMSO. This, folks, is not the age of medical enlightenment.

Despite the foot dragging of the FDA, a singular court ruling allows doctors to use and prescribe this marvelous drug. This court ruling states that if the FDA approves a drug as safe for any use whatsoever, it may be used at the physician's discretion for whatever purpose it is deemed useful. Because the FDA approves DMSO for use in interstitial cystitis, the door is open for any physician of courage, in any state to use, prescribe and recommend DMSO.

The only drawback of which I can think to tell you regarding DMSO is its smell. It is best compared to the smell of fresh garlic. After it has reacted with the body, the odor appears in magnified form on the breath and through the skin. This lasts for three days from the last treatment with DMSO. This is not the stuff you will want to take just before going out on a hot date. This odor of DMSO probably is a blessing in disguise. It makes a person stop and think before using it and probably prevents indiscriminate use of this wonderful medical miracle substance.

Where To Get DMSO

The good news is that DMSO is very inexpensive. The double good news is that lots of supplier offer it on the internet. Here is just one example:

70 % DMSO liquid: http://www.myvitanet.com/dmsogel70ung.html

70% DMSO gel with Aloe: http://www.myvitanet.com/dmsogel70pla1.html

Other DMSO products: http://www.myvitanet.com/dmso.html

Any quick search on Google will find lots of vendors. Just make sure that they are high quality. Vendors usually explain why their particular products are good, so pay attention to what they say.

If you are brave enough (which I am) to use veterinary quality DMSO, you can also find it at just about any feed and tack store. This does not mean pet store. Serious veterinary use is for horses, especially expensive ones. That is why feed and tack stores carry it. Just look through the local yellow pages for such a store and give them a call.