

by ALIX KERR

A new drug has startling effects on a wide gamut of ills and aches

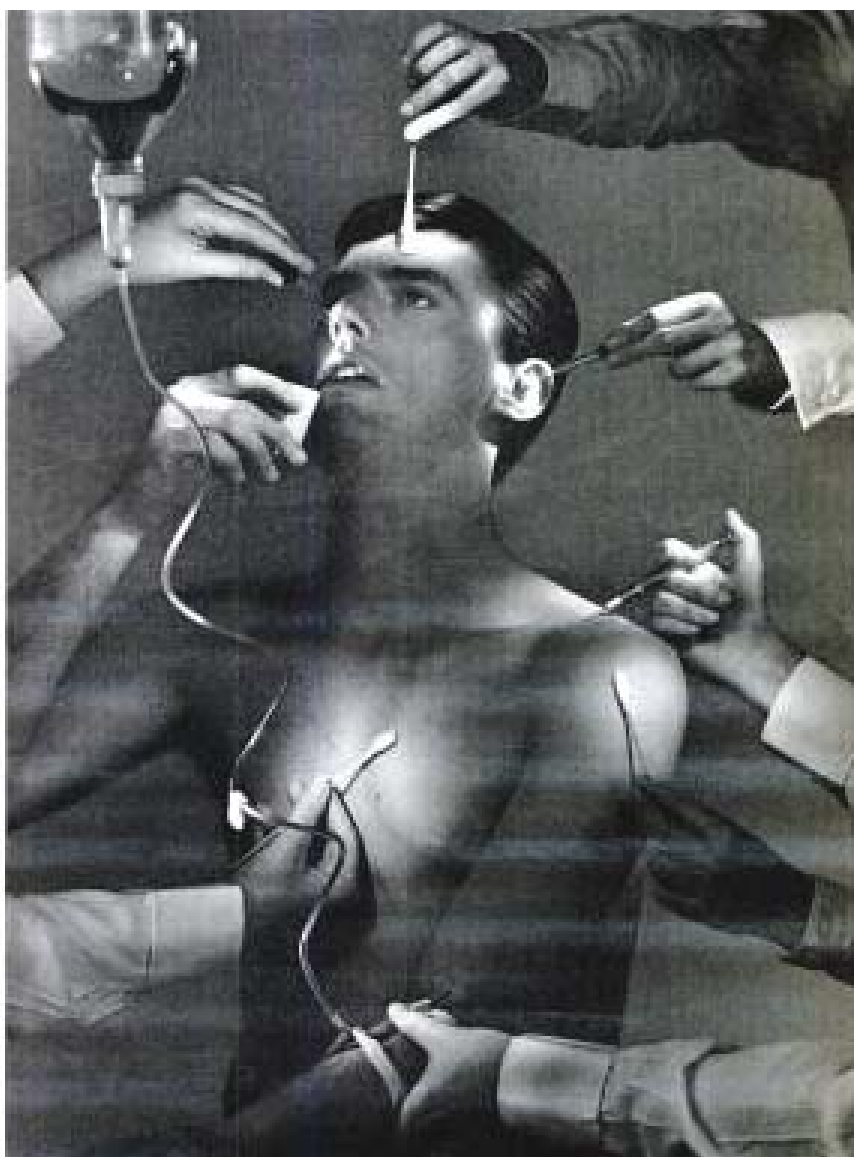
DMSO

A fantastic new experimental drug called DMSO has lately been causing a sensation in the medical world. It is hard to talk about it without sounding like an old-time carnival snake-oil salesman. DMSO appears to be good for arthritis, sinusitis, headaches, earaches, sprains and burns. It reduces swellings, suppresses blisters, kills pain, tranquilizes, fights germs. It enhances the action of other drugs. It can be swallowed or injected, rubbed on or dripped in. In a word, it is unbelievable. But some serious and respected medical scientists believe in it. If DMSO (for dimethyl sulfoxide) lives up to their expectations, it will come closer to being the legendary panacea than any drug in all medical history.

These same scientists hasten to point out that there are many major diseases which DMSO does *not* seem to touch (cancer, for instance). Furthermore, none of the medical uses of DMSO can be considered absolutely proven or even safe as of this moment. When a brief preliminary paper on its effects was published last February it was promptly criticized as "the most preposterous article ever to appear in the medical literature." Several of the country's leading drug companies, however, don't see a thing preposterous about it. They have already agreed to pay sizable sums for rights to develop it into products.

DMMSO is made from a leftover of the paper-manufacturing process and has been in industrial use for several years as a chemical solvent. Its potential medical uses are now being intensively researched under the joint sponsorship of two unlikely partners: the Crown Zellerbach Corp., second biggest paper producer in the U.S., and the University of Oregon Medical School. So far the researchers cannot explain how DMSO does all it does, but they know that it somehow blocks nerve impulses. Much of its potency may derive simply from its chemical ability to dissolve things, carry them around the body and help them penetrate

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This posed picture shows DMSO's many potential—though still not proven—uses. Starting clockwise at patient's forehead: DMSO is rubbed on for headache, dropped into aching ear, injected into and rubbed on

shoulder for arthritis and bursitis, intravenously dripped in arm to reduce water in tissues, painted on for chest pains, swallowed to help absorb diet supplements, dropped in nose for colds and sinusitis.

cell walls. But medicine does not need to understand the mechanisms of drug action in order to exploit it. After more than 60 years of use, doctors still do not fully understand how aspirin works.

Though all the hubbub about DMSO is brand new, DMSO itself is 97 years old. It was synthesized in Germany way back in 1867 but no use was found for it until about 10 years ago, when its powers as a solvent and antifreeze began to be appreciated by science and industry. When Crown Zellerbach discovered that it could easily make DMSO from a compound found in the waste products of paper pulp manufacture, it acquired patents on the most economical method for producing it, then built a DMSO conversion plant.

The therapeutic possibilities of DMSO became apparent only through a series of almost random experiments and accidents. About five years ago an aggressive young Crown Zellerbach chemist named Robert J. Herschler, working at the company's laboratory in Camas, Wash., started looking for new uses for DMSO as a solvent. "We tried it first on notoriously

hard-to-dissolve substances like pesticides," he recalls. "DMSO dissolved them easily. We then checked to see how pesticides in DMSO worked on trees. We found they began to move around with amazing speed—not just in the conducting systems under the bark but right through nonliving layers of wood. The pesticides were colored so we could see them spreading out."

Agricultural experts helped adapt this discovery into a method which may do away with conventional spraying of trees. Pesticides in DMSO are piped into trees the way intravenous drips are put into the arms of patients. They spread to protect leaves and fruit from an impressive roster of mildews, blights, scabs and cankers. DMSO has other agricultural possibilities and even seems to rejuvenate fruit trees that have become barren.

It was during this pesticide research that human experiments began quite by accident. "DMSO almost killed two of us," Herschler remembers. "A technician and I were working on a poisonous insecticide which normally shouldn't

Garlic breath gave researchers a clue



DMMSO's co-discoverers, Surgeon Stanley W. Jacob (left) and Chemist Robert Herschler, paint DMSO mixed with blue dye on rabbit's back to measure penetration into skin.

have gone through our skins. We didn't know why then, but the DMSO carried the poison through us just as it did through the trees—and we were awfully sick for a while."

Two years ago, Dr. Stanley W. Jacob, a young surgeon at the University of Oregon Medical School in Portland, got interested in DMSO. He was working on the preservation of organ transplants and thought DMSO might be useful as an antifreeze. Mutual acquaintances put him in touch with Herschler. Their complementary scientific interests led to startling discoveries which went far afield from Jacob's transplant work.

First a lab assistant and then Dr. Jacob got DMSO on their hands. Within minutes they noticed something that the Crown Zellerbach chemists had experienced but never paid any particular attention to. Both of them got a distinctive oysterish taste in their mouths and a strong smell like garlic on their breaths. Dr. Jacob decided this could be due only to DMSO which must have worked its way through their skins and blood streams. Anything able to do that could have tremendous value in medicine, he realized, and he began to explore possible uses.

One hard problem in medicine that DMSO's properties might be

able to help, Jacob reasoned, was getting serious burns to heal. He tried DMSO on burned rats. It not only helped heal the burns faster; it kept alive rats that should have died quickly in shock. Moreover the rats seemed to be tranquil and in no pain. But to find out for sure whether DMSO did indeed lessen pain, they needed a human burn victim who could tell them how he felt. Before Jacob had a chance to look for a patient, Herschler called up from his lab. "I've had an accident with beta-chlorosulfide—it's a type of mustard gas. I've got burns and blisters all over my face and arms. And do they ever hurt!"

Jacob was sympathetic, but he was also delighted. "Now we can really see what DMSO does. Put it on one side."

Herschler put it on one arm and five minutes later was back on the phone. "Stan, you won't believe this, but it really works." DMSO had relieved the pain of his treated arm and started drying up its blisters, while his face and other arm were not feeling any better.

Next Dr. Jacob discovered that DMSO could considerably reduce surgical adhesions in animals. Since this is something cortisone can also do, Jacob wondered if DMSO might act the way cortisone does



Rheumatologist Edward E. Rosenbaum swabs DMSO on shoulder of patient. He was brought in to conduct tests for bursitis and arthritis.

Now drug firms will take it from here

DMSO⁻ CONTINUED

patients. Just the same, he makes them come in for weekly examinations and runs 12 different regular analyses on their blood and urine.

Actually, the best proof that DMSO is safe to use over long periods of time goes back to Herschler's early lab work. Almost every day for several years, he and his assistants washed their hands with DMSO, still thinking that as a solvent it should get things *off* instead of *in*. Except for the one incident of insecticide poisoning, they suffered no ill effects.

All human tests of DMSO are being conducted under the eye of Dr. Frances Kelsey's Investigational Drug Branch at the Food and Drug Administration. Dr. Kelsey, whose caution kept the U.S. from sharing in the thalidomide tragedy, can veto any human test plan which does not seem safe. She has already placed temporary limits on DMSO trials, restricting them to skin applications until longer animal safety tests are run on other dosage forms.

The real testing of DMSO—that is, the massive, detailed, exacting animal and clinical work required by FDA before any drug can reach the market—will be done by pharmaceutical houses. Their willingness to take on this expensive task is not based on mere

hearsay. They have had the opportunity to do research of their own on DMSO.

The Oregon researchers believe DMSO's potential has only been suggested. Quite apart from the specific DMSO uses he has already talked about, Dr. Jacob says there are others so fantastic that he wants to do a great deal more work before he even mentions them as possibilities. It may be a long time—at least a full year—before the first American patient can go to the drugstore and get a DMSO prescription filled, but when it does start happening, Jacob feels confident that medicine will never be the same again.

But the new era will have built-in hazards that are not obvious. Dr. Jacob tells a story that illustrates how DMSO could do harm at a time when it appears to be doing good. A doctor friend of his twisted an ankle one day, and Jacob promptly daubed it with DMSO. Later, looking at X rays of the lower leg, both Jacob and his friend were horrified to learn that DMSO had killed the pain so effectively that the man had been walking around for four hours with a broken shinbone.

Pharmacologist at University of Washington Medical School, Seattle, gives mouse a test dose of DMSO simply by dipping its tail in a test tube.

