Cetyl Myristoleate:

A Unique Natural Compound, Valuable in Arthritis Conditions

by Dr. Charles Cochran and Dr. Raymond Dent

Introduction

Arthritis is a disease of epidemic proportions, but it has been around for so many centuries that it is considered by most people as a part of growing old or a consequence of physical injury. Arthritis is in fact a far more complex disease than is generally known. For instance, Dorland's Medical Dictionary describes 27 different types of arthritis, and that does not include such diverse conditions as systemic lupus erythematosus, scleroderma, fibromyalgia, and numerous other conditions which some authorities consider to be types of arthritis.[1] One authority states that there are approximately 100 causes for arthritis.[2]

Arthritis is thought to affect more than 50 million Americans, and is generally accepted to be the leading cause of movement limitation and disability. It deserves and receives a great deal of research and medical attention. There are hundreds of drugs, procedures, and medical aids and devices directed at coping with the many manifestations of the disease. Given this degree of complexity, certainly no one agent alone could ever be expected to manage or cure "arthritis" in its entirety. New agents take their place in the spectrum and make a contribution. Now there is a relatively new discovery of a natural substance, cetyl myristoleate, which shows promise of making a great contribution in non-infective types of arthritis.

Cetyl Myristoleate

Cetyl myristoleate was discovered and isolated by one person, working alone, on a quest to find a cure for arthritis. Harry W. Diehl, while employed by the National Institute of Arthritis, Metabolism, and Digestive Diseases, specialized in sugar chemistry. He used his chemical knowledge and research instincts to great advantage, identifying and characterizing over 500 compounds, several of which were patented by the National Institutes of Health (NIH). His most signi ficant discovery before cetyl myristoleate was a method of synthesizing 2-deoxydextroribose, a sugar used in the preparation of oral polio vaccine by Dr. Jonas Salk.[3]

Diehl's interest in discovering a way to help victims of arthritis began over 40 years ago when his friend and next door neighbor, a carpenter, developed severe rheumatoid arthritis. His condition deteriorated over time until he became disabled. The neighbor had a family to support, but his arthritis made that impossible. Diehl is a deeply religious man whose feelings overwhelmed him as his friend's condition worsened. Harry thought, "Here I am working at the National Institutes of Health, and I have never seen anything that was good for curing arthritis."[4] He decided to establish a laboratory in his home and embark on a search for something to relieve the pain and disability of his neighbor and the millions of people

who suffer from arthritis. Unfortunately, he was too late to help the neighbor, but Diehl's research did lead to the discovery of cetyl myristoleate, which may someday be hailed as one of the signi ficant nutritional discoveries of the 20th century.

The Quest

As a researcher, Diehl knew that finding a cure for arthritis first meant inducing the disease experimentally in research animals. He started with mice, and quickly realized that he was unable to induce arthritis in them. Diehl said he tried every way he could to give those mice arthritis, but they just would not get it. Then, he contacted a researcher in California who wrote to him, "If you or anyone else can give mice arthritis, I want to know about it, because mice are 100% immune to arthritis."[5] At that moment, Diehl's research instincts told him that what he wanted was already somewhere in those mice.

It was a long, tedious job, working on his own in his spare time, but Diehl finally found the factor - cetyl myristoleate - that protected mice from arthritis. As Diehl said, "It didn't come on a silver platter to me, but after years of chemical sleuthing and just old-fashioned chemical cooking, I found it!" On thin layer chromatography of methylene chloride extract from macerated mice, Diehl noticed a mysterious compound, which was subsequently identi fied as cetyl myristoleate. As Diehl was to prove, cetyl myristoleate circulates in the blood of mice and makes them immune to arthritis.

Cetyl myristoleate is now known to exist in sperm whale oil and in a small gland in the male beaver. At this time no other sources in nature are known to contain cetyl myristoleate. While the first amounts of cetyl myristoleate for experimentation were extracted from mice, Diehl quickly developed a method for making cetyl myristoleate in the lab by the esteri fication of myristoleic acid.

Chemistry

Cetyl myristoleate, an oil, is the hexadecyl ester of the unsaturated fatty acid cis-9-tetradecenoic acid. The common name for the acid is myristoleic acid. Myristoleic acid is found commonly in fish oils, whale oils, dairy butter, and kombo butter. The chemical formula for cetyl myristoleate is (Z)-ROCO(CH2)7CH=CH(CH2)3CH3. Cetyl myristoleate was unrecorded in chemical literature until Diehl's discovery was reported. The current Merck Index of Chemicals does not list cetyl myristoleate. A search of Chemical Abstracts lists Diehl's method of extracting cetyl myristoleate from mice but contains no reference to cetyl myristoleate prior to his 1977 patent.

Experimentation

To test his theory that mice are immune to arthritis because of cetyl myristoleate, Diehl began to experiment on laboratory rats. This research

was reported in an article written in conjunction with one of his colleagues at NIH in the Journal of Pharmaceutical Sciences.[6] In summary, this paper reports that ten normal mice were injected in the tail with Freund's Adjuvant (heat-killed desiccated Mycobacterium butyricum) to which rats and certain other rodents are susceptible. In a period of 10-20 days, no noticeable swelling developed in the legs or paws. Mice in a second group were injected in the left hind paw. Again, after 10-20 days, no swelling was detected as determined by comparison of the measurements of paws at the time of injection.

Then, a group of rats was injected with cetyl myristoleate, and 48 hours later, they were given the arthritis-inducing Freund's adjuvant. A control group of rats was given Freund's adjuvant only. Both groups of rats were observed for a total of 58 days with respect to weight change, hind and front leg swelling, and general well-being. All rats receiving only Freund's adjuvant developed severe swelling of the front and hind legs, lagged in weight gain, and were lethargic and morbid. Those receiving cetyl myristoleate before receiving Freund's adjuvant grew an average of 5.7 times as much as the control group and had little if any evidence of swelling or other symptoms of polyarthritis.

The authors concluded that it was apparent that cetyl myristoleate gave virtually complete protection against adjuvant-induced arthritis in rats. Furthermore, a 1:1 mixture of cetyl myristoleate and a homologue, cetyl oleate, gave results not signi ficantly different from administering cetyl myristoleate alone.

A Hiatus

Diehl patented his discovery in 1977, receiving a use patent for rheumatoid arthritis. He then sought pharmaceutical companies to conduct human trials with cetyl myristoleate, but none were interested in his discovery. Perhaps the lack of interest was because cetyl myristoleate was a natural substance and could not be granted a product patent, or maybe because drug companies know they will have to run through 25,000 to 35,000 substances before they find one that makes it to market. Diehl had made a major nutritional discovery, and no one was interested! Being a scientist, not a marketing expert, Diehl let his discovery lay dormant for about 15 years.

Cetyl Myristoleate Cures

Diehl's Arthritis

As Diehl got older, he began to experience some osteoarthritis in his hands, his knees, and his heels. His family physician tried the usual regimen of cortisone and non-steroidal anti-in flammatory drugs without much effect on the course of the disease. Finally his physician told Harry he could not have any more cortisone. "So," Diehl said, "I thought about my discovery, and I decided to make a batch and use it on myself." He did, and successfully cured himself of his osteoarthritis.

Many of his family members and friends became aware of the relief Diehl got from his discovery, and they wanted to try it too. Time after time, people with both rheumatoid and osteoarthritis received astounding relief with cetyl myristoleate. Before long, family members and friends grew into customers, and cetyl myristoleate appeared on the market as a dietary supplement in 1991.

Clinical Observations and Usage

In common with many other natural substances and drugs, the exact mechanism of cetyl myristoleate's physiologic activity is unclear. As a fatty acid ester, it appears to have the same characteristics as the essential fatty acids, linoleic and alpha linolenic acids, except stronger and longer lasting. These fatty acids are referred to as "essential fatty acids" because the human body cannot make them and we must ingest them in our diets. These EFA's truly are essential to normal cell structure and body function and function as components of nerve cells, cell membranes, and hormone-like substances known as prostaglandins. Many of the beneficial effects of a diet rich in plant foods is a result of the low levels of saturated fat and the relatively higher levels of EFA's. While a diet high in saturated fat has been linked to many chronic diseases, a diet low in saturated fat but high in EFA's prevents these very same diseases.[7] The use of EFA's over an extended period of time has been shown to decrease the pain, inflammation, and limitation of motion of arthritis.[8]

The difference between the activity of EFA's and cetyl myristoleate is that the quantity required and the period of time over which EFA's are taken are markedly longer. Cetyl myristoleate is taken in a one month course of about 13 grams, while EFA's must be taken over extended periods, sometimes many years, and intake varies widely from hundreds to thousands of grams. Cetyl myristoleate seems to have properties in common with EFA's, but it acts faster and lasts longer.

Because EFA's are necessary for normal functioning of all tissue, it is not surprising that the list of symptoms of EFA deficiency is a long one. In chronic inflammatory processes, the supply of EFA's is depleted. Cetyl myristoleate appears to have the ability to correct the imbalance created by chronic inflammation. Like EFA's, maybe cetyl myristoleate turns off the fires of chronic inflammation by serving as a mediator of prostaglandin formation and metabolism.

Venous blood from the gastrointestinal tract is carried to the liver via the portal vein. With the exception of intestinal chylomicrons that enter the lymphatics, all absorbed products pass initially through the liver, and in most instances are extracted or modified before passage into systemic circulation.[9] Since all fatty acids enter systemic circulation through the liver, an oil like cetyl myristoleate would begin its systemic circulation from the liver also. It is speculated that cetyl myristoleate stimulates the production of immunoglobulins and series 1 and 3 prostaglandins, which could be one explanation for why cetyl myristoleate has such potent effect in auto-immune and inflammatory conditions.

Cases

Here are some cases involving the use of cetyl myristoleate from the author's practice.

Leona - She is a 64 year old mother of five who has been developing degenerative changes in her fingers over the last 15 years. She plays the piano frequently and had to reduce the amount of playing time as a result of the arthritis pain in her fingers. ANA titers have been mildly elevated over the years and rheumatoid disease has been diagnosed in several of her ancestors and one sibling. Leona's other medical problems are mild hypertension and chronic sacro-lumbar pain which appears to be attributable both to sciatic damage sustained in a water skiing accident 24 years ago and Shunerman's disease as teenager. Demonstrating both rheumatoid and osteoarthritis changes in her fingers, she has a mild nodular deformity at the terminal joints of the 3rd and 4th fingers on the left hand and fusiform swelling in the medial and distal joints of most of her fingers. Her thumbs were intermittently painful and swollen. She first took cetyl myristoleate in mid-January, 1997. There is now increased range of motion in all of the finger joints and visible reduction of the rheumatoid-like swelling. The nodular deformities have not changed noticeably. Her back problems demonstrated no improvement. Her sedimentation rate has run from 15 to 35, and is currently 16, with her ANA <1:360. Leona is now able to play the piano all she wants to without pain or swelling of her fingers.

Joyce - She is a 42 year old mother of three and a court reporter in good general health, suffering only from moderate hayfever in the spring. Recently Joyce developed a generalized stiffness and soreness in her fingers, which was worse on her right hand. The condition became so bad over a couple of weeks that she began making numerous mistakes in her court reporting and her speed was signi ficantly reduced. She was diagnosed with tenosynovitis. Joyce shows no deformities of her hands associated with arthritis. She began a course of cetyl myristoleate during the last week of February and finished the last week of March, 1997. She reports complete restoration of her dexterity with return of her normal accuracy and speed, along with elimination of the associated pain.

Bob - He is a 67 year-old retired politician who suffered lumbar and pelvic fractures in WWII when his jeep struck a land mine. Over the years, these injuries produced increasing pain, which seriously affected routine daily activities like getting out of bed in the morning and his ability to play golf. X-rays demonstrate degenerative arthritic changes in the lumbar articulations and the right sacroiliac joint. At 6 feet tall and 185 pounds, he is otherwise in good health. Bob has been using anti-in flammatory drugs for over 20 years, including Voltaren, ibuprofen, Tylenol, and aspirin. He took a one-half course of 7.6 grams of cetyl myristoleate in September, 1996. He experienced moderately severe in flammation (breakthrough pain) on day two which lasted for three days. On the 4th day, the pain began to subside and was completely gone by the 5th day. He has been virtually pain-free since and is very happy with the increased comfort with which he

can begin each day. He can now comfortably walk the golf course whereas before he was limited to a golf cart. In February, 1997, he perceived a slight return of his low back pain and decided to take another one-half course. He experienced no breakthrough pain this time and is currently pain-free. He has not taken any other medication for his back pain since taking cetyl myristoleate initially.

Virginia - She is an 85 year-old lady who still works part-time at the family-owned business and cares for her husband who has cancer. Virginia was diagnosed ten years ago with diabetes, and elevated triglycerides and cholesterol. Overweight all her life, she is now stable at 265 pounds. She suffers from long-standing osteoarthritis in her knees and ankles, for which she was placed on cetyl myristoleate. No other agents have been used by her for arthritis except for non-steroidal anti-inflammatory drugs, both OTC and prescription. After about 7.6 grams of cetyl myristoleate, she was able to walk without limping or experiencing significant pain. About three months following the initial course, some pain returned, but she has retained what she estimates to be 50% improvement. She also has gallstones and a recurrent problem with gout, both of which have been symptomless since her cetyl myristoleate course. She evidently did not receive enough cetyl myristoleate for her body weight and will be given another course of 13.25 grams.

Rose - Rose is a 46 year old mother of four who works as a legal secretary. She was diagnosed five years ago as having an atypical form of multiple sclerosis. She had MRI exams of the skull and spinal cord, which demonstrated several areas of non-specific degenerative changes in the brain with several "bright spots" in the cervical spinal cord. She had periodic visual aberrations as well as constant fatigue and fibromyalgia-like pains focused in her trapezius (bilaterally), and in her upper arms and legs below the knees. She also complained of burning sensations in her hands and feet. All of the symptoms worsened with elevated stress. There was no sign of pernicious anemia or diabetes. She was receiving chiropractic therapy. Joyce was started on numerous naturopathic therapies in March, 1996 without significant benefit over an eight month period. In November, 1996, she started on cetyl myristoleate and indicated that she felt more fatigued for the first three days but that the pain in her upper back and extremities was completely gone. She further reported that the tingling/burning sensation in her feet and hands was also gone. Rose felt this was the most striking aspect of the treatment as those areas were the ones most constantly affected. This improvement lasted until she had to travel out of state to tend to her mother who was diagnosed with a rapidly advancing malignancy. Over the next three weeks, her symptoms began to reappear. After the death of her mother, she returned home in as bad shape as before first taking cetyl myristoleate. She decided that she wanted to take another half course of cetyl myristoleate, which completely duplicated the relief from the initial dosage with the exception that she feels slightly less relief from her tendencies to fatigue than she did after the first course. Rose will be taking another half course to see if she can improve her stamina.

J.P. - He is a 60 year old male who has been a farmer his entire life. Diagnosed with rheumatoid arthritis 15 years ago, he has been on various

pharmacologic protocols during that time. The most recent includes Plaquenil, methotrexate, and prednisone, with daily non-steroidal anti-inflammatory drug dosing. J.P. has fusiform swelling involving most of the joints of his fingers and moderate ulnar deviation of both hands. He suffered severe pain most of the time which limited the labor he could perform. He began cetyl myristoleate during the last week of February, 1997, at which time he terminated his methotrexate and Plaquenil (not recommended except in consultation with a qualified physician). He has also reduced his prednisone from 15 milligrams per day to 5 mg, but he still maintains his NSAID dosing on a daily basis. J.P. experienced a mild increase in pain during the first four days of taking cetyl myristoleate, but since then he has been pain free and the swelling in his hands is reducing. J.P. will be monitored over the next month to determine his stability, with checking of his serum parameters by an MD. If he continues to remain symptom-free, his steroid and NSAID therapies will be terminated. J.P. does not smoke, eat chocolate, nor drink alcohol or caffeinated beverages. He was advised at the onset of his cetyl myristoleate dosage to avoid sugar. He is also taking Glucosaplex (a mix of glucosamines) and Lyprinol (fatty acid extract of green lipped mussel) as an additional natural anti-inflammatory agent.

Optimizing the Effects of Cetyl Myristoleate

Since the days of Paracelsus, physicians have been combining therapeutic agents for synergistic effects, or to achieve potentiation of several compounds. As powerful a nutrient as it is, the effects of cetyl myristoleate can be helped by combining it with other natural substances. Two or three grams daily of omega-3 fish oil or two tablespoonfulls of flaxseed oil during the month-long course of cetyl myristoleate can help its effects. This should be accompanied by 300-500 mg of Vitamin E daily. A minimum of 1,500 mg of glucosamine sulfate should be taken daily for at least three months to assist in rebuilding cartilage damaged by degenerative arthritis. In severe cases, three to six grams of glucosamine daily for one month and reduced to 1,500 mg daily for three months has been found to be very effective. Afterwards, a daily maintenance of 500 mg of glucosamine should be used for healthy cartilage. If stomach upset occurs, glucosamine should be taken with meals.

Clinical experience has shown that glucosamine sulfate is far superior when compared to cartilage extracts, such as sea cucumber, hydrolyzed bovine cartilage, and shark cartilage. This is due to the increased absorption and utilization of glucosamine sulfate compared to these sources of chrondroitin sulfates, which are very large molecules and difficult to digest. Animal and human studies have shown up to 98% absorption of glucosamine,[10,11] compared to only 8% absorption of chrondroitin sulfate.[12]

One of the reasons that glucosamine sulfate is more effective in rebuilding cartilage when compared to other sources of glucosamine, including the N-acetyl and hydrochloride forms, is that it provides bioavailable dietary sulfur. Sulfur helps provide the protein links necessary for cartilage matrix repair. Another source of sulfur is

methylsulfonylmethane (MSM), which has been used historically to treat a wide variety of conditions including allergies, emphysema, arthritis, gastrointestinal upset, and some vascular conditions. MSM is a metabolite of dimethylsulfoxide (DMSO) and provides many similar good effects. MSM is found in most natural unprocessed foods. Because of its volatility, MSM is lost when fresh food is cooked, processed, or stored. The richest source of MSM is mother's milk; consequently, very few nursing infants are deficient in dietary sulfur.

As with any oil, cetyl myristoleate requires lipase to be digested. Lipases are pancreatic enzymes that play a key role in the digestion of fats and fat soluble vitamins. If lipase is absent or deficient, cetyl myristoleate will be poorly absorbed, if at all. As many arthritis patients are of the age when lipase production decreases, approximately 100 mg of lipase enzyme should be taken with each cetyl myristoleate capsule. In addition to taking lipase, cholecystectomy patients will need lecithin or ox bile extract to assure absorption.

Diet can play a role in optimizing the benefits of cetyl myristoleate. Carbonated cola beverages and citrus juices may block the absorption of cetyl myristoleate and should be avoided on the days cetyl myristoleate is taken. Sugar intake should be minimized when taking cetyl myristoleate, and adding refined sugar to liquids like coffee and tea should be avoided altogether. Alcohol and caffeine intake should be very limited or eliminated altogether while combating arthritis and chronic inflammatory conditions.

Reported Results

Both osteoarthritis and rheumatoid arthritis sufferers report striking improvement with cetyl myristoleate. Numerous private correspondence describes decreased stiffness and pain, and increased flexibility and range of motion with cetyl myristoleate. Swelling and redness is reduced in rheumatoid arthritis. Writers describe other health benefits, including positive effect of cetyl myristoleate on emphysema, hepatitis, hypertension, diabetes, eczema, psoriasis, colds, allergies, low back pain, and headaches. These reported improvements in general health status are not surprising since each of these conditions could be associated with deficiency in the balance of EFA's.

Like everything else, cetyl myristoleate does not work 100% of the time. Failure to work can be associated with failure to follow the dietary recommendations; failure to use lipase in conjunction with each capsule of cetyl myristoleate; failure to take a sufficient amount of cetyl myristoleate; failure of the liver to uptake and respond to the cetyl myristoleate; and, misdiagnosis in which the condition is not really an arthritis-type condition.

Dosage

Cetyl myristoleate is taken in a one month course. A total dose of 12 to 15 grams appears to be indicated. This is usually enough for most people, but for osteoarthritis sufferers, the dose appears to be related to the number

of sites in which cartilage has worn away. For example, a patient with osteoarthritis of the knees could expect 10 to 15 grams to be sufficient in most cases, while a patient with osteoarthritis of 5 or 6 spinal discs, both hips, and both knees may require an additional 5 to 10 grams, or even a full second course. Some of the patients treated by the author would likely have benefited even more from their cetyl myristoleate usage with the larger doses now recommended.

Contraindications and Toxicity

With the tens of thousands of people who have taken cetyl myristoleate there have been no confirmed reports of adverse side effects. In common with fish oils, it may produce some mild burping in some people which passes within an hour. There have been no reported interactions with other medications or natural substances, and other substances (except those mentioned above as diet considerations) do not interfere with cetyl myristoleate.

While teratogenicity of cetyl myristoleate is probably the same as for EFA's, as a safety matter cetyl myristoleate should not be used by pregnant or lactating women until studies of cetyl myristoleate's effects on fetuses and infants have been done. As with any substance being added to the diet of anyone with asthma or a history of severe allergic reactions, caution is advised and cetyl myristoleate should be used in these cases under the direct supervision of a health care professional.

Toxicity studies have been performed on cetyl myristoleate and the lack of toxicity is evident. Test results deemed cetyl myristoleate a non-toxic material in accordance with Federal regulations. Mega-doses were given to test animals with no ill effects. Necropsy of test animals showed no ill effects on their internal organs.[13] The LD50 of cetyl myristoleate was not established, but it can be presumed to far exceed 10 grams per kilogram of body weight.

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