

GOUT AND DIVING

Gout is a common, painful, debilitating condition that affects approximately 2% of people. As a result, many divers have gout and virtually every diver knows someone with gout.

Gout develops in people who have chronically high blood levels of urate (uric acid). Surprisingly, two-thirds of people with high blood levels of urate (hyperuricemia) do NOT develop gout. We do not know why some people with hyperuricemia develop gout while others do not.

Uric acid is formed when the body breaks down purines. Purines are common and important. They form the basis of 50% of our DNA and RNA, and are the building blocks used to make many other biomolecules including ATP, GTP, cyclic AMP, NADH, and coenzyme A. Purines are found in high concentrations in meat (especially organs), seafood (anchovies, herring) as well as asparagus and mushrooms. Normally our bodies digest the purines we eat, using what we require and excreting the excess in the urine. If we consume too many purines or if our bodies do not excrete enough uric acid in the urine, uric acid builds up in the blood causing hyperuricemia and sometimes, gout.

Gout most commonly affects joints, but it can also affect the kidneys or urinary tract. Uric acid or urate crystals can form kidney stones or they can form in the tissue of the kidneys, interfering with kidney function. Approximately 15% of people with gout will develop kidney stones formed from uric acid crystals (kidney stones form in 8% of the general population). Renal failure as a result of uric acid deposition in the tissues of the kidneys is relatively rare.

Pseudogout is a different disease. It also causes arthritis, but it is a result of calcium pyrophosphate dehydrate (CPPD) crystals rather than uric acid crystals.

Although the cause of gout is unknown, there are several things that increase the risk of a person developing gout. Gout most commonly occurs in men between the

ages of 30 and 45, and in women between the ages of 55 and 70. It is more common in men. Obesity, overeating, eating a lot of meat and seafood, fasting, high blood pressure (untreated), diabetes (uncontrolled), hyperlipidemia (untreated), arteriosclerosis, alcohol (more than two drinks a day for men and one drink a day for women), taking a medication that raises the blood levels of uric acid (thiazide diuretics, low dose aspirin, some anti-rejection drugs), and injury or recent surgery all increase your risk of developing gout. Fortunately, reducing most of these risk factors is a good idea for all of us and coincidentally will reduce the risk of many other medical problems. A family history of gout will also increase your risk.

From the preceding information you might expect gout to be a chronic nuisance problem that slowly got worse over time. However, it is NOT! Gout usually presents as sudden, severe joint pain, sometimes with redness, swelling and tenderness of the joint. You can go to bed perfectly normal and wake up in the middle of the night with a joint that is so painful that even the weight of the sheet on it is intolerable. The most commonly affected joint is the base of the big toe but the knee is also frequently involved. Usually only one joint is affected but some people have several joints affected at the same time.

The pain is usually maximal 12 to 24 hours after it starts and then it resolves, completely, over the next several days or weeks, even without treatment. An attack of gout occurs when a type of disease fighting white cell called a neutrophil attacks the uric acid crystal. The white cell surrounds the crystal and attempts to digest it, just like it does with a bacteria. Chemicals released during this process cause the signs and symptoms of gout in the joint. We do not know why the neutrophils suddenly attack the uric acid crystals, nor do we know why the body

eventually turns off the attack and the joint becomes painless again.

Gout occurs in three phases. 'Acute gouty arthritis' is the acute attack. The 'intercritical period' is the time between attacks when the person is completely normal. The second attack usually occurs within two years of the first. If gout is untreated, subsequent attacks tend to occur more often, be more severe and prolonged, involve more joints, and may be accompanied by fever. 'Chronic tophaceous gout' develops in people who have repeated attacks over many years. Uric acid crystals accumulate in the joints, bones and cartilage causing a mass or nodule called a 'tophus' (plural tophi).

Tophi are usually painless but they can become inflamed like a gouty joint. They can cause the resorption and erosion of bone resulting in deformity and sometimes are cosmetically upsetting. Tophaceous gout is becoming less common now that more people are being treated for hyperuricemia, but tophi are still found in people with gout who are not treated (or can not tolerate the medications), people taking cyclosporine after organ transplantation, and some older women taking a diuretic.

Gout is relatively difficult to diagnose because so many different diseases and problems can cause joint pain and inflammation. A suddenly painful joint with no obvious cause that completely settles down followed by a second sudden episode is highly suggestive of gout. A blood test that shows a high level of uric acid supports a diagnosis of gout, but two-thirds of people with hyperuricemia never develop gout and some people with normal blood urate levels do develop gout. The best test for gout is to stick a needle into the inflamed joint, draw off a sample of the joint fluid and look for uric acid crystals in the fluid. However, uric

acid crystals are not always present in the joint fluid, even during an acute attack. The material in a tophus located just under the skin can also be extracted with a needle to diagnose gout.

Treatment of an acute attack of gout is primarily aimed at reducing the pain and inflammation. The earlier in the attack treatment is started, the more effective it will be. Nonsteroidal anti-inflammatory drugs (NSAIDs) are commonly used and include ibuprofen (Advil, Motrin), naproxen (Aleve), and indomethacin (Indocid). Aspirin is also an NSAID but it is usually avoided because it affects the

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blood levels of uric acid. NSAIDs should usually not be taken by people with kidney or liver disease, bleeding problems, taking blood thinners, or who have a history of ulcers.

Colchicine is often used in people who can not take NSAIDs. However, colchicine can cause diarrhea, nausea, vomiting, and crampy abdominal pain. For people who do not suffer these side effects, colchicine can be highly effective in treating the acute attack.

Corticosteroids are highly effective anti-inflammatory agents (prednisone, prednisolone, methylprednisolone). They can be taken as pills, or injected directly into the inflamed joint. However, steroids can cause thinning of bones, poor wound healing and reduce the ability of the body to fight infections. For these reasons, steroids are usually taken for only a short time. Oral steroids can also result in an attack of gout when they are stopped. Therefore, they are usually tapered over a period of seven to 10 days. Steroids are usually used only in people who can not take NSAIDs or colchicine.

Once the acute attack has resolved, the risk of future attacks can be reduced by lifestyle modification and by taking medication. Colchicine in low dose (to reduce the risk of side effects) can be effective but it is usually not used for years. NSAIDs can be used and might be a reasonable choice if the person also has arthritis and needs the NSAIDs for daily pain control. However, the risk of bleeding and ulcers rises with long-term daily use of NSAIDs.

If a person only experiences rare, relatively mild attacks of gout, just treating the acute attack may be sufficient. However, for people with severe or frequent attacks, prevention is important. Lifestyle changes should be made and include avoiding the risk factors mentioned above as well as the following. Everyone should drink at least two liters of water a day and limit alcohol intake. Eating a balanced diet with protein primarily from low-fat dairy products (limit meat, fish and poultry) and maintaining a desirable body weight are good advice for all of us. In addition, there is some evidence that drinking a cup or two of coffee per day, taking 500mg of vitamin C per day, and eating cherries and other dark-colored fruits (blackberries, blueberries, purple grapes, raspberries) reduces blood urate levels.

Most people will also need to take a medication to prevent future attacks. These drugs either reduce uric acid production or increase uric acid removal. Uric acid production is reduced by xanthine oxidase inhibitors like allopurinol (Aloprim, Zloprim) and febuxostat (Uloric). Allopurinol is the most commonly used medication but causes a rash and low blood count in some people while febuxostat is more expensive and can cause rash, nausea and reduced liver function. These medications can trigger an acute attack when started and take weeks to months to work. Therefore, colchicine is often taken concurrently for the first several weeks.

Probenecid (Probalan) and benzbromarone increase uric acid

excretion by the kidney. Side effects include rash, stomach pain and kidney stones. Losartan (used to treat high blood pressure) and fenofibrate (used to treat high lipids) also have weak urate-lowering effects.

As with all medications, diving should be avoided until you know how the medication is going to affect you. Diving during an acute attack of gout, especially if it involves the base of the great toe or the knee, is likely to be very unenjoyable!

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Nitrox and Technical Divers (IANTD) since 2000, and is an active cave, trimix and closed circuit rebreather diver/instructor/instructor trainer. David's first love is cave diving exploration and he's been exploring and surveying underwater passages in Canada since 1985. David was responsible for the exploration and mapping of almost 11 kilometres of underwater passages in the Ottawa River Cave System. In 1995, he executed the first successful rescue of a missing trained cave diver. David received the Canadian Star of Courage for this rescue which took place in the chilly Canadian waters of Tobermory, Ontario. He still dives as much as possible, but admits his six year old son Lukas, five year old daughter Emeline and wife (Dr Debbie Pestell) are currently higher priorities than diving!