

## Gout

**Mechanism:** Uric acid accumulation.

**Uric Acid:** **Uric acid** is a heterocyclic compound of carbon, nitrogen, oxygen, and hydrogen with the formula  $C_5H_4N_4O_3$ . It forms ions and salts known as **urates** and **acid urates** such as ammonium acid urate. Uric acid is a product of the metabolic breakdown of **purine** nucleotides. High blood concentrations of uric acid can lead to **gout**. The chemical is associated with other medical conditions including diabetes and the formation of ammonium acid **urate kidney stones**.

**Purines:** Purines are found in high concentration in meat and meat products, especially internal organs such as liver and kidney. In general, plant-based diets are low in purines. Examples of high-purine sources include: sweetbreads, anchovies, sardines, liver, beef kidneys, brains, meat extracts (e.g., Oxo, Bovril), herring, mackerel, scallops, game meats, beer (from the yeast) and gravy. A moderate amount of purine is also contained in beef, pork, poultry, other fish and seafood, asparagus, cauliflower, spinach, mushrooms, green peas, lentils, dried peas, beans, oatmeal, wheat bran, wheat germ, and hawthorn. Higher levels of meat and seafood consumption are associated with an increased risk of gout, whereas a higher level of consumption of dairy products is associated with a decreased risk. Moderate intake of purine-rich vegetables or protein is not associated with an increased risk of gout.

**Causes:** Uric acid is generated as the body's tissues are broken down during normal cell turnover. Some people with gout generate too much uric acid (10%). Other patients with gout do not effectively eliminate their uric acid into the urine (90%). Genetics, gender, and **nutrition** (alcoholism, **obesity**) play key roles in the development of gout.

- 1) If your parents have gout, then you have a 20% chance of developing it.
- 2) British people are 5 times more likely to develop gout.
- 3) American blacks, but not African blacks, are more likely to have gout than other populations.
- 4) **Use of alcohol, especially beer, increases the risk for gout.**
- 5) **Diets rich in red meats, internal organs, yeast, and oily fish increase the risk for gout.**
- 6) Uric acid levels increase at puberty in men and at menopause in women, so men first develop gout at an earlier age (30s to 50s) than do women (50s to 70s). Gout in pre-menopausal women is distinctly unusual.
- 7) Attacks of gouty arthritis can be precipitated when there is a sudden change in uric acid levels.
- 8) **Overindulgence of alcohol and red meats**
- 9) Trauma
- 10) Starvation and dehydration
- 11) IV contrast dyes
- 12) Chemotherapy

### **Some Possible Causes of Elevated Uric Acid Levels**

**Medication** Diuretics used for weight loss or heart disease, insulin, some antibiotics, medication for rheumatoid arthritis, or an overdose of B vitamins can cause uric acid levels to rise. Diuretics reduce sodium, magnesium, calcium and potassium (among other things) levels. If you need to use a diuretic, see our natural herbal products for ones with fewer side effects. One customer reported getting gout when he took beta-blockers for his high blood pressure.

**Poor kidney function** When kidneys are not functioning at optimum levels, they lose their ability to excrete uric acid from the body. This situation may be due to various kidney problems or over-consumption of alcohol. When alcohol is metabolized, lactic acid is produced, which hinders uric acid excretion by the kidneys.

**Dieting** Severe dieting or fasting can cause excess lactic acid, which hinders uric acid excretion by the kidneys. Crash and severe calorie restriction diets shock your metabolism and can trigger a gout attack. Dieting may also cause a loss of potassium, which can increase urate levels in the blood. As mentioned above, some dieters also use diuretics to speed the process, and they can rob the body of potassium and other minerals, triggering a gout attack. It seems to be a vicious circle! However, a proper diet that is done slowly is recommended because losing weight will reduce serum levels of uric acid.

**Diet** Traditional thinking tells us that gout is the result of excessive amounts of alcohol, protein, heavy foods, coffee and soft drinks in your diet. Certain foods contain high levels of purine which can cause uric acid levels to rise. Purine is a protein substance that is transformed into uric acid during digestion. Reduction in consumption of these foods is very often successful in reducing or eliminating gout.

A **potassium deficiency** can increase urate levels in the blood. This is very important, and ways to correct it are discussed above and under the *diuretics* section.

#### Drugs that increase serum uric acid

- 1) Aspirin (Low dose)
- 2) Diuretics
- 3) hypertensive medications
- 4) Nicotinic acid
- 5) Cyclosporine A
- 6) Acetaminophen (Tylenol)
- 7) Others

#### Pharmacological treatment:

- 1) **Colchicine** (PO)
  - a) ASE: nausea, vomiting, diarrhea
  - b) MAX: 6 mg/day in acute attack
  - c) Prophylactic **Dose:** 0.6 -1.2 mg/day
- 2) Goal; keep serum urate < 7.0 mg/dl
- 3) **Probenecid** (Uricosuric properties)
  - a) Mechanism: increases uric acid excretion
  - b) ASE: overt nephrolithiasis
    - i) Avoidance:
      - (1) start at low doses
      - (2) Stay well hydrated
      - (3) Alkalinize urine
        - (a) Sodium Bicarbonate
        - (b) And/or Acetazolamide (Carbonic anhydrate inhibitor)
  - c) Starting **Dose:** 250 mg bid and increase over several weeks
  - d) **SIDE EFFECTS:** Side effects of probenecid are uncommon and usually mild. In addition to causing kidney stones and precipitating acute gouty arthritis, side effects of probenecid include hair loss, skin rash, headache, nausea, sore gums, and fever. In rare instances, it has caused severe anemias
- 4) **Allopurinol**
  - a) Mechanism: Decreases uric acid production
  - b) **Dose:** 300 mg/day
  - c) ASE: fever, dermatitis, elevated liver enzymes, diarrhea, and vasculitis.
  - d) **SIDE EFFECTS:** The most frequent adverse reaction to allopurinol is skin rash. Allopurinol should be discontinued immediately at the first appearance of rash, painful urination, blood in the urine, eye irritation, or swelling of the mouth or lips, because these can be a signs of impending severe allergic reaction, which can be fatal. Rarely, allopurinol can cause nerve, kidney, and bone marrow damage.

#### Treatment

- 1) Drink 2 to 3 L of fluid daily.
- 2) Consume a moderate amount of protein. Limit meat, fish and poultry to 4 - 6 oz per day. Try other low-purine good protein foods such as low fat dairy products, tofu and eggs.
- 3) Limit fat intake by choosing leaner meats, foods prepared with less oils and lower fat dairy products
- 4) Aside from avoiding high purine foods, maintaining a healthy body weight is important for gout patients as well. Obesity can result in increased uric acid production by the body. Follow a well-balanced diet to lose excess body weight. Do not follow a high-protein low-carb diet as this can worsen gout conditions.
- 5) Keep the urine pH high (basic or non-acidic)

- 6) Colchicine, probenecid, allopurinol, sodium bicarbonate.

### **Prevention**

If you are at risk for gout, you should

- 1) Eat a low-cholesterol, low-fat diet. People with gout have a higher risk for heart disease. This diet would not only lower your risk for gout but also your risk for heart disease.
- 2) Slowly lose weight. This can lower your uric acid levels. Losing weight too rapidly can occasionally precipitate gout attacks.
- 3) Restrict your intake of alcohol, especially beer.

If you have had an attack of gouty arthritis, you should do all of the above and follow the regimen prescribed by your physician. The adequate prevention of gouty arthritis may involve lifelong medical therapy.

### **Balanced Diet**

According to the American Medical Association, a balanced diet for people with gout include foods:

- 1) High in complex carbohydrates (whole grains, fruits, vegetables)
- 2) Low in protein (15% of calories and sources should be soy, lean meats, poultry)
- 3) No more than 30% of calories from fat (10% animal fat)

### **Beneficial Foods**

Foods which may be beneficial to people with gout include:

- 1) Dark berries may contain chemicals that lower uric acid and reduce inflammation.
- 2) Tofu which is made from soybeans may be a better choice than meats.
- 3) Certain fatty acids found in certain fish such as **salmon**, flax or **olive oil**, or nuts may possess some anti-inflammatory benefits.

### **Recommended Foods to Eat**

- 1) Fresh cherries, strawberries, blueberries, and other red-blue berries
- 2) Bananas
- 3) Celery
- 4) Tomatoes
- 5) Vegetables including kale, cabbage, parsley, green-leafy vegetables
- 6) Foods high in bromelain (pineapple)
- 7) Foods high in vitamin C (red cabbage, red bell peppers, tangerines, mandarins, oranges, potatoes)
- 8) Drink fruit juices and purified water (8 glasses of water per day)
- 9) Low-fat dairy products
- 10) Complex carbohydrates (breads, cereals, pasta, rice, as well as aforementioned vegetables and fruits)
- 11) Chocolate, cocoa
- 12) Coffee, tea
- 13) Carbonated beverages
- 14) Essential fatty acids (tuna and salmon, flaxseed, nuts, seeds)
- 15) Tofu, although a legume and made from soybeans, may be a better choice than meat

### **Foods to Avoid**

Diets which are high in purines and high in protein have long been suspected of causing an increased risk of gout .

**According to the American Medical Association, purine-containing foods include:**

- 1) Beer, other alcoholic beverages. Limit alcohol consumption to 1 drink 3 times a week.
- 2) Anchovies, sardines in oil, fish roes, herring, Mackerel, Scallops, mussels
- 3) Yeast. (Beer), whole grain breads and cereals, oatmeal
- 4) Organ meat (liver, kidneys, brains, sweetbreads)
- 5) Processed meats (hot dogs, lunch meats, etc.),
- 6) Legumes (dried beans, peas, lima beans)

- 7) Meat extracts, consommé, broth, bouillon, gravies. (e.g Oxo, Bovril)
- 8) Mushrooms, spinach, asparagus, cauliflower, mushrooms.
- 9) Chicken, duck, ham, turkey, Game meats
- 10) Fried foods, roasted nuts, any food cooked in oil (heated oil destroys vitamin E)
- 11) Rich foods (cakes, sugar products, white flour products)
- 12) Dried fruits
- 13) Caffeine
- 14) Eggs

**NOTE:** It is important to remember that purines are found in all protein foods. All sources of purines should not be eliminated.

**Urine at pH 7.0 is neutral and elimination of uric acid decreases by approximately 50% at pH 6.5. The pka of uric acid is 5.75. In urine at pH 5.0, only 15% of uric acid exists in solution. The solubility increases more than 10-fold at pH 7.0 and more than 100-fold at pH 8.0.**

**Extremely Alkaline Forming Foods - pH 8.5 to 9.0:**

Lemons, Watermelon, Agar Agar, Cantaloupe, Cayenne (Capsicum), Dried dates & figs, Kelp, Karengo, Kudzu root, Limes, Mango, Melons, Papaya, Parsley, Seedless grapes (sweet), Watercress, Seaweed

**Moderate Alkaline - pH 7.5 to 8.0**

Apples (sweet), Apricots, Alfalfa sprouts Arrowroot, Avocados, Bananas (ripe), Berries, Carrots, Celery, Currants, Dates & figs (fresh), Garlic, Gooseberry, Grapes (less sweet), Grapefruit, Guavas, Herbs (leafy green), Lettuce (leafy green), Nectarine, Peaches (sweet), Pears (less sweet), Peas (fresh sweet), Persimmon, Pumpkin (sweet), Sea salt, Spinach, Apples (sour), Bamboo shoots, Beans (fresh green), Beets, Bell Pepper, Broccoli, Cabbage, Cauliflower, Carob, Daikon, Ginger (fresh), Grapes (sour), Kale, Kohlrabi, Lettuce (pale green), Oranges, Parsnip, Peaches (less sweet), Peas (less sweet), Potatoes & skin, Pumpkin (less sweet), Raspberry, Sapote, Strawberry, Squash, Sweet corn (fresh), Tamari, Turnip, Sour Dairy

**Slightly Alkaline to Neutral pH 7.0**

Almonds, Artichokes (Jerusalem), Barley-Malt (sweetener-Bronner), Brown Rice Syrup, Brussel Sprouts, Cherries, Coconut (fresh), Cucumbers, Egg plant, Honey (raw), Leeks, Miso, Okra, Olives ripe, Onions, Pickles (home made with brown rice vinegar), Radish, Sea salt, Spices, Taro, Tomatoes (sweet), Vinegar (sweet brown rice), Water Chestnut, Amaranth, Artichoke (globe), Chestnuts (dry roasted), Egg yolks (soft cooked), Goat's milk and whey (raw), Horseradish, Mayonnaise (home made), Millet, Olive oil, Quinoa, Rhubarb, Sesame seeds (whole), Soy beans (dry), Sprouted grains, Tempeh, Tofu, Tomatoes (less sweet)

**Slightly Acid to Neutral pH 7.0**

Barley malt syrup, Barley, Bran, Cashews, Cereals (unrefined with honey-fruit-maple syrup), Cornmeal, Fructose, Honey (pasteurized), Lentils, Macadamias, Maple syrup (unprocessed), Low Fat Milk (homogenized) and most processed dairy products, Molasses organic, Nutmeg, Mustard, Pistachios, Popcorn (plain), Rice or wheat crackers (unrefined), Rye (grain), Rye bread (organic sprouted), Seeds (pumpkin & sunflower), Walnuts Blueberries, Brazil nuts, Butter (salted), Cheeses (mild & crumbly), Crackers (unrefined rye), Dried beans (mung, adzuki, pinto, kidney, garbanzo), Dry coconut, Egg whites, Goats milk (homogenized), Olives (pickled), Pecans, Plums, Prunes, Butter (fresh unsalted), Cream (fresh & raw), Milk (raw cow's), Whey (cow's)

**ACID FORMING FOODS FATS & OILS:** Avocado Oil, Canola Oil, Corn Oil, Hemp Seed Oil, Flax Oil, Lard, Olive Oil, Safflower Oil, Sesame Oil, Sunflower Oil

**FRUITS:** Cranberries

**GRAINS:** Rice Cakes, Wheat Cakes, Amaranth, Barley, Buckwheat, Oats (rolled), Quinoa, Rice, Rye, Spelt, Kamut, Wheat, Hemp Seed Flour

**NUTS & BUTTERS:** Cashews, Brazil Nuts, Peanuts, Processed Peanut Butter, Pecans, Tahini

**ANIMAL PROTEIN:** Beef, Carp, Clams, Fish, Lamb, Lobster, Mussels, Oyster, Pork, Rabbit, Salmon, Shrimp, Scallops, Tuna, Turkey, Venison

**PASTA (WHITE):** Noodles, Macaroni, Spaghetti Distilled Vinegar, Wheat Germ

**BEANS & LEGUMES:** Black Beans, Chick Peas, Green Peas, Kidney Beans, Lentils, Lima Beans, Pinto Beans, Red Beans, Soy Beans, Soy Milk, White Beans, Rice Milk, Almond Milk

**DRUGS & CHEMICALS:** Aspartame, Chemicals, Drugs (Medicinal), Drugs (Psychedelic), Pesticides, Herbicides

**ALCOHOL:** Beer, Spirits, Hard Liquor, Wine

**ACTIVITIES:** Overwork, Anger, Fear, Jealousy, Stress

**Moderate Acid - pH 6.0 to 6.5**

Cigarette tobacco, Cream of Wheat (unrefined), Fish, Fruit juices with sugar, Maple syrup (processed), Molasses (sulphured), Pickles (commercial), Breads (refined) of corn, oats, rice & rye, Cereals (refined), corn flakes, Shellfish, Wheat germ, Whole Wheat foods, Wine, Yogurt (sweetened) Bananas (green), Buckwheat, Cheeses (sharp), Corn & rice breads, Egg whole (cooked hard), Ketchup, Mayonnaise, Oats, Pasta (whole grain), Pastry (wholegrain & honey), Peanuts, Potatoes (with no skins), Popcorn (with salt & butter), Rice (basmati), Rice (brown), Soy sauce (commercial), Tapioca, Wheat bread (sprouted organic)

**Extremely Acid Forming Foods - pH 5.0 to 5.5**

Artificial sweeteners, Beef, Carbonated soft drinks & fizzy drinks, Cigarettes (tailor made), Drugs, Flour (white wheat), Goat, Lamb, Pastries & cakes from white flour, Pork, Sugar (white), Beer, Brown sugar, Chicken, Deer, Chocolate, Coffee, Custard with white sugar, Jams, Jellies, Liquor, Pasta (white), Rabbit, Semolina, Table salt refined & iodized, Tea black, Turkey, Wheat bread, White rice, White vinegar (processed).

**Research Update:**

A recent study published in the New England Journal of Medicine on Mar 11, 2004 revealed that high intake of low-fat dairy products indeed reduces the risk of gout by 50%. It is unknown why low-fat dairy products offer a protective effect. Unfortunately, no natural supplements are proven effective to prevent or alleviate onset of acute gout attacks. The most effective treatment for gout attack is medication.