# Arthritis: Don't Let Joint Pain Slow Your Journey

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**Arthritis and Americans**

According to the (Center for Disease Control) CDC, arthritis is the leading cause of disability in the United States. Twenty-three million Americans (about 11 percent of the U.S. population) report symptoms of joint arthritis, but have never sought medical care for relief. Another 42.7 million Americans (about 20 percent of the U.S. population) have been diagnosed with arthritis by a Physician. Thus, nearly one out of three Americans suffer disabling joint pain, much of which could be alleviated or entirely averted if they only knew how to better care for the health of their joints[1].

So, you may ask, "What can I do to improve the health of my joints--to make sure they last as long as I do?" In this article we will explore the contribution of diet, exercise, obesity and water drinking to joint health and longevity.

Because the knee is a very vulnerable joint to arthritis I will use it as a model in our discussion. I could have just as easily used the spinal discs, hip, shoulder or ankle.

The junction of the femur, often called the thighbone, and the tibia, sometimes referred to as the shinbone, form the knee joint. The end of the femur and the top of the tibia are covered with a layer of cartilage about one eighth of an inch thick. This cartilage provides protection, shock absorption and smooth motion for the joint.

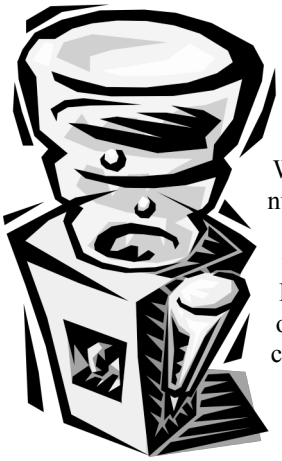
Lubrication fluid is held in the knee by the joint capsule, this capsule is like a bag that surrounds the entire knee joint. When a person complains of having "water on the knee" it usually means that they have extra joint fluid in their joint capsule.

Cartilage is a rubbery material that has no blood vessels running through it. It depends on nutrients diffusing or soaking into it from the bone and joint capsule for health and repair[2].

To maintain good cartilage nutrition, blood must be kept flowing by the joint. Blood vessels so small that only one red blood cell can pass through them at a time line the joint capsule. These vessels are called capillaries. Nutrients have to pass from the blood cell in the capillary to the cartilage cell in the cartilage. This involves moving nutrients from the blood cell, across the capillary wall, through the joint capsule into the joint fluid. The joint fluid must then pass through the layers of cartilage to reach the cartilage cell. To remove the waste products from the cartilage cell the whole process must work in reverse. Good cartilage nutrition depends on the diffusion of fluid from the blood vessel, across the synovial membrane or joint capsule, into the joint space. Cartilage health also depends on the diffusion of waste products back across the synovial membrane and back into the blood vessel.

Anything that inhibits the free flow of fluid, to and from the cartilage, compromises cartilage health and longevity. Cartilage depends on it's nutrition for health and repair. Poor nutrition and failure of repair produce arthritis.

**Cartilage and Water**



Sixty-five to eighty percent of cartilage is made up of water. In cartilage, water functions like a "shock absorber". Water also lubricates and nourishes the cartilage. Water is the medium that carries nutrition to the cartilage from the blood cells and waste products away from the cartilage back to the blood stream. Dehydrated joints become acidic and oxygen starved. This can cause cartilage cells to become sick or die[3].

If you don't drink enough water you starve your cartilage cells for nutrition and drown then in their own waste products. Cartilage depends on water for health and repair. Poor hydration causes a failure in repair and produces arthritis.

**Cartilage and Exercise**

Cartilage has no blood vessels directly supplying it. It depends on cyclic weight bearing to squeeze or pump nutrients in and waste products out of its sponge like matrix[4].

If you don't exercise, nutrition will not be pumped to and waste products from the cartilage. Cartilage depends on exercise for health and repair. A sedentary lifestyle with failure of cartilage repair can produce arthritis.

**Obesity and Cartilage**

Over weight people carry immense loads on their cartilage, thus increasing wear. Cartilage is like a sponge and when it is constantly compressed, as happens in obesity, fluid is not pumped to and from the cells[5,6]. Constant pressure on the cartilage presses out the water from its matrix, thus dehydrating it. The result is poor cartilage nutrition, increased accumulation of metabolic acid, and cartilage cell death. As the cartilage deteriorates narrowing of the joint space between the femur and the tibia can often be seen on x-ray.

Obesity stops fluid flow to and from the cartilage, thus compromising cartilage nutrition. Cartilage depends on its nutrition for health and repair. Poor nutrition and failure of repair produce arthritis.

**Cartilage and Diet**

"You are what you eat" and your joints may be the first to protest your dietary choices. Few people understand the connection between how their joints feel and what they eat and drink. Joint health and joint longevity are dependent on daily care of their nutritional needs and vulnerabilities.

Our goal is to explore the relationship between diet and cartilage health. We will be looking at risky foods by

category including: refined foods, inflammatory foods, vasoactive foods, slow transit foods and plaque forming foods.

# The effect of eating refined foods on the blood cells is to cause them to stick together in stacks or chains.

**Refined Foods**

Refined foods are foods that have been highly processed to break down complex nutrients into very basic nutrients. This process tends to destroy or remove nutrients such as vitamins, minerals and fiber. Refined foods tend to be calorie dense making it easy to eat more calories then your body needs.

Eating refined foods causes the red blood cells in our blood vessels to stick together in long chains or stacks. Scientists call these stacks or chains of blood cells rouleaux. Rouleaux do not flow freely through small capillaries, they tend to flow very sluggishly and slowly, if at all[7].

Sugar, refined starches, oil, alcohol, and cream are a few examples of refined foods that create rouleaux[8,9].

Rouleaux impede fluid flow to and from the cartilage; this interferes with cartilage nutrition. Cartilage depends on its nutrition for health and repair. Poor nutrition and failure of repair result in arthritis.

The unrefined vegetarian diet has been shown to improve blood flow[10,11]. This is because vegetables, seeds and nuts are high in Omega-3 fatty acids[12], which promote blood flow. It is also more difficult to over eat on an unrefined vegetarian diet[13,14].

Dehydration thickens the blood which favors the formation of rouleaux. Drinking plenty of water is important in preventing thickening of the blood[15].

Stress has also been correlated with increased blood thickness[16]. Reducing the stress in your life can be an important means of preserving vital blood flow to joint tissues.

**Inflammatory Foods**

Inflammatory foods, when eaten, increase inflammation throughout the entire body. This increased inflammation tends to cause thickening of the blood vessel walls. Thickened capillary walls restrict the free flow of fluid to and from the cartilage cells[17].

Examples of inflammatory foods include: meat[18,19] especially pork[20], dairy, especially cheese[21] and ice-cream[22].

Foods that are produced through the process of fermentation or rotting contain aflatoxins which also increase inflammation. This includes foods like wine, vinegar, certain mushrooms, and peanut butter made from moldy peanuts. Any food on which mold has grown tends to accumulate aflatoxins, especially foods with Aspergillus mold[23].

Inflammation thickens vessel walls impeding fluid flow to and from the cartilage, thus interfering with cartilage nutrition. Cartilage depends on its nutrition for health and repair. Poor nutrition and failure of repair can result in arthritis.

Believe it or not, some forms of fasting have been shown to decrease inflammation when followed by a vegetarian diet[24]. Studies show that it is the naturally occurring substances found in fruits, vegetables, grains, bark, roots, stems, and flowers called flavonoids that contain the anti-inflammatory properties[25].

Soy products have also been discovered to poses anti-inflammatory properties[26].

We have already discussed the benefits of omega-3 fatty acids for promoting blood flow, these fatty acids[27], as found in flaxseed[28] and olive oil[29,30] have been discovered to have anti-inflammatory effects.

**Vasoactive Foods**

Blood vessels have muscles in their walls that change their size or diameter. When the muscles tighten, the vessel gets smaller and fewer blood cells can travel through it. Vasoactive foods are those foods that contain substances that cause blood vessels to constrict or get smaller in diameter. When a blood vessel that allows only one blood cell to pass through it at a time constricts, all blood flow stops and no nutrients are delivered to the joint tissues.

Examples of vasoactive foods include foods containing caffeine[31] such as coffee[32], tea, and colas. Nicotine is also a vasoactive substance[33,34].

Vasoconstricted blood vessels impede blood flow. This effects fluid transfer to and from the cartilage thus compromising cartilage nutrition. Cartilage depends on its nutrition for health and repair. Poor nutrition and failure of repair produce arthritis.

Dietary changes known to improve vascular responsiveness include: a vegetarian diet[35], tomatoes[36], mono-unsaturated vegetable oils[37]—like olive oil[38], and diets rich in anti-oxidants[39], vitamin E[40], zinc[41] and copper[42]. Foods known to impair vascular responsiveness include diets high in cholesterol[43], salt[44], fat[45], sugar[46], and excess calories[47].

**Slow Transit Foods**

By slow transit foods we mean foods that take a long time to travel through the body from the mouth to the anus. They spend a long time in the stomach and intestines. Slow transit foods are usually slow because they are high in fat and low in fiber. Fiber is the bulk in stool that helps keep food moving down the digestive track[48].

Because low fiber food is in the colon so much longer, bacteria tend to multiply[49]. This results in bacterial overgrowth. When bacteria over grow they produce many toxins[50]. These toxins can produce all the effects we have already talked about up to this point: (1) thicken or coagulate the blood[51,52], a similar effect to that of rouleaux, (2) vasoconstriction[53], and (3) inflammation[54,55,56].

Slow transit foods are usually high in fat and low in fiber, and include meat, fast foods, pastries, especially donuts, fried foods and greasy foods[57].

Foods eaten late at night tend to pass more sluggishly through the digestive system thus they have the same effect of

fostering bacterial overgrowth and decreasing circulation to the joints[58].

Slow transit foods impede fluid flow to and from the cartilage, thus compromising cartilage nutrition. Cartilage depends on its nutrition for health and repair. Poor nutrition and failure of repair cause arthritis.

As already mentioned, fiber plays a significant role in the time food stays in your system[59]. Increasing the amount of fiber you get in your diet is one way to improve joint health. Whole grains[60], dried fruit[61] and fresh vegetables are good sources of dietary fiber.

Mental health can also effect transit times, depression tends to slow transit and make it sluggish[62].

# Cartilage depends on its nutrition for health and repair. Poor nutrition and failure of repair can result in arthritis.

**Plaque-Forming Foods**

The next class of foods we want to discuss are those that favor the clogging of blood vessels with arteriosclerotic plaque. We call these plaque-forming foods. A plaque is a blockage in a vessel that restricts or stops the free flow of blood to and from the tissues, such as the knee joint, heart or brain.

Examples of plaque forming foods include foods high in cholesterol, like meat, butter, milk and eggs[63],[64].

Foods especially prone to plaque formation are those containing cholesterol that has experienced oxidation. This oxidation of cholesterol makes it especially toxic to blood vessel walls and favors the formation of plaque[65].

Cholesterol oxidizes in the presence of oxygen or air. Foods most likely to contain oxidized cholesterol are foods which have air and cholesterol mixed together in them, examples include pancake mixes containing dried egg, ice-cream, because it is whipped full of air, and processed meats such as pork, beef, and chicken especially if they are grilled or roasted[66],[67],[68].

High fat foods contribute to plaque growth, especially foods like: French fries and lard[69],[70].

The most dangerous fats are trans-fats. Trans-fats are produced in the process of hydrogenation. They can also be produced when frying or roasting because the oils are super-heated[71],[72]. Foods high in trans-fat include: hydrogenated margarines or cooking oils, and fried or roasted foods[73],[74],[75].

Anything that causes deterioration in the blood circulation system can be detrimental to joint health. Hardening of the arteries compromises the circulatory system. Hardening of the arteries is facilitated by an elevated intake of salt[76].

Plaque and hardening of the arteries impede blood flow to and from the joint, this compromises cartilage nutrition. Cartilage depends on its nutrition for health and repair. Poor nutrition and failure of repair result in arthritis.

To reiterate, anything that impedes fluid flow, to and from the cartilage, impedes cartilage nutrition. Cartilage depends on its nutrition for health and repair. Poor nutrition and failure of repair produce arthritis.

What we have talked about so far is the contribution of water, exercise and diet to joint health. Which might lead one to ask, "So! What should we eat, drink and do?" This is a very fair question and one that we will do our best to start you on the road to answering.

Caldwell Esselstyn, Jr., MD, of the Cleveland Clinic has demonstrated on angiography that blockages in coronary arteries can be reversed by changes in diet. He makes these dietary recommendations for reversing heart disease: "The optimal diet consists of grains, legumes, vegetables, and fruit, with <10%-15% of its calories coming from fat." He goes on to say that this diet is beneficial for more than just coronary artery disease, "This diet minimizes the likelihood of stroke, obesity, hypertension, type 2 diabetes, and cancers of the breast, prostate, colon, rectum, uterus, and ovary. There are no known adverse effects of such a diet when mineral and vitamin contents are adequate."[77]

**Water**

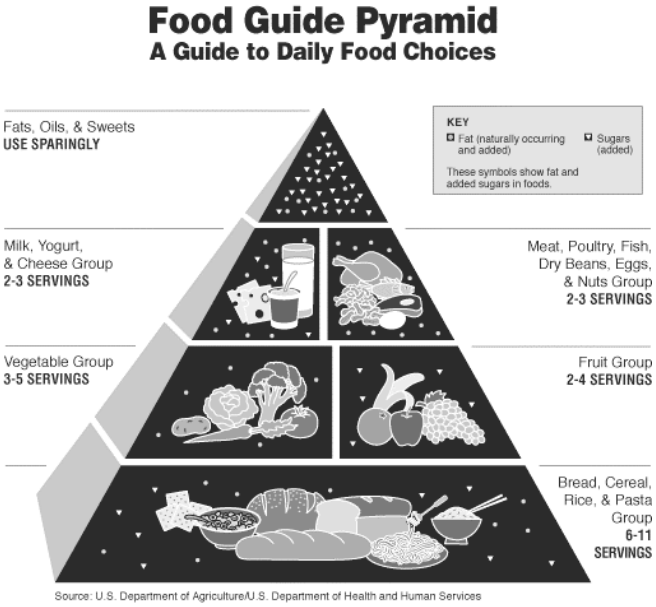
The value of the sage old advice to drink at least eight glasses of water a day cannot be overestimated. Because cartilage is 65%-80% water it needs constant hydration. Starting the day with a large drink of water is one of the best things you can do for you joints. Drinking eight glasses of water a day ensures an abundant supply of fluid for cartilage hydration, nourishment and lubrication. When cartilage is inflamed, it requires water to carry the products of inflammation away from it and healing nutrients back to it.

**Exercise**

Because cartilage has no direct blood supply, and depends on cyclic weight bearing to pump nutrition into it, walking is one of the best exercises for maintaining its health. Walks, especially after meals are of great benefit.

**Diet**

"So! What should we eat?" The simplest and most direct answer that can be supplied is to eat an unrefined plant based diet. We will use the USDA food pyramid, with which most people are familiar, to discuss the different aspects of diet. The food pyramid has six sections each of different size with different food groups in each section. The pyramid starts with a large section at the bottom and progresses to smaller ones toward the top[78].




**Bread, Cereal, Rice & Pasta Group**

At the very bottom of the pyramid, forming its foundation, is a large section called the, "Bread, Cereal, Rice & Pasta Group", where 6-11 servings are suggested. The "bread, cereal, rice and pasta group" that should make up the majority of your diet. Each of these foods should be kept unrefined so as to preserve their vitamins, minerals and fiber. What we are talking about is eating an unrefined plant based diet.

There are many breads on the market, but not all of them are 100% whole grain. One hundred percent whole grain breads contain more vitamins, minerals and fiber; thus they are more nutritious for the cartilage.

Oatmeal is a good example of a whole grain cereal. Refined or highly processed grains are deficient in vitamins, minerals and fiber. Whole grain cereals are always better for joint health.

Brown rice or wild rice is preferable to white rice because of it has more naturally occurring vitamins, minerals and fiber.

Whole grain pasta can also be purchased that does not contain refined or highly processed flours. Whole grain pasta, because it has all of the naturally occurring nutrients, is better than refined products when it comes to preserving joint health and promoting longevity.

**Fruits**

Above the "Bread, Cereal, Rice & Pasta Group", on a second level or tier of the pyramid, is the, "Fruit Group", where 2-4 servings are recommended. Fresh fruit is preferable to fruit that has been juiced, dried or canned. During the juicing process much of the valuable fiber is lost. Juices often get pasteurized; this breaks down the more complex sugars into very simple sugars. Large amounts of sugar are often added during the canning process, which when eaten cause the rouleaux effect that is so detrimental to joint health.

**Vegetables**

To the left of the "Fruit Group" and on the same level of the pyramid is the "Vegetable Group" with 2-4 servings advised. Vegetables, prepared in a simple way, free from spice and grease make a healthful diet. Fresh or frozen vegetables are preferable to canned. Canned vegetables tend to have high amounts of added salt that contributes to elevated blood pressure and hardening of the arteries.

**Nuts and Beans**

The next higher or third layer contains the, "Meat, Poultry, fish, Dry Beans, Eggs & Nut Group" with the recommended daily portion being 2-3 servings. For our discussion please replace the, "Meat, Poultry, fish, Dry Beans, Eggs & Nut Group", with just, "Nuts and Legumes". Nuts, prepared free from added oil and salt, are a good source of protein. Beans are a good source of protein and fiber. Beans should be prepared in as healthful a way as possible, free from added oil and salt.

**Soy and Tofu**

The next higher or third layer consists of the, "Milk, Yogurt & Cheese Group", of which 2-3 servings are allowed. For our discussion please replace the, "Milk, Yogurt & Cheese Group", with a, "Soy and Tofu Group". The soybean is very nutritious and is a wonderful addition to the diet of someone battling with arthritis[79]. In the last few years soy products have become available almost anywhere in the world. In the town where I live, soymilk, tofu, soy burgers, and soy ice cream can all be purchased at regular grocery stores making it easier to substitute for the more deleterious foods in the diet.

"So! What should we eat?" The simplest and most direct answer that can be supplied is to eat an unrefined plant based diet.

**Dried Fruit & Desserts.**

The pyramid is topped with a category entitled, "Oils, Fats & Sweets" with the appropriate advice, "use sparingly". You could replace the, "Oils, Fats & Sweets", group with a dried fruit group and continue the advice to "use sparingly". Many appetizing and healthful desserts can be made, which will be both tasty and good for the health of your joints. Dried fruit is an excellent source of minerals and fiber, and makes a good dessert.

Anything that aids nutrient flow, to and from the cartilage, promotes cartilage health. Cartilage depends on its nutrition for health and repair. Good nutrition and vigorous repair promote cartilage longevity.

**Bon Appetite.**

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