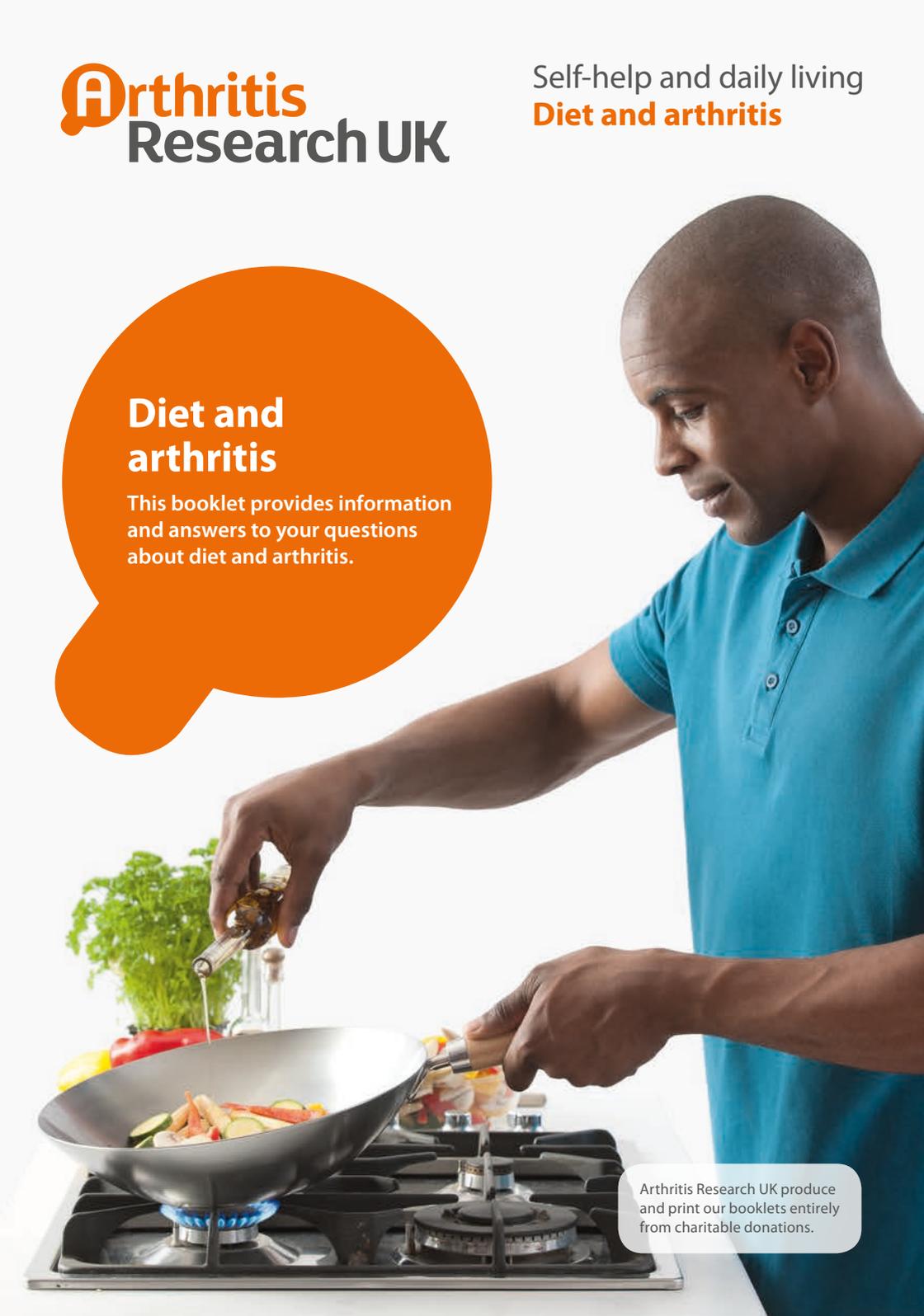


Diet and arthritis

This booklet provides information and answers to your questions about diet and arthritis.



Arthritis Research UK produce and print our booklets entirely from charitable donations.

What is diet and arthritis?



There's a great deal of advice in magazines, in books, and on the internet about diet and nutritional supplements that claim to help arthritis. But how do you know which of these claims to believe? In this booklet we'll explain what's most likely to help, what might help, and what probably won't help. We'll also suggest where you can find out more.

At the back of this booklet you'll find a brief glossary of medical words – we've underlined these when they're first used.

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A good diet

can help to protect you against some potential side-effects of drugs. For example, calcium-rich foods can help protect against osteoporosis, which can result from long-term steroid use.

Eat a balanced and varied diet

to maximise your intake of vitamins, minerals, antioxidants and other nutrients.

At a glance

Diet and arthritis

How can changing my diet help my arthritis?

Research has discovered several links between arthritis and diet, so it's worth thinking about what you eat. The two most important things to think about are:

- your weight – if you're overweight, losing some weight will reduce the strain on your joints, so you may find you don't need to take painkillers quite so often
- whether your diet gives you the vitamins and minerals you need – a good diet can help to protect you against some possible side-effects of drugs and against heart disease (which can sometimes be a complication of certain types of arthritis).

How can I keep to a healthy weight?

The only way to lose weight, and keep it off, is to make lasting changes to the way you eat and/or the amount of exercise you do. The most important things you can do to help are:

- cut down on fats and sugar
- eat more fruit and vegetables
- exercise regularly.

What vitamins and minerals do I need?

The most important vitamins and minerals for people with arthritis are:

- calcium
- vitamin D
- iron.

Other nutrients that may play a part are vitamin C and selenium.

Which foods and supplements might help?

Research has shown that some foods and food supplements really can help with arthritis. Supplements most commonly used are:

- omega-3 fatty acids for inflammatory arthritis
- glucosamine for osteoarthritis.

How can changing my diet help with gout?

Making the following changes to your diet and lifestyle can help to reduce the levels of urate in your body:

- Lose weight if you're overweight.
- Drink less alcohol.
- Drink plenty of water.

How can changing my diet help my arthritis?

Although there are no diets or dietary supplements that will cure your arthritis, some people do find that their symptoms improve as a result of changing what they eat. But because people are all different and there are many different types of arthritis, what works for one person and one type of arthritis may not work for another.

On balance, changing your diet probably won't have as great an impact on your arthritis as your medical treatments, and we don't recommend stopping any of your drug treatment without discussing it with your doctor first. But research has discovered several links between arthritis and diet, so it's still worth thinking about what you eat. The two most important things to think about are:

- your weight – if you're overweight, losing some weight will reduce the strain on your joints, so you may find you don't need to take painkillers quite so often

- whether your diet gives you the vitamins and minerals you need – a good diet can help to protect you against some possible side-effects of drugs and against heart disease (which can sometimes be a complication of certain types of arthritis).

Some forms of arthritis, such as rheumatoid arthritis, and some drugs used to treat them are linked with an increased risk of heart and circulatory problems. Several of the diet and lifestyle changes which are useful for arthritis are also useful for heart and circulation health, including exercising and increasing your intake of omega-3 fatty acids.

If you have any type of arthritis, you should try to eat:

- a balanced and varied diet to get all the vitamins, minerals, antioxidants and other nutrients you need
- a more Mediterranean-style diet, which includes fish, pulses, nuts, olive oil and plenty of fruit and vegetables
- more omega-3 fatty acids, for example from oily fish.

You should also exercise regularly. We'll look at these points in more detail in the following sections.

Keeping to a healthy weight is important if you have arthritis.



How can I keep to a healthy weight?

The most important link between your diet and arthritis is certainly your weight. We know that being overweight puts extra strain on your joints, especially weight-bearing joints – your back, knees, hips, feet and ankles. Because of the way joints work, the pressure on your knees is five to six times your body weight when you walk so even a small weight loss can make a big difference if you have arthritis.

i See Arthritis Research UK special report *Osteoarthritis and obesity.*

Having too much body fat may also increase inflammation in your body, making your joints more painful. Losing weight can reduce inflammation in any kind of arthritis.

Even a small weight loss can make a big difference if you have arthritis.

Am I overweight?

The chart opposite (Figure 1) will show whether you're in the healthy weight range for your height.

Another method of finding out whether you're a healthy weight is to calculate your body mass index (BMI):

1. Multiply your height in metres (m) by itself.
2. Divide your weight in kilograms (kg) by the number you got in stage 1. The result is your BMI.

For example $1.7 \text{ (m)} \times 1.7 = 2.89$
 $90 \text{ (kg)} \div 2.89 = 31.14$
Your BMI is 31.

For most people a healthy BMI is in the range 18.5–25.

The measurement around your stomach (your abdominal circumference) can also help to calculate whether you're overweight or not.

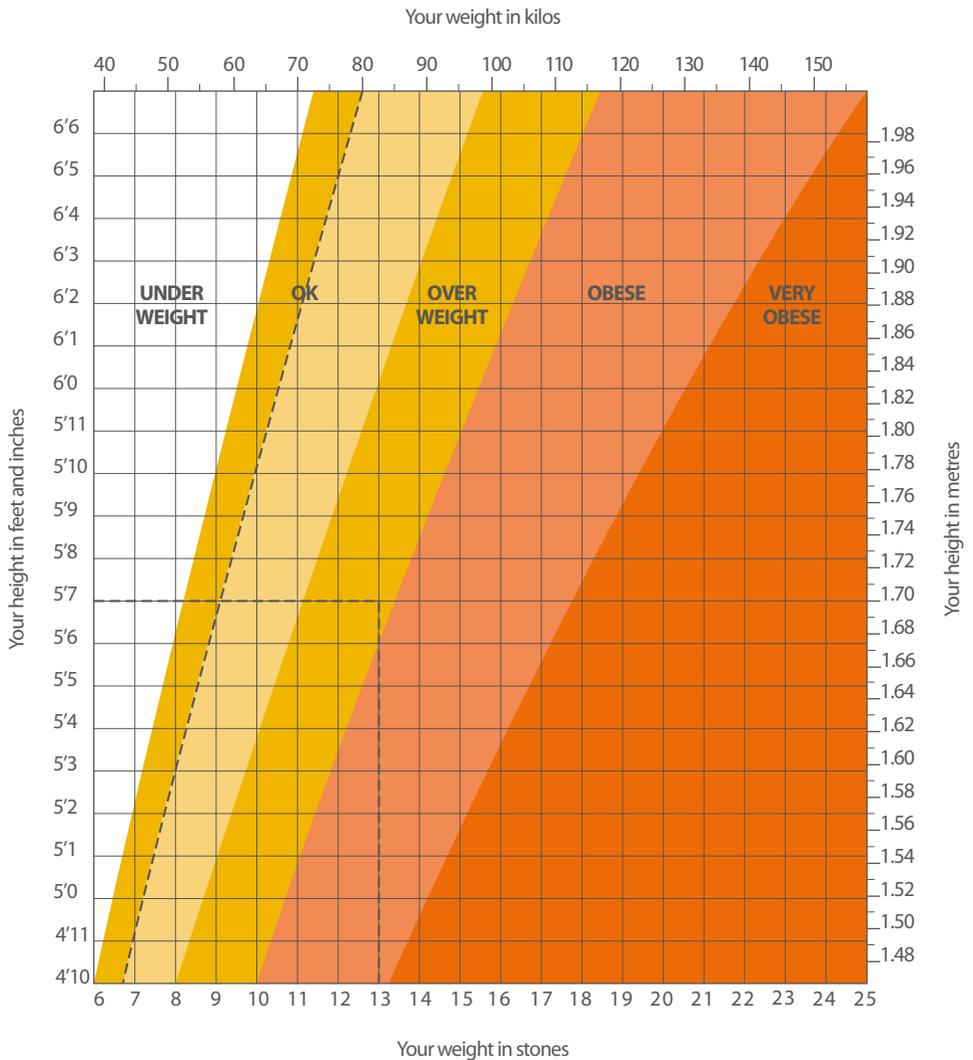
How can I lose weight and eat a healthy diet?

The only way to lose weight, and keep it off, is to make lasting changes to the way you eat and/or the amount of exercise you do. You need to balance your food intake against the energy you burn.

Your body needs food to:

- supply energy for your daily activities
- provide different vitamins and minerals to stay healthy.

Figure 1 Height and weight chart



The energy in food is measured in kilocalories (kcal), often just called calories. If your diet contains more calories than you use, your body will turn the extra to fat, and you'll put on weight. Most people gain weight gradually often by just eating a few extra calories a day. For example, if you eat an extra 100 calories more than you burn off, you'll gain about 500 g (1 lb) of fat per month. On the other hand, if your food contains fewer calories than you use, your body will burn stored fat, and you'll lose weight.

If you have arthritis, you may find it hard to get as much exercise as you used to. And if you're burning less energy you're likely to put on weight. You can find information on exercising when you have arthritis in our *Keep moving* booklet, but it might also be a good idea to reduce your calorie intake.

If you eat fewer calories, it's important to keep a balance between different types of food so you don't lose out on important nutrients. For example, it's important to

eat starchy foods like potatoes, rice and pasta. Wholemeal versions of these foods are better as they contain more fibre and so are more filling for longer.

Fibre is also good for your bowels. Wholemeal versions often provide more vitamins and minerals than white varieties.

Fruit (but not fruit juices) and vegetables are low in calories but will still provide plenty of the nutrients you need.

Cut down on fat

Fat has twice as many calories as the same weight of starch or protein and most people eat far more fat than they need. Eating 30 g (about 1 oz) less fat each day saves 270 calories.

There are four kinds of fats in foods:

- **Saturated fats** are the most important kind of fat to reduce since they can increase inflammation and pain in the body. They come mostly from animals and are found in:
 - full-fat dairy products
 - processed foods like cakes, biscuits and pastry
 - chips (if fried in animal fat)
 - Asian foods, especially meals cooked using ghee (clarified butter)
 - some vegetable oils, such as palm oil and coconut oil.



A portion of fruit or vegetables is about 80 g (3 oz).

- **Monounsaturated fats** are neutral or even useful fats in that they don't make inflammation worse. But they contain just as many calories as saturated fats, so limiting them is still important if you're trying to lose weight. They can be found in olive and rapeseed oil.
- **Trans fats** are the worst kind of fat. They're made from oil chemically processed to make it solid and increase its shelf life but have mostly been removed from processed food in recent years. They increase cholesterol and are damaging to circulation and perhaps your joints. They're listed on food labels as 'hydrogenated oil'.
- **Polyunsaturated fats:**
 - Omega-6 polyunsaturated fatty acids can increase inflammation in the body, so you should aim to eat fewer softer fats and oils from corn or sunflower sources, which are high in omega-6.
 - Omega-3 polyunsaturated fatty acids are useful in the diet and are found in rapeseed oil, walnuts, free-range eggs (depending on the chicken feed), oily fish and fish oil supplements.

See the section 'Which foods and supplements might help?' for more information about omega-3 and -6.

To eat less fat:

- avoid 'invisible' fats in foods like biscuits, cakes, chocolate, pastry and savoury snacks or limit them to special occasions – check the labels

- choose lean cuts of meat, which contain less saturated fat, and always trim off any excess fat
- choose fish and poultry more often
- use skimmed or semi-skimmed milk
- use low- or reduced-fat dairy products (for example yogurt, low-fat cheese)
- use low-fat, olive-oil- or soya-based margarines
- grill instead of frying
- use a very small amount of olive oil if you need to for cooking (if you want to fry foods, use rapeseed oil, which smokes less)
- fill up on wholegrain breads, cereals, fruits and vegetables
- look for snacks that are naturally low in fat, such as fruit, vegetable sticks or plain popcorn – small amounts of nuts and seeds provide good fats but don't appear to cause weight gain.

Cut down on sugar

Sugar contains only calories and has no other food value (so-called 'empty calories'), so you can cut down on it without losing any nutrients. Eating 30 g (about 1 oz) less sugar each day saves 120 calories.

Dried fruit, for example raisins, can be used to sweeten cereals and puddings; unlike sugar and artificial sweeteners, they also provide vitamins and minerals. But go easy, as dried fruits are still fairly high in calories themselves. Try to get used to food being less sweet by not adding sugar or sweeteners to hot drinks.

Eat more fruit and vegetables

The World Health Organisation (WHO) recommends you eat at least five portions of fruit and vegetables every day (see Figure 2). This is to make sure your body gets the important nutrients – particularly vitamins, minerals and antioxidants – that it needs to stay in good health and to protect it during the stress of disease.

Brightly coloured vegetables and fruits are rich in antioxidants, as are leafy green vegetables. It's been suggested that antioxidants may help to protect the joints by mopping up some of the chemicals, known as free radicals, which may cause inflammation. Choose more brightly coloured vegetables or salad to help fill your plate but lower your calorie intake.

Fruit and vegetables are also good sources of fibre and by choosing fruit and vegetables of different colours you'll be getting a variety of vitamins and minerals.

Figure 2 What counts as one portion of fruit or vegetables?

- ½ grapefruit
- ½ pepper
- ½ avocado
- 1 medium apple
- 1 medium orange
- 1 medium banana
- 1 medium tomato
- 1 medium onion
- 2 medium plums
- 2 small tangerines
- 2 tinned pineapple rings in juice, not syrup
- 2 tinned peach halves in juice, not syrup
- 2 5-cm (2-inch) mango slices
- 2 broccoli florets
- 3 sticks of celery
- 3 heaped tablespoons of carrots (raw or cooked)
- 3 heaped tablespoons of fruit salad
- 3 heaped tablespoons of frozen peas
- 5 fresh asparagus spears
- 6 baby sweetcorn
- 7 fresh strawberries
- 8 cauliflower florets
- 14 button mushrooms
- 1 heaped tablespoon of sultanas or other dried fruit
- A handful of grapes
- 150 ml of fruit juice (counts only once however much you drink)

A middle-aged man with a friendly smile is seated at a table. He is wearing a white polo shirt. In front of him is a white bowl filled with fresh, leafy green vegetables. To the left of the bowl is a clear glass of water. The background is bright and out of focus, suggesting an indoor setting with large windows.

**Brightly coloured
vegetables and
fruits are rich in
antioxidants, as
are leafy green
vegetables.**

Exercise regularly

Not only does exercise burn calories that would otherwise end up as fat, but it also increases your strength and suppleness. Of course, arthritis can make exercise difficult and painful, so it's important to find something you can manage and enjoy so that you do it regularly.

Swimming is particularly good exercise if you have arthritis because being in water takes the weight off your joints and exercises just about all muscle groups and joints in the body. Cycling or walking are also good, and many people find Pilates and yoga are helpful as they help to stretch and strengthen the muscles.

i See Arthritis Research UK booklet
Keep moving.

What vitamins and minerals do I need?

You get most of your vitamins and minerals from the food you eat rather than from supplements. Not having enough (a deficiency) of some vitamins and minerals seems to be linked with arthritis progressing more quickly. If you have arthritis, the most important vitamins and minerals to think about are:

- calcium
- vitamin D
- iron.

Other nutrients that may play a part are vitamin C and selenium.

Calcium

Calcium is important for keeping your bones healthy. Calcium deficiency increases the risk of osteoporosis (brittle bones), which is particularly common in women after the menopause. Many people with arthritis also have a risk of developing osteoporosis, especially if they're taking steroids on a long-term basis. A lack of calcium in the diet can also increase your risk of developing a condition called osteomalacia (soft bones).

The best sources of calcium are:

- dairy products such as milk, cheese and yogurt – low-fat ones are best, and it doesn't matter if they come from cows or other animals, for example goats
- calcium-enriched milks made from soya, rice or oats
- fish that are eaten with the bones (such as tinned sardines).

We recommend a daily intake of 1,000 milligrams (mg) calcium, possibly with added vitamin D if you're over 60. Recently there have been worries that taking calcium supplements (but not vitamin D) might have a negative effect on heart health. This seems to apply only to calcium tablets, not calcium from food. If you're taking calcium supplements and are worried, you can increase the calcium you get from your food (see Figure 3).

Skimmed and semi-skimmed milk contain more calcium than full-fat milk.

Figure 3 Approximate calcium content of some common foods

Food	Calcium content
115 g (4 oz) whitebait (fried in flour)	980 mg
60 g (2 oz) sardines (including bones)	260 mg
0.2 litre (½ pint) semi-skimmed milk	230 mg
0.2 litre (½ pint) whole milk	220 mg
3 large slices brown or white bread	215 mg
125 g (4½ oz) low-fat yogurt	205 mg
30 g (1 oz) hard cheese	190 mg
0.2 litre (½ pint) calcium-enriched soya, oat and rice milk	180 mg
125 g (4½ oz) calcium-enriched soya, oat and rice yogurt	150 mg
115 g (4 oz) cottage cheese	145 mg
3 large slices wholemeal bread	125 mg
115 g (4 oz) baked beans	60 mg
115 g (4 oz) boiled cabbage	40 mg

Please note: measures shown in ounces or pints are approximate conversions only.

If you don't eat many dairy products or calcium-enriched substitutes, you may need a calcium supplement. We recommend that you discuss this with your doctor or a dietitian.



Research has shown that some foods and food supplements really can help with arthritis, although the effects are fairly specific to the type of arthritis you have.

Vitamin D

Vitamin D is needed for the body to absorb and process calcium. It's not naturally present in many foods, although oily fish is a good source. It's sometimes called the sunshine vitamin because it's produced by the body when the skin is exposed to sunlight. Where possible, going outside and exposing your arms and face to sunlight is the best way to get vitamin D. From June to August just 15 minutes is generally enough. Don't allow your skin to go red and take care not to burn, particularly in strong sunshine and if you have fair or sensitive skin. Dark skin needs more exposure, and more exposure is needed in winter. Because of the lack of sunlight, slight deficiency is quite common in winter in the UK, especially in the north. There's some evidence that arthritis progresses more quickly in people who don't have enough vitamin D, and severe deficiency causes osteomalacia, so a supplement

such as fish liver oil may be useful during winter months. However, it's important not to take too much fish liver oil because it contains high levels of vitamin A (see section 'Which foods and supplements might help?' for more information).

If you're over 60, dark-skinned or don't expose your skin to the sun very often and are worried about a lack of vitamin D, you should discuss with your doctor whether a vitamin D supplement would be right for you. It's sometimes necessary to take a daily supplement containing 10–20 micrograms (μg), or 400–800 international units (IU), of vitamin D, especially for people over 60. You can buy them from chemists, supermarkets and health food stores. If you have severe deficiency, which is diagnosed through a blood test, you may need an injection or high-strength tablets.

Iron

Iron is important to prevent anaemia, which is quite common in people with arthritis. It can be a side-effect of taking non-steroidal anti-inflammatory drugs (NSAIDs), such as aspirin, ibuprofen and diclofenac, which help the pain and stiffness of arthritis but which may cause bleeding and stomach ulcers. Stopping the NSAIDs or taking another drug alongside them to protect the stomach (a proton pump inhibitor) may fix the anaemia, but taking iron supplements in the meantime will replace the iron your body lost through taking the NSAIDs.

The other main cause is anaemia of chronic disease, which often occurs with rheumatoid arthritis and similar conditions, and which doesn't improve with iron supplements.

If you're anaemic your doctor can tell you if more iron is likely to help.

Good sources of iron are:

- red meat
- oily fish, for example sardines
- pulses, for example lentils and haricot beans
- dark green vegetables, for example spinach, kale and watercress.

Iron is absorbed better if there's also vitamin C in the meal, so have a good portion of fruit or vegetables when you eat. It's best not to drink tea with your meal as it reduces the amount of iron that your body can absorb.

Dairy products like milk and cheese are very poor sources of iron. If you prefer not to eat red meat or fish, then you should make sure you get plenty of pulses and dark green vegetables.

Vitamin C

Poor vitamin C intake has been linked with arthritis. However, if you make sure you have your five portions a day of fruit and vegetables, you're unlikely to have a problem with vitamin C and shouldn't need supplements.

Selenium

Mild selenium deficiency is quite common in the UK and may be linked with arthritis

progressing more quickly. The richest natural source of selenium is Brazil nuts, but meat and fish also contain some. Selenium is nearly always included in antioxidant supplements which you can buy in chemists and health food shops. Recent research suggests that taking high doses of selenium long-term may be harmful, so it's advisable to keep to the recommended daily intake if you take selenium supplements over a long period. However, current evidence suggests that selenium supplements aren't very effective in treating people with arthritis.

Which foods and supplements might help?

Research has shown that some foods and food supplements really can help with arthritis, although the effects are fairly specific to the type of arthritis you have. The two supplements listed below are the most common, but if you'd like more information, our report, *Complementary and alternative medicines for the treatment of rheumatoid arthritis, osteoarthritis and fibromyalgia*, covers a wider range of dietary products that are used in alternative medicine.

Omega-3 fatty acids for inflammatory arthritis

Omega-3 (also called n-3) polyunsaturated fatty acids have been shown to help some people with inflammatory types of arthritis such as rheumatoid arthritis, [reactive arthritis](#), [psoriatic arthritis](#) and [ankylosing spondylitis](#). Recent research

shows they can help even if you're also taking strong disease-modifying anti-rheumatic drugs (DMARDs), such as methotrexate.

What are fatty acids?

Our bodies make some fatty acids from other compounds, but others can't be produced in the body and must be obtained from food – these are called essential fatty acids (EFAs). When we eat fats and oils, our digestive systems break these down into fatty acids. These polyunsaturated fatty acids are divided into two main groups – omega-3 and omega-6.

Omega-3 fatty acids exist in two forms:

- long-chain forms, such as EPA (eicosapentaenoic acid) and DHA

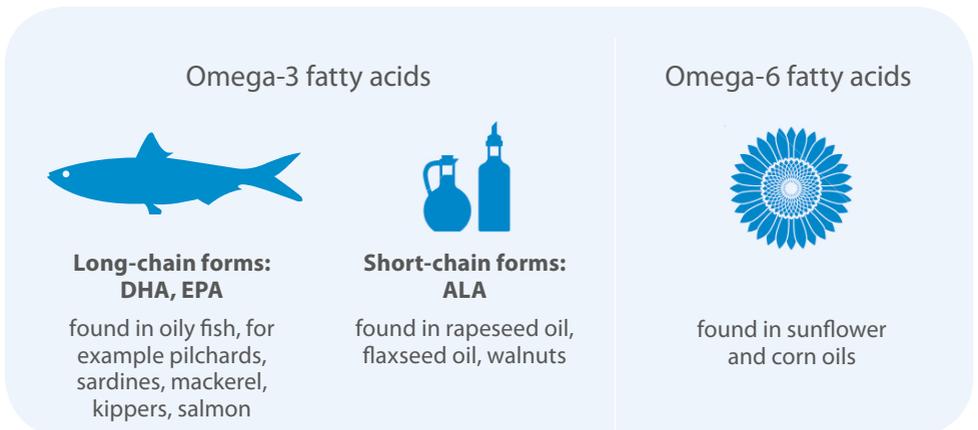
(docosahexaenoic acid), which are found in higher levels in oily fish such as pilchards, sardines, mackerel, kippers and salmon

- short-chain forms, such as ALA (alpha-linolenic acid), which are found in rapeseed oil, flaxseed oil and walnuts.

Omega-6 fatty acids are found mostly in plant seed oils such as sunflower and corn oil (see Figure 4).

The body uses both omega-3 and omega-6 to make chemicals called prostaglandins and leukotrienes. The right balance of these helps to control inflammation, and EPA and DHA promote the anti-inflammatory chemicals.

Figure 4 Essential fatty acids (obtained from food)



Too much omega-6 can increase inflammation, but omega-3 fatty acids, especially the long-chain forms EPA and DHA, are thought to be of most use in inflammatory arthritis. It's possible that the short-chain forms may be converted within the body into the long-chain forms that help arthritis. However, it's not yet clear whether these are as useful as the long-chain omega-3 fatty acids found in fish oil.

How do I increase my intake of fatty acids?

Research suggests you need at least 2.7 g per day of EPA and DHA. In the UK, dietary guidelines recommend eating two portions of fish a week, including one oily (see Figure 5 for a list of oily fish). This works out at about 0.45 g per day of omega-3 fatty acids (see Figures 6 and 7 for the omega-3 content of some foods),

so you may want to consider taking a supplement to reach the full amount. You can buy supplements from health food shops and some chemists, either in liquid forms or as capsules.

❗ **Omega-3 capsules are usually 1 g but check the label. You need to add up the total amount of EPA and DHA to work out how much you need. Even with high-strength preparations you may need 4–5 capsules per day. The capsules are usually made from gelatine which may be produced from animal products. If you want to avoid gelatine you can take vegetarian capsules or liquid fish oil. You'll probably need to take 2–3 teaspoons per day, but again, check the label to work out the amount of EPA and DHA.**



Fish oils act quite slowly so we recommend that you give them at least three months' trial. Our Complementary and alternative medicines report has given fish body oil a score of 5 out of 5 for effectiveness for rheumatoid arthritis, but fish liver oil has only been given a 1 out of 5 for effectiveness in osteoarthritis. We don't have enough evidence to give a score for fish liver oil for rheumatoid arthritis or fish body oil for osteoarthritis.

Figure 5 Which are oily fish and which are not?

Oily fish	Non-oily (white) fish
Anchovies	Cod
Eel	Coley
Herring	Dover sole
Kippers	Haddock
Mackerel	Hake
Pilchards	Halibut
Salmon	Lemon sole
Sardines	Monkfish
Sprats	Plaice
Trout	Red and grey mullet
Tuna (fresh)	Red snapper
Whitebait	Rock salmon/ dogfish
	Sea bass
	Sea bream
	Shark
	Skate



Figure 6 Showing the omega-3 fatty acid content of some fish and other seafood

Description	Omega-3 content per 100 g (typical)
Kippers (raw)	3.00 g
Pilchards (tinned in tomato sauce)	2.97 g
Mackerel (raw)	2.78 g
Mackerel (grilled)	2.40 g
Herring (grilled)	2.30 g
Sardines (tinned in tomato sauce)	2.11 g
Salmon (tinned in brine, drained)	1.85 g
Herring (raw)	1.83 g
Rainbow trout (grilled, flesh only)	1.25 g
Crab (boiled)	1.10 g

Figure 7 Showing the omega-3 fatty acid content of some plant seed oils and nuts*

Description	Omega-3 content per 100 g (typical)
Walnut oil	11.50 g
Rapeseed oil	9.60 g
Walnuts	7.47 g
Soya oil	7.30 g
Blended vegetable oil	6.50 g
Flaxseed oil	6.50 g
Olive oil (virgin and extra virgin)	0.70 g
Olive oil is included for comparison purposes only. <i>*Note that the fatty acids in this case are mostly alpha-linoleic acid (ALA), whose benefits in arthritis are uncertain, not EPA and DHA which are known to be beneficial.</i>	

If you want to increase your intake of omega-3 fatty acids, we recommend taking pure fish body oil rather than fish liver oil.

Possible side-effects of omega-3 fatty acids

Some people have mild stomach upsets and diarrhoea from taking high doses of fish oils. If this happens, try taking the supplement with food and splitting the total dose into two or three smaller doses per day. If this doesn't work, try a lower dose, eating more oily fish, or a combination of both.

Recently, there have been concerns about a possible link between high levels of omega-3 polyunsaturated fatty acids and prostate cancer. If you're male and are considering taking high-dose fish oil, you should check with your doctor first.

What about omega-6 fatty acids?

Omega-6 (also called n-6) polyunsaturated fatty acids aren't thought to be useful for arthritis and they may even increase inflammation by causing a 'traffic jam' with omega-3 polyunsaturated fatty acids. The body processes omega-3 and -6 fatty acids through the same pathway, and it can become overloaded if you take large amounts of both these types of fatty acids.

In the UK, most people have diets that already contain more than enough omega-6, so it may help to cut down on the amount of omega-6 in your diet (such as sunflower oil, corn oil and products made from these such as sunflower margarines).

Glucosamine for osteoarthritis

Osteoarthritis is the most common type of arthritis and is often regarded as a mechanical or wear-and-tear form of arthritis. It particularly affects the weight-bearing joints of the legs and back. Changes to the cartilage mean that the bones in the joint can't move as freely and smoothly as they should.

Many people try glucosamine, sometimes combined with chondroitin, for osteoarthritis. Joint cartilage normally contains glucosamine and chondroitin compounds, and it's thought that taking supplements of these natural ingredients may help to improve the health of damaged cartilage.

Research on glucosamine has produced some mixed results but suggests that glucosamine sulphate is more likely to be of use than glucosamine hydrochloride. If you're thinking of trying glucosamine, we suggest taking one 1,500 mg daily dose of glucosamine sulphate. If you notice an improvement in your joint pain after three months, you may wish to continue with them. There doesn't seem to be much extra benefit in taking glucosamine combined with chondroitin.

Glucosamine is available from chemists, health food shops or the internet. You should avoid websites from non-UK organisations, as international regulations for supplements can vary.

Caution with fish liver oils

It's important not to confuse fish *body* oil with fish *liver* oil (for example cod liver oil and halibut liver oil). Fish liver oils contain omega-3 polyunsaturated fatty acids as well as vitamin D (which helps the body to absorb calcium) and vitamin A.

But it's dangerous to take fish *liver* oils in the large doses recommended for arthritis because of the risk of overdosing with vitamin A. This is particularly important for pregnant women, or women who might become pregnant, because vitamin A can harm the unborn baby.

! If you're pregnant, or could become pregnant, you shouldn't take fish liver oils or vitamin A supplements.

Adults shouldn't take more than 3,000 µg of vitamin A per day. If you eat liver, bear in mind that this also contains a lot of vitamin A and will need to be counted as part of your daily intake of vitamin A.

If you want to increase your intake of omega-3 fatty acids, we recommend taking pure fish body oil rather than fish liver oil.

i For more information please see our report

Complementary and alternative medicines for the treatment of rheumatoid arthritis, osteoarthritis and fibromyalgia. Or ask your GP or consultant to refer you to a registered dietitian.





Possible side-effects of glucosamine

You should bear in mind the following:

- There's some evidence that glucosamine may increase the level of sugar in the blood, so if you have diabetes be sure to check your blood sugar and discuss with your doctor if your readings seem to be higher.
- If you're taking blood-thinning drugs (anti-coagulants) such as warfarin or aspirin, your blood-thinning control may be affected, so make sure you have your regular blood checks and again discuss this with your doctor.
- Glucosamine is often made from shellfish. If you're allergic to shellfish make sure you take a vegetarian or shellfish-free variety.

Should I avoid certain foods?

Some people feel that certain foods are bad for arthritis and that cutting them out helps. These foods include:

- citrus fruits, such as oranges, lemons and grapefruit
- vegetables from the nightshade family (solanaceous plants) including potatoes, tomatoes, peppers, chillies and aubergines.

We don't recommend leaving these fruits and vegetables out of your diet because of the important nutrients they contain. There's no scientific evidence that cutting out these foods can help with arthritis. In fact, they're rich in antioxidants –

oranges and red peppers contain an antioxidant called β -cryptoxanthin which studies have shown may slow down the progression of arthritis.

What about food allergies?

Some people are allergic to certain foods such as peanuts or shellfish. Allergic reactions occur quickly after the food is eaten but there's no real evidence that food allergies are relevant to the development of arthritis or its treatment.

Some people are also intolerant of certain foods. Symptoms of food intolerance develop fairly slowly after eating a food – after hours or even days – so food intolerances can be difficult to identify without the help of an expert.

Research has shown that some people have an improvement in their symptoms if they cut out particular foods. The reasons for this aren't yet clear and the foods involved vary from person to person. Some books even suggest diets which cut out nutritionally important food and could leave your body short of important vitamins and minerals if you followed them for a long time.

The only way to be sure that you have a food intolerance is by dietary 'exclusion and challenge'. This means leaving the food you think you may be intolerant to out of your diet for at least a month (an elimination or exclusion diet) and then 'challenging' yourself by starting to eat the food again to see if it causes a reaction. If your arthritis is related to a

food intolerance, you'll notice a flare-up of your symptoms within a few days.

It's important to cut out each food that you're testing completely and then start eating them again one food at a time. We recommend that you speak to a registered dietitian who can make sure you're cutting out foods completely and check that you're not missing out on important nutrients.

! By law, labels on pre-packaged foods now have to make it clear if the product contains ingredients that people may be allergic to (for example milk, wheat, gluten, nuts), so check food labels carefully.

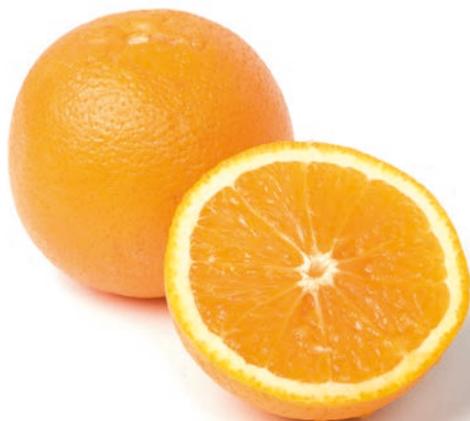
Blood tests like ELISA and RAST can identify proteins called immunoglobulins in the blood. These can be useful as a guide to foods that might be worth testing in an elimination diet. A positive result in these tests doesn't prove that the food will make your arthritis worse, only that it might.

We *don't* recommend other methods of testing for food allergies such as:

- applied kinesiology, where a drop of the food is put under your tongue and the strength of your arm tested
- dowsing or psionic medicine, where a pendulum and a witness such as a lock of your hair are used
- electrodermal (Vega) testing, where you hold an electrode while samples of different foods are placed in the testing device.

Do vegetarian or vegan diets help?

Some studies have shown that people who eat a lot of red meat have a higher risk of developing inflammatory arthritis, and vegetarian diets have been shown to be helpful in the long term for some people with rheumatoid arthritis. A vegan diet, which doesn't include any meat, fish or other animal products (such as milk), may also be helpful – possibly because of the types of polyunsaturated fatty acids included in the diet.



If you eat a vegan diet it's important to make sure you get all the nutrients you need – particularly calcium, vitamin B12, vitamin D and selenium:

Calcium is present in leafy green vegetables (for example cabbage, kale, broccoli), watercress, beans and chickpeas, and some nuts, seeds and dried fruits. Calcium is often added to white bread and to some soya, oat and rice milks – check the label.

Vitamin B12 is also commonly added to soya milk, and yeast extract is another good source.

Selenium can be found in Brazil nuts and is often included in multi-vitamin supplements.

Vitamin D isn't naturally present in many foods, especially if your diet is vegan. However the body naturally produces it when the skin is exposed to the sun (see section on vitamin D). If you're dark-skinned or prefer to keep your skin covered, look for vegetable milks and margarines which have vitamin D added. Shiitake mushrooms also provide some vitamin D, or you may need to consider taking a supplement – vegan supplements are available. Aim for 10–25 µg, depending on whether you go out in the sun often or not.

Does fasting help rheumatoid arthritis?

Fasting for short periods can cause a short-term improvement in the symptoms of rheumatoid arthritis, although they quickly return once you go back to a normal diet. We don't recommend fasting as a treatment for arthritis. However, if you do wish to try it, it should only be done for one day at a time and under expert supervision.

Which foods and supplements are unlikely to help?

- Some people with arthritis find that cider vinegar and honey ease symptoms, although there's no scientific evidence to show that they're helpful. But there's no reason why you shouldn't try it if you want to.
- MSM (methylsulphonylmethane) is a sulphur-containing substance that has been recommended for various health problems, including arthritis. There's no strong evidence to support the effectiveness of MSM for treating the symptoms of arthritis.
- CMO (cetylmyristoleate) is a waxy substance made from beef fat, which some people claim can help arthritis. Again, there's little scientific evidence that it does so.

How can changing my diet help with gout?

Gout is a condition caused by a high level of urate in the body. Urate can form crystals in the joints, causing sudden attacks of severe pain and inflammation. Making the following changes to your diet and lifestyle can help to reduce the levels of urate in your body:

- **Lose weight** if you're overweight as this can reduce urate levels in the body. It must be done slowly – extreme weight loss or fasting can actually raise urate levels because it speeds up the breakdown of cells in the body.
 - **Drink less alcohol** (especially beer), as drinking too much is often linked with gout. If you have gout you should aim to keep your alcohol intake to around 1 or 2 units per day. The government advises a normal maximum of 3–4 units per day for men and 2–3 units per day for women (see Figure 9).
 - **Drink plenty of water** to avoid becoming dehydrated and help to flush out excess urate, which prevents it from crystallizing in the joints. You should drink at least 1 litre (about 2 pints) of non-alcoholic fluids per day, or up to 3.5 litres (about 6 pints) if you have kidney stones.
- ❗ If you're trying to increase your fluid intake, you can include other drinks besides water – but not too many sugary drinks, especially if you're also trying to lose weight.

There's some evidence that drinking sugar-sweetened soft drinks and fructose-rich fruits and juices may be linked with an increased risk of gout. Diet soft drinks don't appear to increase the risk.

Foods that contain a lot of purines may play a part in the build-up of urate, so cutting down on purine-rich foods may be helpful (see Figure 8). Aim to reduce the amount of protein you get from meat – for example, by eating one less portion of meat or fish per day. This can be replaced by other sources of protein, such as beans and pulses or low-fat dairy products.

Urate levels aren't affected by acidic fruits, and there's some evidence that higher vitamin C intake can help to reduce the risk of gout attacks, so you can include fruits like oranges and grapefruit in your diet. There's some evidence to suggest that cherries – either as fruit or as juice, fresh or preserved – may be helpful for gout, and that drinking a glass of skimmed milk every day may help to prevent acute attacks.

Figure 8 Foods which are high in purines

Meat	Fish	Other
Kidneys	Anchovies	Beer
Liver	Fish roes	Yeast
Offal	Herring	extracts
	Mackerel	(for example
	Sardines	Marmite)

Figure 9 Approximate units of alcohol in some popular drinks

Beer, lager, stout

Ordinary strength (4% abv)

Bottle (330ml) = 1.3 units

Can (440ml) = 1.8 units

Pint (568 ml) = 2.3 units

Premium strength (5% abv)

Bottle (330 ml) = 1.7 units

Can (440 ml) = 2.2 units

Pint (568 ml) = 2.8 units

Lager

Super strength (9% abv)

Bottle (330 ml) = 3 units

Can (440 ml) = 4 units

Pint (568 ml) = 5.1 units

Cider

Ordinary strength (6% abv)

Bottle (330 ml) = 2 units

Can (440 ml) = 2.6 units

Pint (568 ml) = 3.4 units

Strong (9% abv)

Bottle (330 ml) = 3 units

Can (440 ml) = 4 units

Pint (568 ml) = 5.1 units

Wine, red or white

13% abv

Standard glass (175 ml) = 2.3 units

Large glass (250 ml) = 3.2 units

Gin, rum, vodka, whisky

(40% abv)

Small measure (25 ml) = 1 unit

Large measure (35 ml) = 1.4 units

Sherry, port

(20% abv)

Standard measure (50 ml) = 1 unit

Alcopops

(5% abv)

Bottle (275 ml) = 1.4 units

Urate levels aren't affected by acidic fruits, and there's some evidence that higher vitamin C intake can help to reduce the risk of gout attacks.

Glossary

Anaemia – a shortage of haemoglobin (oxygen-carrying pigment) in the blood which makes it more difficult for the blood to carry oxygen around the body. Anaemia can be caused by some rheumatic diseases such as rheumatoid arthritis or lupus, or by a shortage of iron in the diet. It can also be a side-effect of some drugs used to treat arthritis.

Ankylosing spondylitis – an inflammatory arthritis affecting mainly the joints in the back, which can lead to stiffening of the spine. It can be associated with inflammation in tendons and ligaments.

Antioxidants – naturally occurring chemicals found in certain foods such as leafy green vegetables, fresh fruit and wholegrains. It's thought that they may help to protect the body from the harmful effects of free radicals, which are known to cause cell damage.

Cartilage – a layer of tough, slippery tissue that covers the ends of the bones in a joint. It acts as a shock absorber and allows smooth movement between bones.

Disease-modifying anti-rheumatic drugs (DMARDs) – drugs used in rheumatoid arthritis and some other rheumatic diseases to suppress the disease and reduce inflammation. Unlike painkillers and non-steroidal anti-inflammatory drugs (NSAIDs), DMARDs treat the disease itself rather than just reducing the pain and stiffness caused by the disease.

Examples of DMARDs are methotrexate, sulfasalazine, gold, infliximab, etanercept and adalimumab.

ELISA (enzyme-linked immunosorbent assay) – a biochemical test which may be used to detect an antibody associated with an infectious disease or a substance which could potentially cause an allergic reaction.

Free radicals – atoms or molecules that react very readily with other molecules and can damage body cells or tissues. Free radicals are produced naturally in the body as a result of metabolism but disease, environmental pollutants, radiation, and stress can create extra free radicals, leading to an imbalance. Free radicals are neutralized by antioxidants.

Inflammation – a normal reaction to injury or infection of living tissues. The flow of blood increases, resulting in heat and redness in the affected tissues, and fluid and cells leak into the tissue, causing swelling.

Leukotrienes – a group of compounds released in the body which play a part in allergic or inflammatory reactions.

Menopause – the time when menstruation ends, usually when a woman is in her 50s. This means the ovaries stop releasing eggs every four weeks, and it's no longer possible to have children. If this happens before the age of 45, it's known as premature menopause.

Non-steroidal anti-inflammatory drugs (NSAIDs) – a large family of drugs prescribed for different kinds of arthritis

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Diet and arthritis

that reduce inflammation and control pain, swelling and stiffness. Common examples include ibuprofen, naproxen and diclofenac.

Osteoarthritis – the most common form of arthritis (mainly affecting the joints in the fingers, knees, hips), causing cartilage thinning and bony overgrowths (osteophytes) and resulting in pain, swelling and stiffness.

Osteomalacia – softening and weakening of the bones, most commonly caused by lack of vitamin D. In children, it's known as rickets and can cause poor bone development.

Osteoporosis – a condition where bones become less dense and more fragile, which means they break or fracture more easily.

Prostaglandins – chemicals derived from fatty acids, some of which control inflammation.

Proton pump inhibitor (PPI) – a drug that acts on an enzyme in the cells of the stomach to reduce the secretion of gastric acid. They're often prescribed along with non-steroidal anti-inflammatory drugs (NSAIDs) to reduce side-effects from the NSAIDs.

Psoriatic arthritis – an inflammatory arthritis linked to the skin condition psoriasis.

Purines – nitrogen-containing compounds, found mostly in nucleic acids – DNA and RNA. The body breaks purines down to uric acid, which passes from the body via the urine.

RAST (radioallergosorbent test) – a blood test that uses radioactive isotopes to identify which substances a person may be allergic to.

Reactive arthritis – a specific type of inflammatory arthritis that usually occurs after a mild infection.

Rheumatoid arthritis – an inflammatory disease affecting the joints, particularly the lining of the joint. It most commonly starts in the smaller joints in a symmetrical pattern – that is, for example, in both hands or both wrists at once.

Warfarin – a drug used to prevent blood clots from forming or growing larger. It works by thinning the blood, making it less sticky and reducing the blood's ability to clot.

Further reading

Food Allergies and Food Intolerance: The Complete Guide to their Identification and Treatment

by Professor Jonathan Brostoff and Linda Gamlin. Inner Traditions Bear & Company, Vermont USA, 2000. ISBN 978-0-892818-75-4.

NHS Choices includes good advice on many conditions and on weight loss. It also gives a balanced view of research publicised in the media. www.nhs.uk

Nutrition and Arthritis by Dr Margaret Rayman and Alison Callaghan. Blackwell Publishing 2006.

ISBN 978-1-405124-18-8.

References

Used as a source of information for Tables 5 and 6:

McCance and Widdowson's The Composition of Foods. The Royal Society of Chemistry and Food Standards Agency 2002.
ISBN 978-0-854044-28-3.

Fatty Acids: Supplement to McCance and Widdowson's The Composition of Foods. The Royal Society of Chemistry and the Ministry of Agriculture, Fisheries and Food 1998.
ISBN 978-0-854048-19-9.

Where can I find out more?

If you've found this information useful you might be interested in these other titles from our range:

Conditions

- *Ankylosing spondylitis*
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- *Osteomalacia*
- *Osteoporosis*
- *Psoriatic arthritis*
- *Rheumatoid arthritis*
- *Reactive arthritis*

Therapies

- *Complementary and alternative medicine for arthritis*
- *Complementary and alternative medicines for the treatment of rheumatoid arthritis, osteoarthritis and fibromyalgia (63-page special report)*

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St Mary's Gate, Chesterfield
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Phone: 0300 790 0400
www.arthritisresearchuk.org

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Diet and arthritis

Related organisations

The following organisations may be able to provide additional advice and information:

Arthritis Care

Floor 4, Linen Court
10 East Road
London N1 6AD
Phone: 020 7380 6500
Helpline: 0808 800 4050
Email: info@arthritiscare.org.uk
www.arthritiscare.org.uk

British Dietetic Association

5th Floor, Charles House
148–49 Great Charles Street Queensway
Birmingham B3 3HT
Phone: 0121 200 8080
www.bda.uk.com

Food Standards Agency

Aviation House
125 Kingsway
London WC2B 6NH
Helpline: 020 7276 8829
Email: helpline@foodstandards.gsi.gov.uk
www.food.gov.uk

NHS alcohol information website

www.nhs.uk/Livewell/alcohol/Pages/Alcoholhome.aspx

NHS Direct

www.nhsdirect.nhs.uk

National Rheumatoid Arthritis Society (NRAS)

Ground Floor
4 The Switchback
Gardner Road
Maidenhead SL6 7RJ
Phone: 0845 458 3969 or 01628 823524
Helpline: 0800 298 7650
Email: helpline@nras.org.uk
www.nras.org.uk

Vegetarian Society

Parkdale, Dunham Road
Altrincham
Cheshire WA14 4QG
Phone: 0161 925 2000
Email: info@vegsoc.org
www.vegsoc.org

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Please note: We've made every effort to make sure that this content is correct at time of publication. If you would like further information, or if you have any concerns about your treatment, you should discuss this with your doctor, rheumatology nurse or pharmacist.



We're here to help

Arthritis Research UK is the charity leading the fight against arthritis.

We're the UK's fourth largest medical research charity and fund scientific and medical research into all types of arthritis and musculoskeletal conditions.

We're working to take the pain away for sufferers with all forms of arthritis and helping people to remain active. We'll do this by funding high-quality research, providing information and campaigning.

Everything we do is underpinned by research.

We publish over 60 information booklets which help people affected by arthritis to understand more about the condition, its treatment, therapies and how to help themselves.

We also produce a range of separate leaflets on many of the drugs used for arthritis and related conditions. We recommend that you read the relevant leaflet for more detailed information about your medication.

Please also let us know if you'd like to receive our quarterly magazine, *Arthritis Today*, which keeps you up to date

with current research and education news, highlighting key projects that we're funding and giving insight into the latest treatment and self-help available.

We often feature case studies and have regular columns for questions and answers, as well as readers' hints and tips for managing arthritis.

Tell us what you think

Please send your views to:
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A team of people contributed to this booklet. The original text was written by Dr Peter Fisher, who has expertise in the subject. It was assessed at draft stage by clinical nurse specialist Maureen Cox and GP Dr Lisa le Roux. An **Arthritis Research UK** editor revised the text to make it easy to read, and a non-medical panel, including interested societies, checked it for understanding. An **Arthritis Research UK** medical advisor, Kate Gadsby, is responsible for the content overall.

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