ARTHRITIS

The information explosion in the science of nutrition very often creates the impression that available information is contradictory. Consequently, it is no longer easy to distinguish between fact, misinformation and fiction. The Division of Human Nutrition, Faculty of Medicine and Health Sciences, Stellenbosch University act as a reliable and independent source of nutrition information.

There are more than a hundred types of arthritis, two of the most common being *rheumatoid- and osteoarthritis.* Other forms of the disease and related conditions are gout, systemic lupus erythematosus, scleroderma, ankylosing spondolitis and juvenile arthritis.

It is postulated that several types of arthritis are caused by either a virus or by constant stress (from obesity or inappropriate strenuous exercise) that initiates the inflammatory process. This process normally occurs to protect and repair tissue damaged by infections, sports injuries, toxicity, or wounds. Once the cause is resolved, however, the inflammation usually subsides. With rheumatic disease, the inflammatory response is often not as efficient as it should be, especially in the aged where the major body changes associated with aging inherently affect the inflammation process and may also contribute or partially contribute to the onset and/or progression of arthritis. These changes include: decreased body protein, body fluid, bone density as well as an increased proportion of total body fat and changes in the nervous- and immune system.

Arthritis is usually chronic, but may present as acute episodes. An acute attack is of short duration, but may recur and develop into a chronic condition. Chronic arthritic conditions are associated with alternating periods of remission (absence of symptoms) and flares (worsening of symptoms), which often occur without any identifiable cause.

How do rheumatic disorders influence the nutritional status of individuals?

Eating inadequately because of:

- Reduced appetite caused by medication, fatigue and pain.
- Taste changes due to dry mouth, dental caries and infection of the gums.
- Fatigue as a result of anaemia (caused by a decreased intake or medication-induced gastro-intestinal bleeding) and pain.
- Difficulties in chewing and swallowing.
- Involvement of the small and large joints may limit the ability to perform activities of daily living, such as shopping as well as preparing and eating of foods. Meals may thus be missed or replaced by nutritionally deficient snacks.
- Changes in the function of the oesophagus and the gastrointestinal tract may also affect dietary intake, digestion and absorption.

Protein-energy malnutrition caused by an increased metabolic rate and inadequate intake.
Drug related adverse effects might also have deleterious effects on the nutritional status.

OSTEOARTHRITIS

Osteoarthritis (OA) is a degenerative joint disease in which the cartilage that covers the ends of bones in the joint is damaged, causing pain and loss of movement as bone begins to rub against

bone. Inflammation occurs at times, but it is not a primary symptom of the condition. OA can occur in any joint and it is thought to be due to past load impact injuries or from constant friction. It is the most prevalent form of arthritis.

Although OA occurs mostly in the elderly, it is not necessarily age-related. Its onset is usually asymptomatic in the 2nd or 3rd decade of life and is very common by the age of 70 years. The joints most often affected are those of the thumb, knees, hips, ankles and spine. The onset is gradual, usually involving one or multiple joints. Pain is the earliest symptom and is worsened by exercise and relieved by rest. Early stages of the disease are marked by stiffness (especially morning stiffness following inactivity for a period of time), usually when rising from a chair or after standing, but lasts <20-30 minutes and is lessened with movement. As the disease progresses, joint motion diminishes, and the joint can enlarge and it progresses to general soreness.

The prevalence of OA is higher among the obese/overweight persons as compared with those of normal body weight. Obesity and injury are the two greatest risk factors for OA. Excess weight impacts adversely on weight-bearing joints; however, weight reduction is thought to improve all affected joints. It has been reported that if overweight and obese individuals reduced their weight by 5 kg or until their BMI (body mass index) was within the recommended normal range, 24% of surgical cases of knee osteoarthritis would be avoided. Recently researchers have suggested that the increased risk of joint problems is not only the added mechanical stress brought about by being overweight, but so the metabolic disturbance associated with obesity that has an additional effect on cartilage metabolism. This view is supported by evidence that osteoarthritis of the fingers, which is not associated with mechanical stress, seems to occur more frequently in obese individuals.

Increasing consumption of long-chain omega-3 fatty-acids (oily fish/fish or oil supplements) may improve pain and function in OA patients. The Western diet has a high ratio of omega-6 to omega-3 fatty acids, predisposing to inflammation. The type of fat included in the diet is therefore thought to be important and should be so adapted as to include increased amounts of omega-3 fatty acids (found primarily in marine oils and algae, and to a lesser extent in plant leaves) as compared to omega-6 fatty acids (vegetable oils such as sunflower oil). Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are two fatty acids that form part of the omega-3 fatty acid group. EPA and DHA together with alpha-linolenic acid (found in linseed-, flaxseed and soybean oils, walnuts as well as green leaves) have been shown to reduce inflammation.

Reducing raised blood cholesterol and increasing intake of rich vitamin K sources may benefit OA. Epidemiological studies have implicated serum cholesterol as a systemic OA risk factor. Furthermore, low-density lipoprotein (LDL)-cholesterol appears to influence OA development and progression. Reducing cholesterol accumulation with statins appears to have favorable effects in OA. In practice the most important and common form of dyslipidaemia is hypercholesterolaemia. Diets high in saturated fatty acids and trans fatty acids increase low-density lipoprotein (LDL) cholesterol levels, one of the risk factors of heart disease. Not all saturated fatty acids (SFA) increase LDL cholesterol. Lauric (C12:0), myristic (C14:0) and palmitic (C16:0) acids increase LDL cholesterol whereas stearic (C18:0) has no effect. There is convincing evidence that replacing SFA with polyunsaturated fatty acids (PUFA) decreases the risk of CVD. When polyunsaturated fats replace saturated fats in the diet, this could help to reduce blood cholesterol concentrations and thus lower the risk of OA, similar but lesser effect is achieved by replacing SFA with monounsaturated fatty acids (MUFA). In view of the positive linear relationship among dietary saturated fat, LDL cholesterol, and cardiovascular disease (CVD) risk, saturated fat should be limited to less than 10% of total energy intake in order to prevent CVD. For those at risk of cardiovascular disease the intake should be less than 7% of energy.

There is a lot of conflicting evidence for anti-oxidant and micronutrient supplementation and joint disease. In the Framingham Osteoarthritis Cohort Study, a moderate intake of vitamin C (120–200 mg/d) resulted in a threefold lower risk of osteoarthritis progression, but did not have an impact on the incidence of the disease. In a multicenter, double-blind, randomized, placebo-controlled, crossover trial was conducted on 133 patients with symptomatic osteoarthritis of the hip or knee joints calcium ascorbate (1 g of calcium ascorbate containing 898 mg of vitamin C) was reported to reduce pain significantly compared with placebo.

Clinical studies have reported benefits from vitamin E administered for the treatment of symptomatic osteoarthritis over a short-term period, but two large studies, performed over a longer period, found no evidence of benefits in terms of reduced pain or stiffness or improved physical function.

There is some preliminary evidence that MSM (Methylsulfonylmethane) supplementation of 3g per day results in significantly decreased pain and physical function impairment compared with placebo, but no notable changes were found in stiffness and aggregated total symptom scores. Importantly, the long-term benefits and safety in managing osteoarthritis could not be confirmed by this one pilot trial.

Dietary guidelines for osteoarthritis

- Follow a healthy, balanced diet that promotes the maintenance or attainment of ideal body weight. An initial aim of a 10% body weight reduction should be considered as a first-line approach for obese patients with OA. The overall aim for obese/overweight patients is a BMI within the healthy range of 18.5 - 25 kg/m^2. Weight management (usually weight loss) can be particularly challenging because the disease often limits the ability to increase energy expenditure through exercise. Dietary modification should include moderate energy restriction without compromising micronutrient intake.
- It is essential to maintain a regular exercise program to aid in weight management. Non-loading aerobic exercise (such as brisk walking, cycling and swimming) has been shown to reduce symptoms, increase mobility and lessen continuous damage from the condition. It is important that an exercise programme is introduced gradually and to the capability of an individual so as not to exacerbate an existing problem. Additionally exercise often improves sleep, results in better tolerance of discomfort and promotes a greater sense of well-being. Increased muscle tone and strength as well as general conditioning protect the affected joints during exercise. Consult a professional as needed.
- Eat oily fish regularly to increase the intake of omega 3 fatty acids in the diet (Table 2). Substitute red meat with salmon, mackerel, snoek, trout, sardines, pilchards and shellfish at least two times per week. Reduce intake of omega-6 fatty acids by substituting oils rich in monounsaturates such as rapeseed, canola and olive oils. Aim to increase intake of long-chain omega-3 fatty acids via a direct source of EPA/DHA. Consider a daily standard fish oil supplement (1-2 capsules/day)
- Most of the fat in the diet should come from foods that are sources of PUFA and/or MUFA such as fish, nuts, and vegetable oils. Choose only lean meat cuts and chicken without the skin. Limit portions to about 60-90 g per day. Eat oily fish or low-fat white fish instead of red meat, chicken or pork twice a week. Choose leaner meat cuts such as fillet and remove all visible fat before cooking. Limit the intake of organ meat and offal to small portions and special occasions. Read product label and try to choose products low in saturated fat (< 1.5 g per 100 g). Avoid or limit processed meat such as polony, vienna sausages or salami. Eat legumes and dishes made from dried beans instead of meat. Aim for at least 10 g of

soluble fibre and 25-29 g of total fibre per day. Food sources include legumes (such as black, lima, navy, pinto and kidney beans and chick peas), psyllium, whole grains such as oats, oat bran, quinoa, barley, and some vegetables and fruit. Include nuts in the diet. Aim for 60 mL (¼ cup) of plain, unsalted nuts at least five times a week. Select foods that contain plant sterols. While small amounts of plant sterols occur naturally in whole grains, nuts, vegetables and fruit, they don't provide enough to reach the recommended 2 g per day level. Only a few foods, such as some margarines and juices, may be fortified with plant sterols. Consider taking a supplement if product availability is limited. Check the product label for these terms: phytosterol, plant sterol or sterol esters.

- Ensure an adequate vitamin C, Calcium, Vitamin D and Vitamin K intake. Many persons with osteoarthritis do not consume sufficient calcium and have a poor Vitamin D status. The latter tends to be more common among individuals who do not receive sufficient exposure to sunlight, for example the elderly, who tend to confine themselves indoors, bed-ridden individuals or those who, due to religious reasons, cover most body surfaces with clothes. It has been reported that the risk for progression of the disease is increased three-fold in those individuals with a poor Vitamin D status. Increase green-vegetable consumption, particularly of rich sources such as spinach, Brussels sprouts, kale and broccoli.
- Adequate intake of at least the RDA (Recommended Daily Allowance) of all micronutrients (vitamins and minerals) is recommended.
- Some alternative therapies that have been used to lessen the need for Non-Steroid Anti-inflammatory Drugs (NSAD) and lessen the severity of the symptoms include chondroitin sulfate, glucosamine, avocado pears and soybean oils. These have yielded favorable results when used in conjunction with conventional medical therapy. Consultation with a doctor is always recommended before using *any* alternative therapies.

RHEUMATOID ARTHRITIS

Rheumatoid arthritis (RA) is a chronic, autoimmune systemic disorder of multifactorial etiology that results in symmetrical joint inflammation. Genetic susceptibility accounts for 50% of RA risk. Additionally, smoking has the highest contribution to development of RA, especially when the individual already has a genetic susceptibility. It is a debilitating and frequently crippling disease with overwhelming personal, social and economic effects - even more severe than OA. It occurs more frequently in women than in men with a ratio of 3:1. The onset of RA may occur at any age, but most often affects individuals between the ages of 25 - 50 years.

Any joint may be affected, but involvement of the small joints of the extremities, i.e. hands and feet is most common. It is usually symmetrical, but initially it may occur in any joint. The most frequent complaints are pain, stiffness and swelling with periods of remissions and exacerbations. Stiffness lasting >30 min on arising in the morning or after prolonged inactivity is common; early afternoon fatigue and malaise also occur.

Since other structures with synovial linings (e.g. tendon sheaths) can rupture, suppression of inflammation in the early stages of the disease can result in substantial improvements in long-term outcomes.

Dietary habits could represent both disease risk and protective factor, based on the properties of specific foods. Specific dietary choices can indeed show pro-inflammatory effects (for example red meat, salt, excessive energy intake) or on the contrary reduce inflammation (oil, fatty fish, fruit, vegetables and others). The prevalence distribution of RA shows a higher number of RA patients in Western countries, in opposition with Eastern world and developing countries. The Western diet,

characterized by a high intake of red meat, saturated and trans fats, a low ratio of omega-3:omega-6 fatty acids and high consumption of refined carbohydrates, has been associated with an increased RA risk principally through an increase of inflammation and an induction of insulin-resistance and obesity.

Nutritional requirements in rheumatoid arthritis

Energy:

The specific impact of the inflammatory response as induced by RA on the metabolic rate of an individual is unknown and may vary from person to person. In addition, activity levels may vary greatly and should be taken into consideration. Weight should be monitored closely and the energy intake adjusted accordingly so as to achieve or maintain ideal body weight.

In general terms, energy requirements can be increased by 114 - 135 % of the energy requirement of a healthy person during the inflammatory phase of the disease. Upon remission of the disease, energy requirements should be adjusted according to the weight (if over- or under weight) and activity level (if sedentary, receiving physiotherapy or if the person is still very active) of the individual.

Protein:

Protein requirements for individuals who are poorly nourished or who are in the inflammatory phase of the disease are 1.5 - 2 g protein/kg body weight. Well-nourished individuals do not have increased requirements.

Fat:

Fat should contribute less than 30% of the total energy requirement both for the purposes of healthy eating and/or weight management. The type of fat included in the diet is however thought to be important and should be so adapted as to include increased amounts of omega-3 fatty acids (found primarily in marine oils and algae, and to a lesser extent in plant leaves) as compared to omega-6 fatty acids (vegetable oils such as sunflower oil). Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are two fatty acids that form part of the omega-3 fatty acid group. EPA and DHA together with alpha-linolenic acid (found in linseed-, flaxseed and soybean oils, walnuts as well as green leaves) have been shown to reduce inflammation in RA. Importantly, studies only showed an improvement at doses of at least 3.0g or more of the long chain n-3 fatty acids, EPA and DHA after a period of 8-12 weeks. Dosing for fish oil supplements therefore should be based on the amount of EPA and DHA in the product, not on the total amount of fish oil. Supplements vary in the amounts and ratios of EPA and DHA. A common amount of omega-3 fatty acids in fish oil capsules is 0.18 grams (180 mg) of EPA and 0.12 grams (120 mg) of DHA. Five grams of fish oil contains approximately 0.17 - 0.56 grams (170 -560 mg) of EPA and 0.072 - 0.31 grams (72 - 310 mg) of DHA. Different types of fish contain variable amounts of omega-3 fatty acids, and different types of nuts or oil contain variable amounts of a-linolenic.

For an anti-inflammatory effect, the recommended doses of fish oil should contain 3.0 to 4 g of **EPA** and **DHA** per day, coupled with advice to avoid n-6 rich foods and increase n-3 fats in the background diet.

Although omega-3 fatty acids have been shown to be beneficial, in addition to improved dietary habits, they should never replace conventional drug therapies. Nevertheless, a reduced need for some anti-inflammatory drugs has been found with long-term omega-3 fatty acids supplementation.

Individuals who wish to consider using such supplements in the long-term should do so in consultation with their doctors.

Vitamins and Minerals:

Common nutrient deficiencies found among people with RA include that of Calcium, Folic acid, Magnesium, Vitamin D, Vitamin B6 and Zinc. However, there is no consistent evidence that supplementation with these nutrients at doses higher than the RDA afford additional benefit.

Deficient Calcium and Vitamin D intake, decreased physical activity and deficient exposure to sunlight, all play an important role in the development of metabolic bone diseases, such as osteoporosis in individuals with RA, and, therefore, early supplementation with Calcium and Vitamin D is indicated, especially in those individuals who do not get regular exposure to sunlight. Persons with existing bone disease may also benefit from such supplements.

Coenzyme Q10 (CoQ10) supplementation may reduce markers of oxidative stress.

Additionally, the type of medication used can also influence the absorption and metabolism of certain nutrients and should therefore be taken into consideration. Folic or folinic acid supplementation is indicated in patients who take methotrexate (MTX) to reduce medication side-effects. (see *Dietary concerns associated with the use of commonly prescribed drugs*).

Pre- and Probiotics

It is now well established that more than 100 trillion microorganisms, primarily bacteria, colonize the human oral-gastrointestinal tract, most residing in the distal intestine. This is referred to as the gut microbiome. In recent years, there has been a dramatic increase in the interest regarding the composition and function of the gut microbiome, resulting in a large body of evidence supporting the gut microbiome as a crucial component in shaping host physiology and maintaining gut and immune homeostasis. Scientists have suspected for some time that the gut microbiome plays a role in rheumatoid arthritis, as well as many other inflammatory and autoimmune diseases. It is well established that gut microbiota plays a vital role in the pathogenesis of RA, with accumulating evidence suggesting that gut dysbiosis induces a chronic inflammatory response that may be linked to disease development. Of interest, patients with RA have significant changes in the intestinal microbiota compared to healthy controls, and several studies have suggested the use of probiotics as a possible adjuvant therapy for RA. Dietary fiber, prebiotics or probiotics could have beneficial effects on disease activity in RA through modification of the microbiota. Several different strains of Lactobacillus and Bifidobacteria, as single species or in mixed culture, have been investigated, and some have demonstrated beneficial effects on disease activity in RA human subjects. As of now, *L.casei* probiotic bacteria seems to be the strongest candidate for application as adjuvant therapy for RA patients.

Dietary guidelines for rheumatoid arthritis

- Avoid a typical Western Diet pattern. Aim to decrease pro-inflammatory dietary patterns, and increase the intake of anti-inflammatory dietary factors (Table 1)

Decrease intake of pro-inflammatory Dietary factors	Increase intake of anti-inflammatory dietary factors
Saturated fatty acids of animal origin (keep at < 10% total	Low-energy diets based on the consumption of vegetables,

energy).	fruit, legumes, fish, prebiotics, and probiotics.
Unsaturated fatty acids in the trans configuration (hydrogenated fatty acids).	n-3 Polyunsaturated fatty acids,, DHA and EPA (found in seafood and fish oil).
Red meat.	Dietary fibre > 10-15 gram per day.
Dietary salt intake above 2300 mg/day.	Carotenoids (lycopene)
Sweetened drinks, and in general high energy diets rich in refined (low-fibre) carbohydrates, in addition to animal fat.	Vitamins D and A
	Oligo elements such as selenium, magnesium and zinc.
	All polyphenols: Flavonoids (quercitin, Cathechins), which are present in vegetables, cereals, legumes, spices, herbs, fruits, wine, fruit juices, chocolate, tea, and coffee and non-flavonoids (Resveratrol).
	Fat-free or low-fat dairy intake.
	Prebiotics (inulin, bran, oligofructose) and Probiotics.

- Avoid being **overweight,** as it puts undue stress on the joints. Exercise (e.g. swimming, cycling or walking) together with a sensible, low fat diet will help minimize symptoms.
- Eat oily fish regularly to increase the intake of omega 3 fatty acids in the diet (*Table 2*). Substitute red meat with salmon, mackerel, snoek, trout, sardines, pilchards and shellfish at least three times per week.

Table 2: Food sources of omega-3 fatty acids

Food Source: (150g raw weight)	Total fat (g)	Total Omega-3 (g) (Including DHA and EPA)
Sardines in Sardine oil	23.25	4.95
Herring/Butterfish	17.40	3.33
Salmon	19.50	2.79
Mackerel	20.85	2.50
Pilchards in brine	8.10	2.42
Herring	13.50	2.40
Anchovy	7.20	2.10
Smoorsnoek (medium fat fish, potato and onion)	7.05	1.04
Tuna in brine	3.75	0.75
Trout	4.05	0.60
Catfish	6.45	0.45
Haddock	1.05	0.30
Lobster	1.35	0.30
Shrimp	1.65	0.45

Source: Kruger M, Langenhoven ML, Faber M. Fatty acid and Amino acid Composition Tables. Supplement to the MRC Food Composition Tables (1991). Parow: Medical Research Council, 1992.

- **Supplements:**
  - Omega-3 fatty acid supplements can also increase the dietary intake of this nutrient. However, the use of supplementation does come with its own side effects in some individuals, namely increased bleeding time, gastrointestinal discomfort and a fishy taste or odor.
  - If a supplement is taken, do not exceed the supplier's recommended daily dose (see product's package insert) and take the supplement in consultation with your doctor – especially those individuals on anti-coagulation (including aspirin) medication.

- Be aware of omega-3 fatty acid supplements that also contain large dosages (more than 150% of the RDA) of vitamins A, D and E, especially if the omega-3 fatty acid supplement is taken in combination with other vitamin and mineral supplements, which also contain these vitamins.
- A practical recommendation is to recommend a 10 to 15 ml dose of fishoil per day. The oil is chosen as an option as it is generally easier to take and can be supplied at substantially less cost than fish oil capsules (required at 20-30 standard capsules of 500mg fish oil per day to get the recommended dose of EPA and DHA). The fishy taste can be minimized by adding the fish oil to the surface of fruit or vegetable juice in a small glass without stirring, then swallowing the contents of the glass. This is followed immediately by more juice from a second glass to remove any oil that may cause an unpleasant aftertaste. It may help to take the dose immediately before a solid meal.
- Any decision to take supplements of any type in large doses should be based on the advice of your doctor or dietitian.
- Certain foods are thought to exacerbate the disease. It is, therefore, best to identify these foods by following an exclusion diet, which must be done under the supervision of a dietitian. Commonly suspected foods include dairy products, red meat, eggs, cereals, alcohol and chocolate.
- Include fresh fruit and vegetables, especially those rich in beta-carotene, e.g. carrots, apricots and sweet potato and also those rich in vitamin C, e.g. broccoli, orange, cabbage, potato and guava.
- Use salt in moderation.
- Drink at least 6-8 glasses of water per day.
- If you drink alcohol, do so in moderation.
- Enjoy moderate intakes of avocados, nuts and sunflower seeds for vitamin E and whole grains, cereals and eggs for selenium.
- Stress is known to exacerbate disease activity and a stress management programme may prove beneficial.
- Provision of a walking aid, modifications to the kitchen layout and the use of adapted cutlery may provide renewed self-reliance in maintaining an adequate nutritional status.
- Eat in a relaxed environment.

When, despite these measures, nutrient intake is poor, enteral- (tube feed) or parenteral (administration of nutrient solutions via infusion into a large-diameter vein) nutrition may be necessary. A doctor or dietitian should make the decision to initiate this type of specialized feeding.

DIETARY CONCERNS ASSOCIATED WITH THE USE OF DRUGS COMMONLY PRESCRIBED:

Medications used in the treatment of RA can affect the nutritional status of an individual by interfering with the absorption, metabolism and/or excretion of nutrients.

♦ Non-Steroid Anti-inflammatory Drugs

Gastrointestinal side effects such as nausea, vomiting, constipation and gastrointestinal bleeding can be experienced which may result in loss of appetite and iron-deficiency due to chronic blood loss.

♦ Disease Modifying Anti-rheumatic Drugs (such as hydroxychloroquine, sulfasalazine and methotrexate):

Nausea and loss of appetite may occur.

♦ Methotrexate

This drug has been associated with low levels of folic acid. Folic or folinic acid supplementation is indicated in patients who take methotrexate (MTX) to reduce medication side-effects. Methotrexate may also cause nausea, abdominal pain and mouth ulcers, which, when severe may impair food intake and require dietary treatment.

DIETARY SUGGESTION:

Eat a diet that includes good sources of folic acid (fresh green leafy vegetables, fruit, organ meats, dried nutritional yeast) vitamin B6 (pork, cereal bran and germ, milk, egg yolk, oatmeal and legumes) and Vitamin B12 (yeast, liver, beef, eggs, kidney). Supplementation should always be practiced under medical supervision.

♦ Penicillamine

This drug can cause an altered taste, nausea, vomiting, diarrhoea and loss of appetite. It can bind to iron and may cause iron malabsorption (and thus iron deficiency anemia may result). It should thus always be taken at least 6 hours apart from any iron supplements. This drug is also associated with decreased copper and zinc levels in the blood.

♦ Corticosteroids

Corticosteroids may cause nausea and oedema. Obesity with alterations in fat distribution is a common adverse effect that can persist even with reduction in the dosage. It is also associated with accelerated protein breakdown, increased blood fats, glucose intolerance (that can lead to diabetes), an increased loss of calcium in the urine as well as a decreased calcium absorption, which increases the risk of developing osteoporosis. Loss of bone mineral density is proportional to the dose and duration of the therapy.

DIETARY SUGGESTION:

- The amount of weight gained should be closely monitored and the diet and exercise program should be adjusted accordingly.
- Adequate Calcium and Vitamin D intake should be ensured.

♦ Salicylates (Aspirin)

Chronic aspirin ingestion is associated with nausea, vomiting, gastro-intestinal bleeding (that can result in iron deficiency anemia), increased bleeding time, as well as low levels of Vitamin C and folic acid.

DIETARY SUGGESTION:

- Never take aspirin on an empty stomach, but always with a meal.
- Focus on increasing dietary intake of Vitamin C by consuming Vitamin C-rich foods such as e.g. broccoli, citrus fruits, cabbage, potato, guava, strawberry and pineapple.
- Dietary intake of folic acid also needs to be increased by consuming more fresh green leafy vegetables, fruit, organ meats and dried nutritional yeast.
- Chronic users of aspirin may be recommended to take a supplement of vitamin C (not exceeding 250 mg per day) under medical supervision.

Dietary guidelines to address disease- or drug-induced nutritional disorders in people with RA

NUTRITIONAL DISORDER	POSSIBLE SOLUTION	REDUCE/AVOID INTAKE OF
Decreased appetite	• Small frequent meals (5-6 meals) instead of three main meals • Meals should be appetizing in appearance and taste and provide enough energy and protein	
Nausea and vomiting	• Eat small, frequent meals • Food is best tolerated at cool or room temperature • Eat dry, salty crackers, pretzels, biscuits and cookies • Simple foods such as rice, scrambled eggs, toast, noodles, bananas, mashed potatoes, custards may be better tolerated • Clear, cold non-acidic liquids • Light low-fat foods • Enough liquids • Allow plenty of fresh air in the house • Disperse cooking odours	• Milk products • Cream soups • Fatty / fried foods • Sweet desserts • Avoid lying down immediately after eating
Sore mouth or throat	• Eat soft, moist food at cool or room temperature (mashed potatoes, macaroni and casseroles) • Drink through a straw	• Spicy, salty or acidic foods • Carbonated beverages • Juice, especially citrus fruits • Bananas • Crisp or raw foods • Hard / tough meats • Textured or granular foods • Coarse bread products • Extremely hot or cold foods.
Dry mouth	• Eat foods with a high moisture content (serve with gravies / sauces, casseroles, chicken, fish, vegetables with sauces) • Have liquids at mealtime with the food • Drink extra liquids between meals • Chewing of sugarless gum or sucking of mints may help • Concentrate on good oral hygiene	• Thick liquids • Thick hot cereals • Dry foods, bread products, tough meats, crackers • Excessively hot foods • Alcohol
Mouth blindness (lack of/reduced taste sensation)	• Strongly flavoured / spicy foods and supplements • Emphasis on aroma and texture	• Bland foods • Plain meats • Unsalted foods
Taste alterations	• Include many cold foods and milk products • Experiment with foods • Increase use of flavouring and seasoning • Fruit-flavoured supplements	

Problems with chewing and swallowing	• Include favorite foods in the diet by adapting the consistency and making texture changes • Suck a peppermint/ sweet before mealtimes as it stimulates saliva secretion • Very hot/cold foods with a texture stimulate the swallow reflex better than lukewarm, bland foods • Eat foods with a high moisture content (serve with gravies / sauces, casseroles, chicken, fish, vegetables with sauces) • Eat small frequent meals (5-6 meals) instead of three large meals • Avoid washing food down with fluid • Milk and milk products are known to cause phlegm (excess mucus production) and it is recommended that milk is not the last item to take at mealtimes. Milk should not be taken on its own as a snack. • Thickening agents: *Maizena* or commercial products (*Nestargel*) can be used to thicken soup, sauces and dishes.	• Thin liquids, coffee and tea • Breakfast flakes, soft white bread and cracker biscuits • Dry cottage cheese and melted hot cheese • Dry mince/ fish with bones and chunky meat • Raw fruit and pineapple • Raw vegetables, chunky vegetables, e.g. beetroot, spinach, corn and firm peas • Thin/very chunky soup • Dry cakes, cookies, dessert with raisins, nuts, coconut, seeds, hard sweets and chocolates • Alcohol
Early satiety	• High-calorie diet with calorically dense foods • Meat, fish, poultry, eggs, whole milk, cheese, cream soups, ice cream, whole-milk yoghurt, creamed vegetables, rich desserts • Small, frequent feedings • Use of calorically dense supplements	• Low-fat or nonfat milk products • Broth-based soups • Green salads • Steamed, plain vegetables • Low calorie beverages
Diarrhoea	• Eat smaller more frequent meals • Fluid replacement is very important to prevent dehydration. Try and drink water or re-hydration drinks after every loose stool. (Home recipe for oral rehydration therapy (remember hygiene): 1 liter of cooled boiled water, 8 teaspoons of sugar and 1/2 teaspoon of table salt). • A low fat and low dairy diet may be indicated (damage to the surface of the gut may cause intolerance to lactose; drinking milk or eating milk products can cause cramps, abdominal distress and diarrhoea in some people). • Moderate the intake of fibre. Concentrate on **soluble fibre** (fruit, oats, and legumes). • Eat bananas, potatoes, fish, meat and drink apricot juice, tomato juice to replenish sodium (salt) and potassium. • Eat foods that have been brought to room temperature.	• Avoid gas forming foods and drinks (e.g. peas, lentils, cabbage, cauliflower, broccoli, onion, nuts, cucumber, beans and bran, garlic, beer). • Limit the intake of fructose (fruit sugar) by avoiding apple and pear juice as well as grapes, honey, dates, nuts, figs and soft drinks. • Avoid alcohol and caffeine, since both may have a dehydrating effect.
Constipation	• Regular diet with fibre added (whole grains, dried fruit such as prunes - even prune juice, bran, etc.). Fibre-enriched supplements / bulking agents may be beneficial • Extra fluids and exercise can be beneficial	• Gas-forming foods and beverages
Iron deficiency anaemia	• The iron present in animal sources is better absorbed than those from plant sources.	• Do not drink tea (except rooibos tea) and coffee

	• Try to include at least one good source of iron that is easily absorbed (e.g. liver, kidney, red meat, fish, chicken and eggs) at each mealtime. • Plant sources of iron include legumes, enriched cereals, dried fruit and nuts. Although these sources are poorly absorbed, the absorption can be increased if eaten in combination with easily absorbed iron sources. • Include Vitamin C-rich sources (tomatoes, spinach, guavas, sweet melon, paw-paw, strawberries, broccoli, cauliflower and Brussels sprouts) when eating iron rich meals.	with meals. The *tannins* reduce iron absorption. • *Phytates* and *oxalates* in certain cereals and vegetables also reduces absorption but should not be excluded from the diet. • It is advised that milk portions with meals should be kept small as the Casein in milk inhibits iron absorption. • Avoid the use of antacids as it leads to a lower absorption of iron.
Individuals with increased energy and protein requirements	• Commercially available high energy and protein drinks (balanced in terms of micro- and macronutrients) may be used effectively to meet the increased requirements. • Household ingredients, such as sugar, vegetable oil, peanut butter, eggs and non-fat dry milk powder can be used in porridge, soups, gravies, casseroles or milk based drinks to increase the protein and energy content without adding to the bulk of the meal. • At least 500 - 750 ml of whole milk or yoghurt should be consumed daily (use in porridge and in the preparation of food: custards, puddings, cream soups). • Add generous amounts of sugar, butter, peanut butter, margarine, cheese, mayonnaise and cream to foods (if tolerated). • Use honey or jam on bread • Beans, seeds and peas are good sources of protein and cheaper than meat, eggs and milk products.	• Avoid foods with poor nutrient density / "empty calories" such as crisps, sweets and cooldrinks.

Finally, most chronic arthritic conditions have no known cure. Medication, in addition to physical, occupational, and nutritional therapies is the mainstay of their management. It is essential, therefore, that newly diagnosed individuals undergo close monitoring so as to ensure that their nutritional status is maintained at as an optimum level as possible. Immediate attention to any nutritional disorders that may develop in the course of the disease can minimize nutritional deficiencies and prevent protein-energy-malnutrition. Early detection of nutritional disorders together with individual treatment(s) and monitoring is considered essential.

For further, personalized and more detailed information, please contact a dietitian registered with the Health Professions Council of South Africa.

References from the scientific literature used to compile this document are available on request.

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