

Department of Nutrition and Dietetics

Phosphate and Potassium

A guide for people with diabetes
on lowering the phosphate
and potassium in your diet

Information for patients



You have been asked to follow a low phosphate and low potassium diet. This booklet has been designed to enable you to continue to enjoy your food whilst following this diet.

What is phosphate?

Phosphate is a mineral found in food. It is needed to build strong bones but is also found in our muscles and other body tissues. Phosphate is present in large amounts in dairy foods and most protein foods.

What is potassium?

Potassium is a mineral found in food. It is needed for the normal function of all nerves and muscles including the heart. Potassium is present in most food and drinks.

Why is the amount of phosphate and potassium high in my blood?

The kidneys normally help to control the level of phosphate and potassium in our blood. When the kidneys are not working properly, the level of phosphate and potassium in the blood may become too high. We are aiming to help keep your blood results between:

- Potassium
- Phosphate

What happens if my phosphate level is high?

In the short-term, a high phosphate level can make your skin, and sometimes, your eyes feel very itchy. In the long-term, if the levels are not controlled, it can lead to weakened or brittle bones which may lead to fractures and severe bone pain.

A high phosphate level can lead to a hardening of the blood vessels around your heart and other organs. This can have a damaging effect and can make it more difficult for you to receive a kidney transplant.

What happens if my potassium level is high?

If the potassium level becomes too high, it can affect how your muscles work. Your heart is a muscle, so a raised potassium level can be dangerous as it can affect the way your heart beats.

There are other factors that may cause your potassium level to increase. These can include recent blood transfusions, certain medication, constipation and poorly controlled diabetes.

If you are experiencing constipation or struggling to control your diabetes, seek further medical advice.

What can I do to control the amount of phosphate and potassium in my blood?

To help control these levels in your blood, it is important to reduce the amount of phosphate and potassium you take into your body from food. If the phosphate level remains high, you may be asked to take some tablets called phosphate binders (see page 22).

Other dietary requirements

You have been asked to follow a low phosphate and low potassium diet. If you have coeliac disease, are following a weight reducing diet or have other dietary needs, it is important that these diets continue. The dietitian will discuss this with you.

We do not recommend the purchase of over the counter multivitamins or mineral preparations. Please do not hesitate to discuss this with the dietitian if you have any questions.

Food labelling

Potassium and phosphate are not listed under the nutritional values on food and drink labels; however, you may want to use the ingredients list as a guide. The ingredients are listed in order of quantity; therefore, should it list a high potassium or high phosphate food first, you may:

- Choose to avoid it
- Choose a smaller portion size
- Limit the amount of other high phosphate or potassium foods you choose in the day

Salt substitutes

Food manufacturers may use salt substitutes to reduce the amount of salt (sodium) in some foods. LoSalt or potassium chloride (KCl) are salt substitutes which are high in potassium. If they are listed as part of the ingredients, the food should be avoided.

Preservatives

Potassium sorbate is a preservative which is often added to food and drinks such as cordials and squashes. This does not need to be avoided as it is present in very small amounts.

Phosphate additives

Phosphate is also used as a food additive. It is added to many foods to help increase the shelf life or improve the colour and taste of food. It is these foods we should try to limit in our diet as nearly all of the phosphate is absorbed by the body and has a greater impact on the phosphate level in the blood.

One of the best ways to reduce our intake of phosphate additives is by choosing fresh rather than processed foods, where possible. Phosphate additives are added during the manufacturing of foods such as processed meats and processed cheese; baked goods such as scones, cakes and instant sauces; beverages such as cola drinks.

Did you know?

- Up to half of the phosphate in your diet can come from phosphate additives
- Processed meat contains more than twice as much phosphate as fresh meat
- Processed cheese spread and slices contain nearly twice as much phosphate as hard cheese
- Cola contains 30 times more phosphate than lemonade

How do I know which foods contain additives?

Food labels will always include a list of ingredients; unfortunately, it isn't always as easy as looking for the word 'phosphate'. The phosphate additive will be included in the list of ingredients and may be listed as an E number or a chemical name e.g. E450 or diphosphates. The chemical name will usually contain the letters PHOS.

Foods containing these additives should be avoided, where possible.

For further information on phosphate additives, please ask to see your dietitian.

Eating out and celebrations

It can be challenging to choose a meal when eating out, or at a time of celebration when following a low phosphate and low potassium diet. If you require further information about this, ask your dietitian for guidance.

Dairy products and eggs

These foods are an important source of protein and calcium. They also contain potassium and are very rich in phosphate so you will need guidance on portion sizes.

The following table will illustrate how best to include these foods.

Dairy foods

- Limit total daily intake of milk to $\frac{1}{3}$ pint (200 mls) per day
- If you struggle to achieve this, you can dilute 200 mls of full cream milk with 100 mls of water
- Cream cheese and cottage cheese can be eaten freely
- Fresh double cream can be used in small amounts
- Single cream contains more phosphate than double cream so should be used sparingly

The following foods are very high in phosphate so should be limited. You can choose one from the following list each day:

- One whole egg
- 30 g (1 oz) cheese e.g. cheddar / Wensleydale
- 120 g (4 oz) reduced sugar yoghurt or fromage frais
- 120 g (4 oz) custard
- 150 g (5 oz) reduced sugar milk pudding e.g. rice pudding or sago
- Two scoops of plain ice-cream

Avoid

- Tinned milk e.g. condensed and evaporated
- Artificial cream, processed cheese or cheese spread e.g. Dairylea / Primula

Please ask your dietitian about milk alternatives such as soya, almond, oat and coconut milks.

Protein foods

Protein foods include meat, poultry, fish, nuts, pulses and meat substitutes e.g. Quorn and tofu. They can be high in phosphate but are a valuable food source as they provide protein, vitamins and minerals. For this reason, many are not restricted; however, guidance on portion sizes may be required as eating too much protein will increase your phosphate intake. Oily fish are slightly higher in phosphate than other fish but they help to protect your heart, and it is recommended that you include them in your diet once a week.

Foods to choose	Foods to avoid
Meat Most meats can be included in the quantities as advised by your dietitian	Offal e.g. liver and kidney Liver paté, processed ham and veal
Fish Cockles, cod, tinned crab, crabsticks, eel, haddock, halibut, mussels, plaice, shrimps, sole, tinned and fresh tuna, whelks, fish fingers and fishcakes	Anchovies, coley, fresh crab, grey mullet, red mullet, monkfish, scampi, lobster, prawns, swordfish, sea bass, whitebait and scallops
Oily Fish Fresh and tinned mackerel, fresh and tinned salmon, tinned sardines and trout	Pilchards, fresh sardines and herring

<p>Meat substitutes and vegetarian alternatives Quorn and tofu are low in phosphate and are suitable alternatives to meat</p>	
<p>Foods to choose</p>	<p>Foods to avoid</p>
<p>Nuts and seeds Coconut milk can be used in small amounts in cooking</p>	<p>Avoid nuts and seeds Tahini paste (from sesame seeds)</p>

Lentils and pulses

- These are a useful source of protein for vegetarians
- They are high in phosphate and potassium, so should be avoided if a meal also contains meat or fish
- Using canned varieties or boiling lentils and pulses first will reduce the potassium content
- Red lentils, chick peas, butter beans, mung beans and black gram are the lowest potassium and phosphate choices
- Lentil, chick pea (besan) and soya flours are high in phosphate and potassium, and should be avoided
- If you use these in your cooking, please discuss this further with your dietitian

If you are vegetarian or vegan, please inform your dietitian and further advice can be given.

Starchy foods

These foods are an essential part of the diabetic diet and should be included at every meal. They provide us with energy and fibre as well as minerals. Some starchy foods, for example; potatoes, yam and plantain are high in potassium and guidance may be required (see page 11) on portion sizes.

Foods to choose	Foods to avoid
<p>Breads</p> <p>Most breads are suitable and can be eaten freely e.g. wholemeal, white, granary, pitta bread, bagels and croissants</p>	<p>Bread containing nuts, dried fruit, potato starch or coconut, rye bread, soda bread and naan bread</p>
<p>Breakfast cereals</p> <p>Porridge made with water or milk from allowance Cornflakes, Rice Krispies, Cheerios, Weetabix, Shredded Wheat, Shreddies, Special K, Puffed Wheat and Grape Nuts</p>	<p>Breakfast cereals containing nuts, yoghurt-coating, chocolate or dried fruit e.g. muesli, Fruit and Fibre, Raisin Splits, Weetabix Minis and Sultana Bran All Bran, Ready Brek, Jordans Crunch and branflakes</p>
<p>Other starchy foods</p> <p>Chapatis, corn or tortilla wraps, Yorkshire puddings, dumplings, cream crackers and crispbreads, cous cous, pasta, rice and noodles</p>	<p>Tinned spaghetti in tomato sauce and tinned ravioli in tomato sauce Crumpets, pikelets, scotch pancakes, English muffins and oatcakes</p>

Cooking methods

If you need to add flour to thicken sauces try corn flour, plain flour or rice flour

Lentil, chick pea (besan) and soya flours are high in potassium

Starchy vegetables

Starchy vegetables include potatoes, sweet potatoes, yam and plantain. They contain large amounts of potassium and therefore need to be limited in the diet.

It is recommended that starchy vegetables are limited to:

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To reduce the potassium content of these foods, they should be boiled first. They should be cut up into small pieces and boiled in large amounts of water until soft. Once soft, drain the potatoes, discarding the water; do not use the water for gravy, soups or as a drink.

It is advised that you do not use a microwave oven, steamer or pressure cooker to cook potatoes.

Once potatoes have been boiled, you can roast them or make them into chips.

Suitable low potassium alternatives to potatoes include: rice, noodles, pasta, cous cous and bread.

Vegetables

Vegetables are an important source of vitamins and minerals as well as fibre; however, they are also a source of potassium. **To reduce the potassium content of the vegetables, they should be boiled first in a large amount of water. This water should be discarded and not used to make gravy or soup.**

We recommend limiting your vegetables to serving(s) each day.

A single serving of vegetables such as broccoli, carrots, cabbage, sweetcorn, peas and cauliflower is equivalent to 2 - 3 tablespoons.

Certain vegetables such as broad beans, Brussel sprouts, asparagus and mushrooms contain more potassium; therefore, the recommended portion size is smaller (1 tablespoon).

Baked beans are a rich source of potassium and should be considered one of your vegetable servings. A serving of baked beans is equivalent to 1 tablespoon.

Avoid artichokes, beetroot, celeriac, raw celery, raw okra, parsnip, spinach, callaloo (amaranth), chard and kale as they are very high in potassium.

Salad

In place of your vegetables, you may have a side salad made up from a selection of up to five of the following:

- 4 slices cucumber
 - 10 g mustard and cress
 - 35 g gherkin
 - 3 - 4 small pickled onions
 - 2 rings green or red pepper
 - 2 radishes
 - 3 leaves of lettuce
 - 2 spring onions
 - 4 slices of pickled beetroot
 - A bunch of watercress
- Plus 1 small tomato

Making tomato-based sauces

Tomato based sauces can be used if not eaten with potatoes. They can be included within rice and pasta based meals.

- 100 g of tinned tomatoes per portion can be used to make a pasta based sauce
- Alternatively, 2 tablespoons per portion of a bought ready-made tomato pasta sauce can be used e.g. Dolmio, Ragu or supermarket own brand
- Tomato puree should not be used
- Vegetables from the above list can be added to the sauce

When making stews

All potatoes and vegetables should be boiled separately and the water thrown away, before they are added to stews and casseroles.

Fruit, nuts and seeds

Fruit, nuts and seeds are an important source of vitamins, minerals and fibre; however, they are also a source of potassium.

Below is a list of fresh, tinned, stewed fruit and fruit juice. The quantities are equal to one portion. We recommend limiting your fruit, nuts and seeds to portions each day.

Fresh fruit	Tinned fruit
1 medium apple 1 medium pear 2 medium clementine 2 small tangerines 5 slices fresh lemon 2 small satsumas 1 small orange 5 passion fruit 1 medium peach 1 slice fresh pineapple 9 fresh strawberries 25 fresh raspberries 1 medium slice watermelon 20 blackberries 12 raw cherries ½ fresh grapefruit 1 small guava 1 small Sharon fruit 15 grapes 1 medium kiwi fruit 1 small nectarine 2 small plums 150 g punnet of blueberries	12 canned grapefruit segments 7 slices tinned peaches 4 halves tinned pears 4 tablespoons of: fruit cocktail fruit pie filling mandarins plums strawberries lychees mango 3 tablespoons of: gooseberries guavas papaya rhubarb Stewed fruit 4 tablespoons of: apple blackberries gooseberries 3 tablespoons of: plums rhubarb

Fresh fruit juice (please choose unsweetened fruit juices)

300 ml unsweetened pineapple juice
300 ml unsweetened grape juice
200 ml unsweetened cranberry juice
150 ml apple juice
100 ml orange juice
80 ml pomegranate juice
80 ml passion fruit juice
80 ml tomato juice
Avoid ready-made fruit smoothies

The following fruits are very high in potassium and can be included; however, the portion size is small.

1 small apricot	1 dried apricot
½ small banana	2 raw dates
2 small slices of mango	1 dried date
½ naseberry (sapodilla)	1 small dried fig
¼ avocado	1½ tbsp canned prunes
½ slice papaya	1 tsp raisins
1 small slice galia melon (100 g)	
1 medium slice cantaloupe or honeydew melon (75 g)	

tbsp = tablespoon (30g = 1oz)

tsp = teaspoon

Please avoid starfruit

Snack foods

These foods contain a lot of fat and sugar and; therefore, should only be eaten occasionally. Try to choose lower sugar options, whenever possible and only have a small portion.

Foods to choose	Foods to avoid
<p>Cakes Fairy cakes, angel cake, Madeira cake, a small portion of Victoria sponge cake with cream or jam filling</p>	<p>Cakes containing nuts, dried fruit, chocolate, marzipan, toffee and coconut Carrot cake, American style muffins, shop bought sponge cakes and packet cake mixes, cassava pone, coconut ice (sugar cake), scones, banana bread</p> <p>Baking powder is high in phosphate; take care when buying baked goods or when baking at home. Use small amounts or avoid, if possible</p>
<p>Biscuits Plain biscuits e.g. rich tea, wafer biscuits, digestives and Morning Coffee</p>	<p>Any biscuits with chocolate or nuts Oat based biscuits e.g. HobNobs and flapjack</p>

Foods to choose	Foods to avoid
<p>Puddings A scoop of plain ice-cream, fruit (from your allowance) and cream, reduced sugar milk pudding or yoghurt (from your allowance) and sugar free jelly</p> <p>The following puddings would not normally be recommended for people with diabetes but may be taken on special occasions: Fruit crumble or fruit pies</p>	<p>Sponge puddings e.g. syrup sponge and jam sponge, puddings containing nuts or chocolate and sweet potato pudding</p> <p>Remember to include stewed, fresh or tinned fruit with your fruit allowance</p>
<p>Sweets and chocolate Sugar-free mints and chewing gum</p> <p>A small portion of chocolate can be included once per week. Try to have it after a meal e.g. 2 finger Kit Kat, Milky Way (26g), single finger Twix or Blue Ribband</p>	<p>Liquorice, toffees, fudge and chocolate bars e.g. Mars, Snickers, Bounty and carob</p> <p>Any sweets or chocolate containing dried fruit, nuts or toffee Fruit gums and sweets made with fruit juices</p>

Foods to choose	Foods to avoid
<p>Savoury snacks Remember, these tend to be high in salt</p> <p><i>The following, maybe taken occasionally:</i></p> <p>Corn snacks: Wotsits, Prawn Cocktail Skips and Nik Naks Olives, pretzels and unsalted popcorn</p>	<p>Bombay mix, tortilla chips, Monster Munch, Twiglets, Wheat Crunchies, Sev or Ganthia</p> <p>Cheese biscuits: Tuc and Ritz Potato based snacks: potato crisps and Quavers Nuts</p>

Drinks

If you have been provided with a fluid allowance, all drinks should be included within that allowance. Remember, if you add milk to tea or coffee to use it from your daily milk allowance.

Drinks to choose	Drinks to avoid
<p>Soft drinks No-added sugar fruit squash, 'diet', 'light' and 'Zero' fizzy drinks e.g. lemonade, Tango and Fanta Mixers such as slimline tonic water, diet bitter lemon and diet dry ginger</p> <p>Full sugar fizzy drinks such as Lucozade should only be taken to treat hypoglycaemia</p>	<p>To include fruit juice - see fruit portion information (page 15) High Juice squash, blackcurrant squash and coconut containing drinks Cola type drinks, including 'diet', 'light' or 'zero' options (Cola, Pepsi and Dr Pepper) Sunny Delight Milkshakes</p>

Drinks to choose	Drinks to avoid
<p>Hot beverages Tea, fruit teas and green tea Limit to one cup of coffee a day Camp coffee and Chai (made with milk from daily allowance)</p>	<p>Horlicks, Ovaltine, Bournvita, cocoa and drinking chocolate, Bovril, Oxo and Marmite</p>
<p>Alcohol Dry white wine, sparkling wine, gin, brandy, vodka, whisky, rum, Baileys and Vermouth Limit lager and beer to half a pint a day</p> <p>Try to keep your alcohol intake to within the recommended limits</p>	<p>Stout, strong ale, Guinness, cider, barley wine, liqueurs, red wine, sweet white wine, sweet sherry and alcopops</p>
<p>Nutritional supplements Appropriate supplements will be prescribed, if required</p>	<p>Nourishment, Nutriment and Complan</p>

Herbs and spices

Herbs and spices will also add to your overall potassium intake. The measurements are given as per person serving i.e. multiply the recommended amount by the number of portions the dish is estimated to provide.

Example: 2 teaspoons of garam masala can be added to a curry to feed a family of four. **(tsp = teaspoon)**

Low (use freely)	Medium (½ tsp)	High (¼ tsp)
Bay leaf	Anise seeds	Amchoor powder
Black pepper	Cayenne pepper	Chilli powder
Cardamom	Cumin seeds	Coconut powder
(ground)	Curry powder	Coriander powder
Cinnamon	Garam masala	Fennel seeds
(ground)	Garlic powder	Groundnuts
Cloves (dried)	Mint (dried)	Molasses
Coriander leaves	Parsley (fresh)	Paprika
(fresh)	Poppy seeds	Parsley (dried)
Fenugreek seeds	Red chilli	Turmeric powder
Garlic (fresh)		
Ginger (fresh / dried)		
Green chilli		
Lemon		
Mint (fresh)		
Mustard seeds		
Nutmeg (ground)		
Rose water		
Saffron		
Tamarind pulp		
Vinegar		
White pepper		

Miscellaneous

Foods to choose	Foods to avoid
<p>Sugars, spreads and preserves Artificial sweeteners, thinly spread jam, honey or marmalade, or try using low sugar jam or marmalade</p>	<p>Chocolate spread, chocolate nut spread, treacle, jaggery, ice-cream sauce and peanut butter</p>
<p>Sauces and pickles Mayonnaise, brown sauce, mint sauce, vinegar, salad cream, horseradish sauce, tomato ketchup, tartare sauce, soy sauce and mustard</p> <p>Pickles and chutneys are often high in potassium; therefore, use sparingly e.g. 1 teaspoon</p>	<p>Tomato puree</p> <p>Avoid salt substitutes e.g. LoSalt and supermarket-own brands</p>
<p>Soup Homemade soup (recipes are available from the dietitian)</p>	<p>Tinned, fresh and packet soups should be avoided as they are high in salt</p>
<p>Dips and dressings Garlic mayonnaise, thousand island sauce and sweet chilli dipping sauce Honey and mustard, French or Italian dressing or olive oil mixed with balsamic vinegar</p>	<p>Hummus, Tzatziki, salsa or any dips containing cheese or sour cream</p>

Phosphate binders

If your phosphate level remains high, you may be prescribed a tablet to help lower the level. These are known as phosphate binders.

How do phosphate binders work?

Phosphate binders reduce the amount of phosphate that moves from the food into the blood. When food is digested, phosphate is released into the gut. Like a sponge soaking up water, the binder soaks up the phosphate in the gut. The phosphate is then carried out of your body when you open your bowels. This means that less phosphate is free to move into your blood.

When do I take my binders?

The number of binders and when they are taken during the day is very important. They must be taken when you have meals that contain high phosphate foods (e.g. dairy foods, eggs, meat, fish or pulses). The exact timing of your binders is determined by the type that you have been prescribed.

Taking binders at the wrong time can cause side-effects, such as stomach pains and could also lead to high calcium levels.

Your doctor has recommended you take the following phosphate binder:

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It is important to take them with each meal. If you do not have anything to eat at a mealtime, do not take a binder.

You are advised to take your binders as follows:

Breakfast:

Lunch:

Evening meal:

Supper:

Snacks:

It is important to take your binders with you when you are eating out.

How can I remember to take my binders?

- Keep them in your cutlery drawer, on your table or where you eat your meals
- Keep a supply in your coat pocket or handbag for when you are away from home
- Small tablet boxes are available for your binders (please speak to your dietitian)

If you have any questions about your medication, please speak to the doctor or pharmacist.

Information contained in this booklet is correct at time of printing. Manufacturers are continually changing the ingredients of their products and altering portion sizes. These changes may affect the potassium content of these foods.

Personal notes

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If you have any suggestions or comments regarding this leaflet, please let your dietitian know.

The information contained within this leaflet is intended for your specific needs and should not be passed on to anyone else.

If you have any queries, please contact:

Dietitian

Contact number



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