PAEDIATRIC RENAL NUTRITION TASKFORCE

Managing phosphate intake: a guide for families

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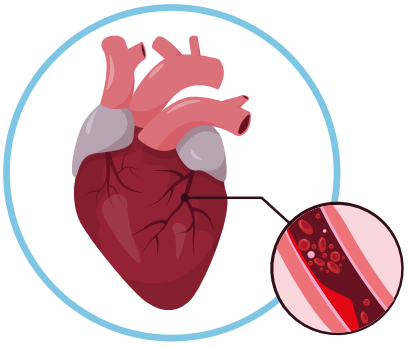
Why do I need to reduce my child's dietary phosphate intake?

Phosphate is a mineral that is important for the development of strong bones and to produce energy for the body. Our kidneys control the level of phosphate in the body by getting rid of any excess in the urine. When your child's kidneys are not working properly, the phosphate levels in their blood may increase.

What are the effects of high blood phosphate levels?

Short term

Red sore eyes, itchy skin and bone pain



Long term

Weak bones, poor growth and hardening of blood vessels, which can damage the heart

Which foods are high in phosphate?

There are two types of phosphate in our food and drinks:

- *Phosphate additives* which are added to some foods during their processing to help keep the food moist, improve its texture or color, or to extend its shelf life.
- Phosphate which occurs *naturally* in foods such as meat, milk and dairy products.

Limiting dietary phosphate intake from food additives and reducing some naturally occurring sources can help prevent high blood phosphate levels and protect your child's bones and heart.

Are all phosphates equal?

The amount of phosphate we absorb from our diet varies depending on the source.

The phosphate in additives can be completely absorbed by the body. This is a concern as this can quickly cause your child's blood phosphate to rise. Limiting processed foods is a priority.

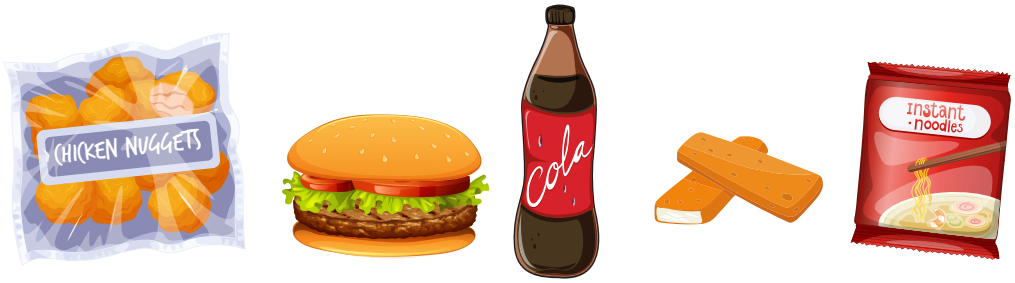
The phosphate that is found naturally in foods is less well absorbed (see table below). As these foods provide essential protein, vitamins, minerals and fiber, they are important for the growing child. However, it may be necessary to reduce certain natural sources such as meat, milk, eggs, beans and nuts.

Source	Examples of foods	How much phosphate do we absorb into our body?
Phosphate additives	Processed meat and chicken, plant-based 'fake' meat and burgers, frozen fish products, processed cheese products, cake and pancake mixes, dark colored soft drinks (such as colas)	**Up to 100%**
Naturally occurring animal-based phosphate	Milk and dairy products (e.g. cheese, yogurt, ice cream), eggs, meat, fish	**40-60%**
Naturally occurring plant-based phosphate	Beans, lentils, soya, tofu, quinoa, nuts	**20-40%**

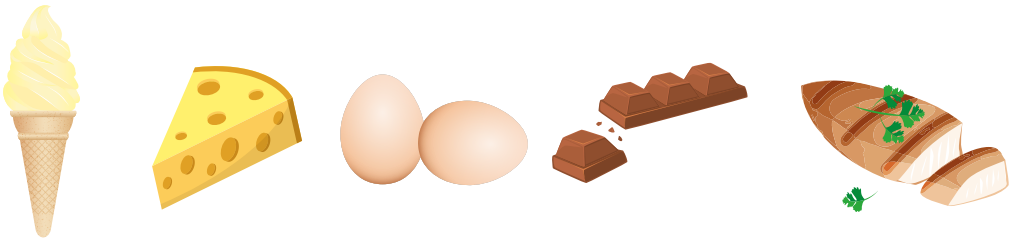
Stepwise guide to reducing phosphate intake

Step 1 Limit phosphate additives

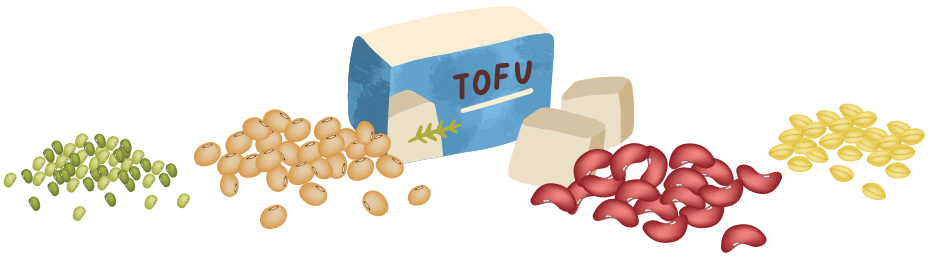
Choose fresh foods rather than processed foods



Step 2 Reduce intake of some foods naturally high in phosphate



Step 3 Replace some of the naturally occurring animal-based phosphate foods with plant-based foods



Step 1 Limit phosphate additives

Preparing more foods from fresh at home

Processed foods are the main source of phosphate additives in the diet. Cooking more foods at home using fresh ingredients is encouraged.

What type of foods contain phosphate additives?

The following table details foods which may contain phosphate additives; their presence may be brand related.

Fresh meat and poultry	Fresh, raw meat and poultry could contain enhancers which include phosphate additives (see page 7 for further details)
Processed meat and poultry	Processed meat and poultry e.g. sausages, burgers, breaded products (such as chicken nuggets)
Fish	Frozen processed fish and breaded fish products (such as fish fingers)
Processed plant-based meat alternatives	Vegeburgers, vegetarian sausages, 'fake' meat
Bakery items	Cakes, biscuits, crumpets, flour tortilla wraps, naan bread
Dairy	Dried milk products, milk desserts and yogurts, evaporated milk, cream, ice cream, sterilized and ultra-high temperature (UHT) milk, processed cheese (especially sliced or spreadable products)
Potato products	Chilled, dried and frozen products such as chips and waffles
Powdered food	Packet sauces, instant dessert mixes e.g. pancake mixes
Drinks	Dark colored fizzy drinks. Chocolate drinks or malt-based drinks

How can I tell if phosphate additives are present?

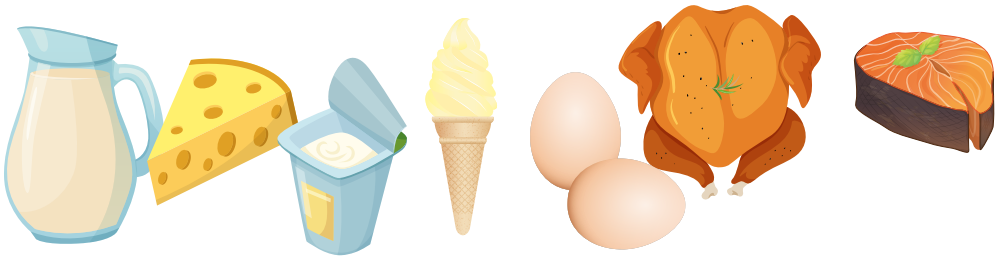
Not all food labels will tell you if an item contains phosphate additives. Some are listed by name or as an E-number (see table below).

E338	Phosphoric acid	**E450**	Diphosphates
E339	Sodium phosphates	**E451**	Triphosphates
E340	Potassium phosphates	**E452**	Polyphosphates
E341	Calcium phosphates	**E541**	Sodium aluminium phosphates
E343	Magnesium phosphates		

You can check ingredient lists for these, or look for 'phos' as part of an ingredient name. These foods should be limited, or suitable alternatives found. In general, ready to eat, processed and 'fast food' are more likely to contain phosphate additives compared to fresh foods.

Step 2 Reduce intake of some foods naturally high in phosphate

You may need to lower your child's intake of natural phosphate sources. These include milk and milk products (e.g. cheese, yogurt, ice cream), eggs, meat and fish. See pages 12-13 for a guide to choosing foods which are lower in phosphate.



The following foods contain similar amounts of naturally occurring phosphate - your dietitian will advise you on how much you can give each day

The number of portions allowed may change depending on your child's blood results

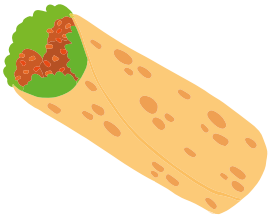
Portions

	1 egg
	100ml milk
	80ml cheese sauce (5 tablespoons)
	1 thin slice or I heaped table-spoon cheddar cheese (20g)
	1 small portion camembert or brie (30g)
	1 pot fromage frais (85g) or fruit yogurt (120g) or soya yogurt (120g)

	150g crème fraiche
	½ pot natural yogurt (60g)
	1 pot custard or rice pudding (125g)
	2 scoops ice cream (120g)
	1 small chocolate covered biscuit bar (50g)
	½ mini pizza (50g)

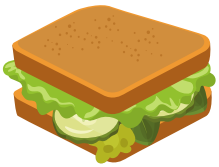
Step 3 Eat more plant-based foods

Plant-based foods provide important vitamins, minerals and fiber and the phosphate in these foods is less well absorbed. Here are some ideas to increase the plant-based foods in your child's diet:

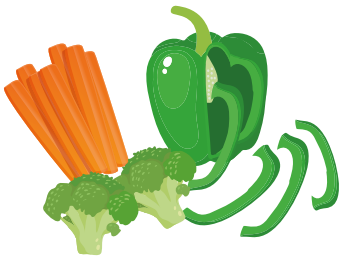


Replace some of the meat in Bolognese sauce, chilli con carne, burgers and burritos with lentils or beans

Add extra fresh, frozen or canned vegetables to pasta sauces, curries and stews and cut down on the amount of meat, chicken or fish you give



Reduce the amount of meat, fish, eggs or cheese in your child's sandwich filling and replace with hummus or mashed avocado; add some salad items such as cucumber or lettuce



Pack some raw vegetables into your child's lunch box, or give as a snack e.g. carrots, bell peppers, broccoli or cauliflower

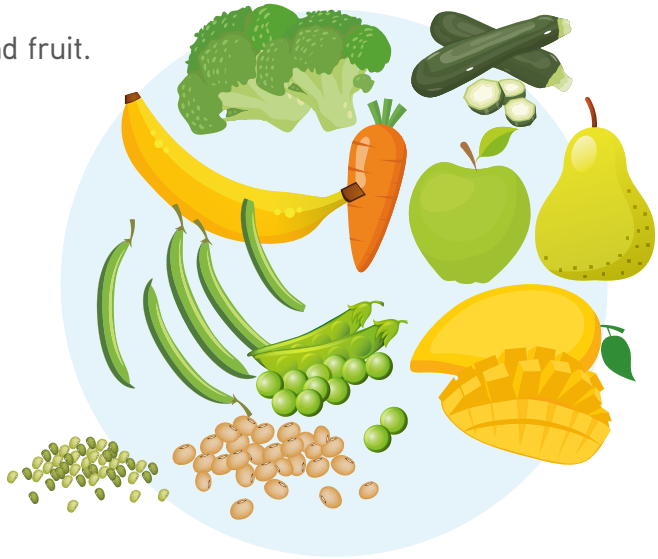
Include a side salad with your child's meals e.g. bulgar wheat, quinoa, couscous or rice with added seeds, nuts, celery, radishes, spring onions or sweetcorn

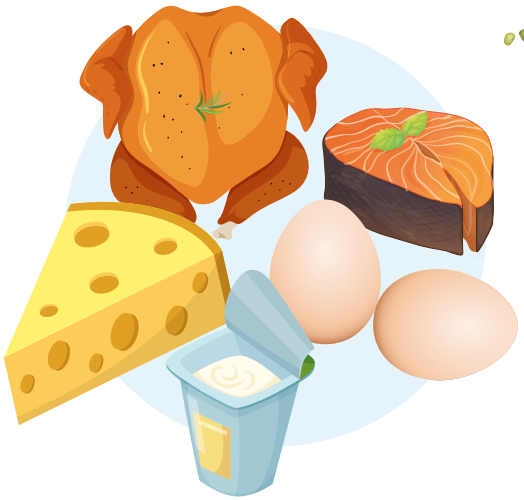
Feeding your baby

Breastmilk or whey-dominant infant formula is usually suitable. Some babies may need a specialized infant formula designed for babies with kidney problems.

Introduce solid foods around 6 months of age. If you think your baby is ready for solids before 6 months, discuss this with your dietitian. Depending on your baby's ability, foods can be either a pureed texture, minced texture or cut into little soft pieces. Use fresh ingredients as much as possible.

Start with homemade vegetables and fruit.





Then gradually introduce natural phosphate foods such as dairy, eggs, fresh unprocessed meat, fish or chicken. The introduction of these foods may need to be delayed, depending on your baby's level of kidney function.

Even if your baby's phosphate level is normal, it is beneficial to avoid the easily absorbed phosphate found in processed foods.

Your dietitian will help you with any changes you may need to make to your baby's diet

Use of phosphate binders

Phosphate binders are often prescribed alongside dietary advice about phosphate intake to help manage your child's blood phosphate level.

This table details some practical points to help you get the best out of phosphate binders.

It is important that your child takes their phosphate binder **with meals and snacks** and not between meals.
The dose of phosphate binder should be **tailored to the amount of phosphate in your child's diet**, including both foods and drinks. Your doctor or dietitian will advise you about this.
Remember to give phosphate binders with **all snacks** which contain phosphate.
Some foods such as vegetables, fruit and cereal products e.g. rice, bread, crisps, cakes and biscuits, may be low in phosphate. If they are not eaten at the same time as a high phosphate food, you may not need to give a phosphate binder. However, **check food labels for possible inclusion of phosphate additives.**
If your child is having nasogastric or gastrostomy feeds, you may be able to mix the phosphate binders into the feed. **Some phosphate binders may cause feed ingredients to settle out.** In this case you need to mix the phosphate binders with some water and put them down your child's tube at the beginning and/or end of the feeding period. You may prefer to give the phosphate binders by mouth before and/or after your child's feeding period. Discuss this with your child's dietitian or doctor.

How to choose foods lower in phosphate

As your child gets older, their diet will become more varied. The following table provides suggestions for alternatives to foods and drinks high in phosphate additives. Some foods and drinks indicated in this table aren't suitable for babies and young children.

	Step 1. Limit phosphate additives	**Step 2.** Reduce intake of some foods naturally high in phosphate	**Step 3.** Give more plant-based foods and choose lower phosphate alternatives
	High in phosphate ADDITIVES	**High in NATURAL phosphate**	**Lower phosphate alternatives**
Milks	Ultra-high temperature (UHT) milk products Non-dairy creamer Plant-based milks containing a phosphate additive	Cow's milk - whole and semi-skimmed, condensed and powdered milk	Dilute cow's milk with water (50:50) Milk substitutes, including some plant-based milks such as oat milk and almond milk†
Dairy	Processed cheese slices/ strips/cheese spread	Hard cheese e.g. cheddar, edam Yogurt Ice cream	Cottage, cream or ricotta cheese Plant-based cheeses Vegan, coconut or soya oil cheese Cream, soured cream Jelly, sorbet, fruit lollies
Bakery	Baked goods or puddings with phosphate-containing raising agents e.g. crumpets, muffins, scones, pastries, naan bread and tortillas/ wraps Baked savoury foods e.g. meat pastries, cheese bread, pizza	Foods containing chocolate	Baked goods without phosphate-containing raising agents* e.g. croissants, English muffins and hot cross buns Plain or jam/cream-filled biscuits, plain cakes, teacakes, cream cakes and doughnuts Cream crackers, wholemeal or white bread, pitta bread, chapattis, rice cakes
Starchy foods	Frozen, chilled and dried potato products e.g. potato waffles, potato cakes	Macaroni cheese, cheese on toast, cheesy fries	Fresh potatoes, homemade chips, wedges, roast potatoes Rice, couscous, pasta, quinoa
Breakfast cereals	Check the label for phosphate-containing additives	Cereals containing chocolate	Porridge oats, rice-based and wheat-based cereals
Dry product mixes	Cake, biscuit, pancake and dessert mixes Packet sauces Instant pasta or noodle dishes	Sauces made up with milk	Pasta, rice, noodles with homemade sauces/flavourings

* A phosphate free raising agent can be made using cream of tartar and sodium bicarbonate in place of baking powder. This may not be suitable if you are also restricting potassium intake.

† It is not advised to give rice milk drinks to young children.

	Step 1. High in phosphate ADDITIVES	Step 2. High in NATURAL phosphate	Step 3. Lower phosphate alternatives
Meat	Frozen beef burgers or takeaway foods Processed chicken e.g. chicken nuggets and popcorn chicken Sausages, bacon, ham, salami Tinned meats, meat paste, pâté	Fresh or frozen meats e.g. chicken, turkey, pork, beef and lamb Check meats from the supermarket for phosphate additives	Try to reduce meat portion sizes Sausages made in a butcher's shop Homemade beef burgers and meatballs
Plant-based protein	Some processed plant-based meals/products e.g. meat-free country pie, meat-free hot dogs, chicken-free crispy grills	Portion sizes may need to be reduced Nuts* e.g. almonds, hazelnuts, peanuts, walnuts Seeds* e.g. pumpkin, sesame, sunflower, tahini paste	Tofu, Quorn®, textured soya protein, soya or pea-based veggie burger, beans and pulses e.g. lentils, kidney beans and chickpeas
Fish and shellfish	Processed fish products e.g. fish fingers/cakes, battered or crumbed fish Fish paste	Fresh or frozen fish e.g. cod, haddock, salmon and tuna Tinned fish: salmon, tuna, mackerel, sardines, pilchards (only if without bones and without skin)	Try to reduce fish portion sizes
Eggs	Some baked egg products e.g. quiche	Egg yolks	Egg whites To make scrambled eggs (with 2 eggs) replace one of the whole eggs with 1 egg white
Spreads & dips	Processed cheese spreads Processed dips	Nut butters and chocolate spread	Biscuit spread, jam, marmalade, syrup, honey▲ Small amount of sour cream/ salsa/pureed vegetable dips Hummus, guacamole and refried beans
Drinks	Dark colored fizzy drinks e.g. colas● Chocolate or malt-based drinks	Cow's milk	Light colored fizzy drinks e.g. lemonade Water, diluted fruit squash, cordials and some natural fruit juices Coffee●, tea●, herbal and fruit teas

* For babies, nuts and seeds should be ground or given as nut butter. Whole nuts should not be given to children under 5 years of age.

▲ Not below the age of 1 year.

● Children under the age of 12 years should not have caffeine-containing drinks.

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