HYPER = High
PHOSPHAT = Phosphate
AEMIA = Blood

Taking charge of your blood phosphate levels

A brochure for patients with chronic kidney disease who have been diagnosed with high phosphate in their blood
Your doctor has diagnosed you with high blood phosphate levels, related to your chronic kidney disease.

This booklet is a guide to help you understand:

- Why you need phosphate
- How your body uses phosphate
- Why you have high phosphate
- Why we need to control it.

This booklet will also provide you with information on ways to help you control your phosphate levels.

Phosphorus is a naturally occurring mineral that is found in food. In the body it is found primarily as phosphate. Along with calcium, phosphate is needed for building strong bones.

Healthy kidneys filter the blood and remove excess phosphate from the body. When your kidneys aren’t working well, blood phosphate levels can rise. This build up of excess phosphate is called hyperphosphataemia.

Hyperphosphataemia refers to a high level of phosphate in your blood

Many patients will not have any symptoms associated with their hyperphosphataemia. However, for some patients, too much phosphate in the blood can make you feel unwell. Symptoms may include:

- itching and/or rash
- fatigue
- anorexia, nausea, vomiting and abdominal pain
- muscle weakness, cramps
- numbness or tingling in the face
- shortness of breath
- sleep disturbances
- bone and joint pain.

Over time, high blood phosphate levels can draw calcium out of the bones, weakening them and causing bone disease. High blood phosphate and calcium levels can also increase parathyroid hormone levels and cause the blood vessels to harden, reducing blood flow.

Lowering your blood phosphate levels may reduce your risk of heart and bone problems.
HOW DO I KEEP MY BLOOD PHOSPHATE LEVEL UNDER CONTROL?

Keeping your blood phosphate levels ‘under control’ means working with your healthcare team to take any necessary measures to maintain your phosphate at recommended target levels. Your doctor will take your blood as often as monthly (before dialysis) to monitor the level of phosphate in your blood.

In Australia, the recommended blood phosphate levels are:1,2

- <1.5 mmol/L in patients with stage 3 or 4 chronic kidney disease.
- <1.6 mmol/L in patients with stage 5 chronic kidney disease who are on haemodialysis or peritoneal dialysis.

There are a number of things your doctor will discuss with you so you can manage your phosphate level.

These include:

1. The importance of eating a healthy diet that is low in phosphorus, which will help you to reduce your blood phosphate levels

2. Taking phosphate binder medications as directed by your doctor (see Why do I need a phosphate binder?)

3. Dialysis to help clean your blood (if you have stage 5 chronic kidney disease).

HOW CAN I REDUCE THE AMOUNT OF PHOSPHORUS IN MY DIET?

The following section presents some general tips that will help you to decrease your phosphorus intake from your diet. Make sure you talk to your renal dietitian and doctor about your specific situation. Your renal dietitian is specially trained to help patients with chronic kidney disease make the best food choices.

Food and fluids with high protein content (e.g. red meat, chicken, fish, eggs and dairy products) are an essential part of a healthy diet, but are high in dietary phosphorus. Limiting the amount of these that you eat and taking phosphate binders with these foods will help to reduce your blood phosphate levels.

Many other foods are also high in phosphorus. It may be necessary to limit the amount of some of these foods for better blood phosphate control.

Processed foods often have higher levels of phosphate additives. These may be added to keep food from drying out (e.g. some fresh and processed meats), improve flavour or colour and to increase shelf life. It is often hard to know what foods may have phosphate additives in them.

To assist in identifying these and other sources of dietary phosphorus, the tables in this booklet have been divided into two groups: LIMIT and BETTER ALTERNATIVES.

- Foods and fluids to LIMIT are particularly high in phosphorus and should generally be avoided.

- BETTER ALTERNATIVES are lower in phosphorus or the form of phosphorous is absorbed less; although serving sizes still need to be considered (see The importance of serving sizes).

THE IMPORTANCE OF SERVING SIZES

Even if food is low in phosphorus, serving size also plays an important role in the amount of phosphorus you get from foods. For example if you eat lots of small snacks with phosphorus in them, this will add to your blood phosphate levels. Talk to your renal dietitian and doctor for specific advice about number of serves and serving sizes based on your individual needs and limitations.
MEAT, POULTRY, FISH AND ALTERNATIVES

You can choose ____ serves of meat, poultry, fish or alternatives per day (your renal dietitian will work with you to decide how many serves are right for you).

Remember, these high protein foods are also high in dietary phosphorus. Phosphorus present in legumes and lentils is poorly absorbed by your gut, and may present a better dietary alternative for you – please discuss this option with your renal dietitian.

<table>
<thead>
<tr>
<th>LIMIT</th>
<th>BETTER ALTERNATIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offal e.g. kidney, brains, tripe and liver</td>
<td>Lean red meat, poultry and pork</td>
</tr>
<tr>
<td>Sausages and other processed meats</td>
<td>Eggs (3–4 per week)</td>
</tr>
<tr>
<td>Meat pies, sausage rolls</td>
<td>Fresh fish, canned tuna</td>
</tr>
<tr>
<td>Fish with edible bones e.g. canned salmon, sardines, anchovies, kippers</td>
<td>Tofu (bean curd)</td>
</tr>
<tr>
<td>Fish roe, fish paste, crab, prawns and oysters</td>
<td>Boiled legumes and lentils e.g. borlotti, cannellini, kidney and baked beans</td>
</tr>
<tr>
<td>Hard cheese e.g. cheddar, fetta, parmesan</td>
<td>Ricotta or cottage cheese</td>
</tr>
</tbody>
</table>

1 SERVE = 1 SLICE ROAST MEAT / CHICKEN OR 1 EGG OR 20 g COOKED MEAT OR 1/2 CUP OF COOKED LEGUMES

MILK, YOGHURT AND OTHER DAIRY FOODS

Dairy foods are high in dietary phosphorus and hence should be limited to two (2) serves per day. Your doctor will work with you to decide if/when you need to take phosphate binders when consuming these foods.

<table>
<thead>
<tr>
<th>1 SERVE =</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mL milk (fresh / uht / soy)</td>
</tr>
<tr>
<td>100 mL flavoured milk / milkshake / malted milk</td>
</tr>
<tr>
<td>100 mL cappuccino / café latte / hot chocolate</td>
</tr>
<tr>
<td>100 g yoghurt</td>
</tr>
<tr>
<td>100 mL custard</td>
</tr>
<tr>
<td>2 scoops ice cream</td>
</tr>
<tr>
<td>100 mL white or cheese sauce</td>
</tr>
</tbody>
</table>

FRUIT AND VEGETABLES

The good news is that all fruit and vegetables are low in phosphorus!

However, some types may need to be limited if your potassium levels are high. Ask your renal dietitian for advice about what is right for your individual needs.
BEVERAGES

Please note: for milk-based drinks (such as milkshakes, cappuccinos etc.), check out the recommended number of serves and serving sizes in the milk, yoghurt and dairy foods section.

<table>
<thead>
<tr>
<th>LIMIT</th>
<th>BETTER ALTERNATIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beer</td>
<td>Water, Cardial, Black tea, Black coffee (instant, espresso and percolated coffee)</td>
</tr>
<tr>
<td>Cola-based soft drinks</td>
<td>Wine and spirits (spirits shouldn’t be mixed with cola-based soft drinks)</td>
</tr>
</tbody>
</table>

ALCOHOL SHOULD BE CONSUMED IN MODERATION. PLEASE TALK TO YOUR RENAL DIETITIAN FOR A GUIDE ON AMOUNTS.

CEREALS AND GRAINS

<table>
<thead>
<tr>
<th>LIMIT</th>
<th>BETTER ALTERNATIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown rice and wholemeal pasta</td>
<td>White rice, noodles, white pasta</td>
</tr>
<tr>
<td>Bran-based cereals e.g. bran flakes, whole wheat cereal</td>
<td>Plain breakfast cereals e.g. porridge</td>
</tr>
<tr>
<td>Cereal products containing chocolate, or nuts e.g. chocolate puffed rice cereals, muesli</td>
<td>Puffed rice cereal and corn flakes</td>
</tr>
</tbody>
</table>

WHY IS WHITE BETTER THAN BROWN?
Wholegrain foods are higher in dietary phosphorus than white breads or grains. Raising agents like baking powder and yeast increase the amount of phosphorus you absorb. You should discuss with your renal dietitian the number of serves and serving sizes that are right for you.

BREADS

<table>
<thead>
<tr>
<th>LIMIT</th>
<th>BETTER ALTERNATIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholemeal/brown, rye and multigrain bread or rolls</td>
<td>White bread and rolls, continental bread</td>
</tr>
<tr>
<td>Wholegrain cracker biscuits</td>
<td>Unleavened breads e.g. tortilla, pita</td>
</tr>
<tr>
<td></td>
<td>Muffins, crumpets, croissants</td>
</tr>
<tr>
<td></td>
<td>White cracker biscuits</td>
</tr>
<tr>
<td></td>
<td>Water crackers</td>
</tr>
</tbody>
</table>

SPREADS

<table>
<thead>
<tr>
<th>LIMIT</th>
<th>BETTER ALTERNATIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peanut butter, nut-based spreads</td>
<td>Jam and honey</td>
</tr>
<tr>
<td>Brewer’s yeast and yeast extracts</td>
<td>Marmalade</td>
</tr>
<tr>
<td></td>
<td>Lemon spread</td>
</tr>
</tbody>
</table>
### Why Do I Need a Phosphate Binder?

Controlling your diet alone (even if you are on dialysis) usually will not keep your blood phosphate levels within a healthy range. This is why phosphate binders are used. Phosphate binders are taken with your food and help to prevent your body from absorbing some of the phosphorus from the food you eat.

The phosphorus in the food interacts with the phosphate binder and is carried through the digestive tract without being absorbed into the blood, and is eliminated in your stool.

People have different levels of phosphate and calcium in their blood. In order to control your phosphate you may require more than one phosphate binder. Your doctor will advise you on which phosphate binders to take to help you to reduce your blood phosphate level.

Remember, you will need to reduce your dietary phosphorus intake and take your phosphate binder, as recommended by your doctor and renal dietitian, even if you are also on dialysis.

### Why Is It Important That I Take My Phosphate Binder and Manage My Diet?

Managing your blood phosphate levels is all about balance; take a moment to weigh up:

- **Against:**
  - The potential short- and longer-term effects that high levels of blood phosphate can have on your body (see What is phosphate? for a list of symptoms that may be caused by your hyperphosphataemia).

YOU are in charge of your phosphate levels. Sticking to your low-phosphorus diet and taking your phosphate binder medications with meals as advised by your doctor will help you to control the amount of phosphate in your blood.

### Snacks

Self-raising flour and raising agents like baking powder or yeast increase phosphorus absorption.

<table>
<thead>
<tr>
<th>LIMIT</th>
<th>BETTER ALTERNATIVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cakes, especially chocolate cakes or cakes with chocolate icing</td>
<td>Plain cakes (e.g. orange, madeira, butter) +/- icing</td>
</tr>
<tr>
<td>Baked muffins, buns</td>
<td>Jelly</td>
</tr>
<tr>
<td>Scones, pancakes and pikelets</td>
<td>Plain biscuits e.g. shortbread, milk coffee</td>
</tr>
<tr>
<td>Chocolate coated biscuits</td>
<td>Pieces of fresh fruit</td>
</tr>
<tr>
<td>Nuts and seeds</td>
<td>Plain cereal bars e.g. fruit filled</td>
</tr>
<tr>
<td>Chocolate or yoghurt covered muesli bars</td>
<td>Vegetable sticks</td>
</tr>
<tr>
<td>Chocolate</td>
<td>Pretzels</td>
</tr>
<tr>
<td>Cheese flavoured snacks</td>
<td>Home-made popcorn</td>
</tr>
</tbody>
</table>

Please consult with your dietitian about the recommended sugar and salt content of your snacks.

### Remember...

**High-phosphorus drinks and snacks between meals** should be avoided, including milk drinks, cheese, yoghurt, cakes and scones. Choose snacks that are lower in phosphorus, such as plain biscuits, white crumpets or fruit.

**Packaged and processed foods** often contain phosphate-rich additives. Cooking with fresh produce can help to reduce the amount of phosphorus you consume.

Baking without raising agents (such as yeast, self-raising flour or baking powder) also helps to decrease your phosphorus intake.
WHAT ARE SOME COMMON TYPES OF PHOSPHATE BINDERS?

There are three common types of phosphate binders:

- Calcium-based phosphate binders
- Calcium-free phosphate binders
- Aluminum-based phosphate binders.

Please refer to the Consumer Medicine Information sheets provided with your medication and discuss with your doctor if you would like more information about the medicines you are prescribed.

CALCIUM-BASED PHOSPHATE BINDERS

Calcium-based phosphate binders bind phosphate from your food and may also be used to add calcium to your diet. Calcium carbonate (e.g. Calcitab®, Calsup®) is one commonly used binder.

CALCIUM-FREE PHOSPHATE BINDERS

Calcium-free phosphate binders such as lanthanum carbonate (Fosrenol®), sevelamer hydrochloride (Renagel®) and sucroferric oxyhydroxide (Velphoro®) are used in some chronic kidney disease patients. Your doctor will advise which phosphate binders are right for you.

ALUMINUM-BASED PHOSPHATE BINDERS

Aluminum-based phosphate binders such as aluminium hydroxide (e.g. Alu-tab®) may be prescribed when phosphate is poorly controlled.

HOW DO I TAKE MY PHOSPHATE BINDER?

For phosphate binders to work properly, it is essential that they are taken with or immediately after meals and snacks. Your doctor and renal dietitian will tell you how and when you should take your phosphate binders. They will also discuss how many phosphate binders you need to take when you eat.

If you miss a meal then there is usually no need to take your phosphate binders at that time, unless otherwise advised by your doctor or renal dietitian. You should resume taking your phosphate binders with or after your next meal as advised by your doctor.

Talk to your doctor or renal dietitian if you find it difficult to swallow large tablets. Some phosphate binders (but not all) can be chewed or crushed. Speak to your renal pharmacist for specific advice about your phosphate binder medication.

HOW CAN I REDUCE THE AMOUNT OF PHOSPHORUS IN MY DIET?

Remembering to take your medications isn't always easy. Here are a few tips that might help:

- Know which medicines need to be taken with meals and which ones should be taken on an empty stomach.
- Know which medicines may cause side effects when taken alone or if they are taken together. Check with your doctor or pharmacist regarding side effects that may be associated with the medications you are taking, and always report any side effects you experience when you take your medicines.
- Set a routine. Ask your doctor, nurse or pharmacist if you need help remembering to take your medicines.
- It is very important to take your medicines. You should always talk to your doctor if you have any concerns about your phosphate binders or other medications as they may be able to help.
WHAT DOES A PHOSPHORUS-CONTROLLED MEAL PLAN LOOK LIKE?

Planning your meals doesn't have to be daunting and you can include many of the foods you like and normally eat. A sample meal plan has been provided below. Please see your renal dietitian for individual advice as everyone likes to eat and drink different things.

**BREAKFAST**
- 2 slices white bread toasted and topped with honey or jam
- 100 g low fat fruit yoghurt
- Cup of black tea

**MORNING TEA**
- 1 small piece of fruit e.g. apple, pear OR orange
- Cup of black coffee

**LUNCH**
- Pita bread wrap with tuna and salad OR 1 mug of home-made chicken and corn soup and a white bread roll
- Water

**AFTERNOON TEA**
- 2 plain biscuits e.g. milk coffee, milk arrowroot
- Cup of black tea

**DINNER**
Main meal of:
- Lean meat, 1 cup mashed potato and 1 cup of mixed vegetables, OR
- Pasta with bolognaise sauce and a side salad, OR
- Chicken stir fry with mixed vegetables and rice or noodles

**SNACK**
- 1 piece of white bread toasted and topped with jam OR 1 dry biscuit
- Cup of black tea

MY FOOD AND DRINK PREFERENCES

Listing some of the foods and drinks you like to consume is a great way to start a conversation with your renal dietitian about planning the right meals for you.

Take this list with you when you go to your next appointment with your renal dietitian, who will work with you to tailor your diet to meet your individual needs.
<table>
<thead>
<tr>
<th>NAME</th>
<th>PHONE NUMBER</th>
<th>ADDRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal dietitian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal nurse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renal pharmacist</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Acknowledgements

This booklet was developed with editorial support by Anthony Meade, Principal Renal Dietitian at the Royal Adelaide Hospital, and reviewed by renal dietitians. Nutritional analysis was performed with FoodWorks® 2009 Professional Edition v 6.0.2539 (Xyris™ Software).

References

Shire Australia
Fosrenol® registered to Shire Australia. Level 6, 123 Epping Road, North Ryde NSW 2113
**Medical Information:** Free call 1800 012 612. e. enquiresaustralia@shire.com