

Calcium and phosphate management

What are calcium and phosphate?

Calcium and phosphate are two minerals which can be found in the blood and tissues of the body.

They are the major components of bone, providing much of the essential strength. In nature, calcium and phosphate can combine together to form limestone.

The levels of calcium and phosphate in the blood are maintained in careful balance. This balance is “see-saw like” in nature. As one rises the other often falls due to hormonal and chemical factors. It is important that these substances stay at normal levels in your blood in order to maintain health.

What is the link between calcium phosphate balance and renal disease?

The kidneys are important in maintaining the balance of calcium and phosphate in the blood. For people with kidney disease this balance can be disrupted.

The kidney achieves this balancing act by filtering excess phosphate from the blood and by producing a substance (active vitamin D) that is essential in the absorption of calcium in the gut and the entry of calcium into the bone. In kidney failure these processes fail and phosphate accumulates in the blood.

As blood phosphate rises, calcium levels fall. This fall in calcium is detected by the parathyroid gland, which initiates the release of parathyroid hormone. Parathyroid hormone acts on bone to release calcium back in to the blood.

The overall effect is that calcium levels in the blood are corrected at the expense of calcium loss from the bone and a higher level of the parathyroid hormone.

Outcomes for people with renal disease

As kidney function slowly deteriorates, the constant “leeching” of calcium from the bone can result in serious bone disease. The weakening of bone can be very gradual, so that no symptoms or signs may help to warn of the loss of bone strength. If ignored, ultimately the bones will crack and crumble.

It is therefore essential that calcium and phosphate balance is monitored and managed in a way that decreases a person’s risk of developing serious complications.

What are the common strategies used to manage calcium phosphate balance in people with renal disease?

The calcium and phosphate levels of your blood are measured when you have a blood test. In this way, the current management of your calcium/phosphate levels can be assessed.

The aim of calcium/phosphate management is to prevent increasing blood phosphate levels, normalise blood calcium levels, whilst minimising the release of parathyroid hormone and preventing bone disease through the loss of calcium.

Preventing increasing blood phosphate levels

Reducing the amount of phosphate absorbed into the body through the gut is one way of preventing phosphate levels rising. However, calcium and phosphate are present in almost all of the food we eat. In fact phosphate is so abundant in food that it is impossible to devise a diet that is phosphate free. So merely avoiding foods that are particularly high in phosphate will not deter rising phosphate levels.

Often a phosphate-binding tablet will be prescribed to further reduce the amount of phosphate absorbed from the food in the gut. Phosphate binders are taken with food and they act by “trapping” the phosphate from the food

before it has the chance to cross the intestinal wall to be absorbed into the blood. The “bound” phosphate is then eliminated via the bowel in the faeces (rather than entering the body via the blood stream).

There are several types of phosphate binders. For more information regarding the names, dosage, and administration of these substances please seek advice from your renal specialist or pharmacist.

Normalising blood calcium levels

This is primarily achieved by using medications that increase or normalise the amount of calcium that is absorbed from the food in your gut. Calcitriol is active Vitamin D and it assists calcium to be absorbed into the blood stream, from the gut.

Did you know?

Parathyroid hormone is a substance made by four small glands in the neck. The parathyroid glands are so named because they are near the thyroid gland. Their purpose has nothing to do with the thyroid gland at all – they simply live close by.

- The management of calcium and phosphate balance in patients with chronic renal disease has improved markedly in recent years. The skeletal pain, disabling fractures, tendon ruptures, and myriad other symptoms associated with over-active parathyroid glands can now be avoided, and the quality of life of patients with end-stage renal disease has improved as a result.
- Some people may require surgical removal of the parathyroid gland as part of their management plan.
- Whilst for most people diet alone is not enough to reduce total phosphate intake, there are some foods that are particularly high in phosphate that you may be asked to avoid. For more information please seek advice from a renal specialist, dietician or nurse.
- People who discuss the management of their condition with their health care team (doctors, nurses) acquire a

better understanding of planned treatment and achieve an increased compliance with therapy.

PROBLEM

Renal Disease

CAUSE

Decreased Filtration And Elimination Of Phosphate Decrease
Production Of Vitamin D

Rising Phosphate Levels In The Blood Decreasing Calcium Levels In
The Blood

Triggers The Release Of Parathyroid hormone

Acts on Bone To Release Calcium into the Blood

In an effort to Corrected Calcium Levels of the Blood

OUTCOME

Decrease Bone Strength

Ever Spiralling Phosphate And Calcium Levels In The Blood

MANAGEMENT

Oral Vitamin D

Monitor Calcium And Phosphate Blood Levels

Avoid Food High In Phosphate

Use Of Phosphate Binders