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FLUID BALANCE

This chapter describes how the amount of water in the body is controlled by the kidneys. It looks at the problem of too much or too little water in the body and gives information on how to deal with it.

INTRODUCTION

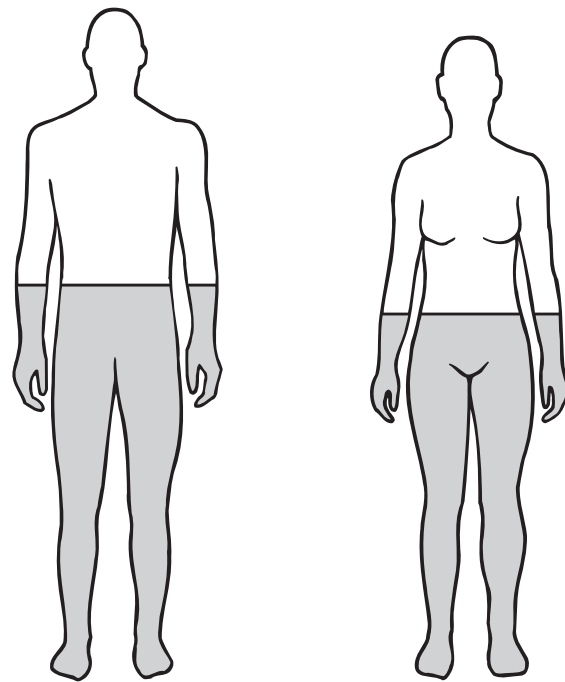
One of the two main functions of the kidneys is to remove excess water from the body. Water comes into the body from drinks, and also from food, especially high-liquid food such as soup, jelly and ice-cream. By removing excess water from the body, the kidneys are able to control the body's water content. This is called fluid balance. To understand fluid balance, it helps to know a bit about how the body is made up.

FLESH AND FLUID

The body is made up of two main parts: flesh and fluid. The flesh is all the solid parts of the body, such as bone, muscle and fat. Most of the fluid part is simply water, such as the water in blood, urine and saliva. Men have approximately 60% of fluid to 40% of flesh in their bodies, whereas women, whose bodies contain a higher proportion of fat, have approximately 55% of fluid to 45% of flesh (see diagram).

The easiest way to see a change in the amount of fluid in the body is to measure body weight. The known weight of 1 litre of water is 1 kilogram. So, if you weigh yourself, then drink 1 litre of water, then weigh yourself again, your weight will show an increase of 1 kilogram.

Fluid and flesh proportions in the human body



Males 60% water

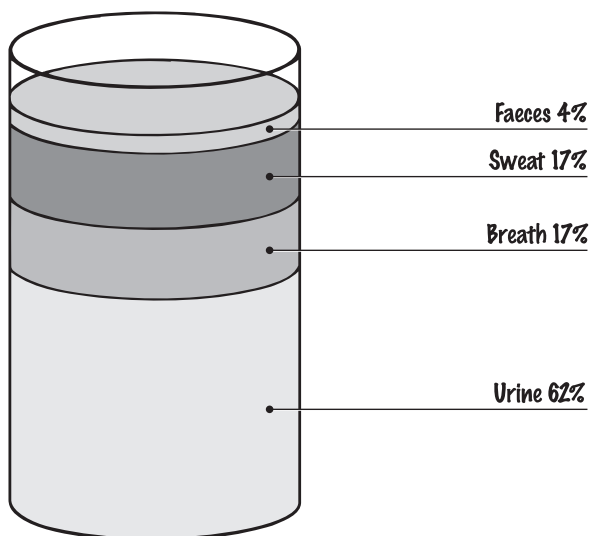
Females 55% water

WHAT IS THE 'TARGET WEIGHT'?

The term 'target weight' means the weight that the doctor considers to be the 'best' weight for an individual patient. At this weight, there will be neither too much nor too little water in the body. Men will have about 60% fluid to 40% flesh, and women about 55% fluid to 45% flesh. A kidney patient's target weight may have to go up or down as flesh weight is gained or lost. Flesh weight increases if a person eats too much, or may decrease due to dieting or illness.

Weight also changes according to how much fluid is in the body. If a person has too much water in their body (i.e. is fluid overloaded, see below), they will weigh more. The target weight, therefore, is the ideal weight when the person is neither 'wet' (fluid overloaded) nor 'dry' (dehydrated). Sometimes target weight is called 'dry' weight or 'ideal' weight.

Water loss from the human body



Judging the amount of water in the body is difficult. But with practice, patients can learn to 'feel' when they are at their target weight.

CONTROL OF FLUID BALANCE

Normal healthy kidneys can control the amount of water in the body with ease. If you do not have kidney failure, you do not have to think about your fluid balance because your kidneys control the amount of urine you pass.

If a person drinks 10 pints of water (or beer), they will usually pass about 10 pints of urine. Similarly, if they drink three cups of tea per day, they can expect to pass the equivalent of about three tea cups of urine.

Fluid is also lost from the body in other ways – as you breathe, when you sweat and in your faeces (see *diagram*). If someone becomes very hot, they will sweat more. To control fluid balance, they will then need to compensate for the sweat lost by passing less urine.

In kidney failure, it is different. Many kidney patients do not pass any urine at all. Others pass exactly the same amount of urine every day, no matter how much they drink. This means these patients are unable to control how much water is in the body. If someone with kidney failure drinks too much, they may keep that fluid in their body. This is called fluid overload (see *page 21* for more details). Conversely, if someone with kidney failure drinks too little, or loses too much water from the body (say, through sweating), they will become dehydrated (see *page 21*). Finding the balance is not always easy.

SODIUM (SALT) AND FLUID BALANCE

Sodium is a mineral that plays a part in helping to control the body's fluid balance. Too much of it can contribute to high blood pressure. Table salt contains sodium, so dialysis patients should avoid eating salty

foods such as bacon, crisps and many processed foods. They should also avoid adding salt to their food either at table or in cooking. Also, eating salty foods makes people want to drink more fluid. If people with kidney failure drink too much, they may develop fluid overload.

WHAT IS FLUID OVERLOAD?

This is a condition in which there is too much water in the body. It is caused by drinking too much fluid, or not losing enough. Fluid overload often occurs with high blood pressure (see *Chapter 4*). High blood pressure may not cause any symptoms.

When the water content of the body reaches a very high level, excess water collects in and under the skin. The problem usually first shows as swelling around the ankles. This is called ankle oedema. The reason the ankles are affected first is simple – gravity tends to make fluid fall to the bottom of the body.

If fluid overload is not treated, the swelling due to excess fluid slowly creeps up the body into the thighs, and then into the lower abdomen and lower back. Hopefully, by this stage, the patient will have asked for medical help. If not, fluid will continue to spread up the body, and eventually settle in the lungs. Fluid in the lungs, which causes shortness of breath, is called pulmonary oedema. It is a very serious condition, and can be life-threatening.

Occasionally, people with kidney failure suddenly develop pulmonary oedema, without going through the ‘warning stages’ of ankle and leg swelling. This can happen if they drink a lot of fluid very quickly. When pulmonary oedema comes on this quickly, it needs urgent treatment. And urgent means exactly that – treatment straight away.

Fluid overload tends to occur mainly in kidney patients on dialysis. However, it can be a problem for pre-dialysis patients too, and also for people who have had a kidney transplant.

HOW IS FLUID OVERLOAD TREATED?

Remember, ‘what goes in has to come out’. Therefore the first treatment of fluid overload for all people with kidney failure is simply to drink less. However, this is not usually enough. It is also important that they cut down on salt in their diet, since salt increases thirst. Additional treatments depend on whether or not a patient is on dialysis:

1. In patients not on dialysis. If patients are pre-dialysis, or if they have a failing transplant, they will usually be given tablets called diuretics or ‘water tablets’ to treat fluid overload. These patients are usually able to pass urine, and the tablets work by increasing the amount of urine that is passed every day. A combination of passing more urine and drinking less usually does the trick. Two commonly used diuretic drugs are furosemide and bumetanide. Stronger diuretics, such as mefruside and metolazone, may be given as well.

If taking diuretics and drinking less does not get rid of all the fluid, it may be necessary to have some dialysis. This may be for just a few days. However, sometimes the difficulty in getting rid of fluid is a sign that kidney failure is well advanced and that dialysis may need to be permanent.

2. In patients on dialysis. Dialysis patients with fluid overload should also drink less. However, because people on dialysis usually pass little urine, diuretics don’t normally work for them. A different treatment for fluid overload is needed. These patients need a combination of drinking less (usually a daily limit of 1 litre for haemodialysis patients and 1.5 litres for PD patients), and removing more water by dialysis.

DEHYDRATION

Dehydration is the opposite of fluid overload. It occurs when there is too little water in the body. Dehydration

may occur if someone does not drink enough, or if they lose fluid as a result of sweating, diarrhoea or vomiting.

It can be difficult for people to judge when they are dehydrated. However, dehydration is almost always accompanied by low blood pressure. This is easier to identify than high blood pressure. Low blood pressure makes people feel weak and dizzy when they stand up.

HOW IS DEHYDRATION TREATED?

Any patient with kidney failure who is suffering from dehydration needs to drink more.

If a patient (pre-dialysis or with a failing transplant) takes diuretics, these should be reduced or stopped. If the dehydration is severe, admission to hospital for intravenous fluids (via a drip) may be necessary.

For dialysis patients, a reduction in the amount of water removed by dialysis may be needed. If haemodialysis patients are severely dehydrated, they can be given a lot of intravenous fluid during a dialysis session.

TAKING CONTROL OF YOUR OWN FLUID BALANCE

Keeping the right balance of fluid in your body is crucial for long-term health when you are on dialysis. This is particularly important if you have haemodialysis as the dialysis is not done every day and body fluid will build up between treatments.

Keeping the right balance means making sure that the amount you drink is no more than the amount of fluid that is removed by dialysis. You are in control of how much you drink, and can learn to judge how much is safe for you. You can help yourself by not eating salt or salty food, using a small cup to drink out of and spreading your drinks throughout the day. If you get thirsty, sucking an ice cube may help (but don't forget this is water too).

KEY FACTS

- 1** Fluid balance is the balance between water coming into the body, from drinks and food, and water leaving the body, mainly in the urine or by dialysis.
- 2** Too much water in the body is called fluid overload. This may cause swelling of the ankles.
- 3** If you eat salty foods, such as bacon, crisps and many pre-packed foods, you will become very thirsty and will not be able to control your fluid intake. So control of salt intake is vital for control of fluid intake.
- 4** The treatment of fluid overload is to drink less, and to remove more fluid from the body. This is done by taking diuretics (water tablets), or by increasing the amount of water removed by dialysis.
- 5** If fluid overload is not treated, shortness of breath due to fluid in the lungs may develop. This condition – known as pulmonary oedema – needs urgent treatment in hospital.
- 6** Judging the amount of water in the body is difficult. But, with practice, patients can learn to ‘feel’ when they are on their target weight – i.e. when they are neither ‘wet’ (fluid overloaded) nor ‘dry’ (dehydrated).
- 7** When there is too little water in the body (dehydration), dizziness may occur.
- 8** The treatment of dehydration is to drink more, and to remove less water from the body. This is done either by stopping diuretics, or by reducing the amount of water removed by dialysis.

- 9** Fluid balance is one area where you can really take control and do a lot to help yourself. Make sure that the amount you drink is no more than the amount of fluid that can be removed by dialysis, and learn to judge how much is safe for you. Help yourself by avoiding salty food (that makes you thirsty), using a small cup to drink out of and spreading your drinks throughout the day.