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What I tell my patients about **interdialytic weight gain**

In patients receiving haemodialysis, interdialytic weight gain (IDWG) is the weight increase between the end of one dialysis session and the start of the next. **Elizabeth Lindley** and colleagues describe how to manage this weight gain

Although you may sometimes put on 'real' weight (that is, flesh weight) between dialysis sessions, especially after a bout of illness, interdialytic weight gain (IDWG) is usually due to the accumulation of fluid. This article is about managing interdialytic fluid gain (IDFG). As long as you do not gain or lose real weight, your IDWG in kilograms will be the same as your IDFG in litres.

Fluid gained between dialysis sessions is mostly extracellular fluid, which is all the body fluid that is not inside cells. Extracellular fluid contains glucose and the salts of various metals. The most abundant metal in extracellular fluid is sodium, which mainly comes from sodium chloride (common salt) in your diet. The sodium in one litre of extracellular fluid is equivalent to about eight grams of salt.

The kidneys normally help to control the volume and the sodium level of the extracellular fluid by excreting excess sodium and water in urine. If your kidneys are unable to do this, your body can control the level of sodium in the extracellular fluid by making you thirsty.

How does my body make me thirsty?

There are two types of thirst: volumetric and osmometric. You experience volumetric thirst if your extracellular fluid volume is too low, which may happen after dialysis. The low fluid volume causes a reduction in blood flow to the kidneys, which activates the renin-angiotensin system (RAS). The RAS generates hormones that raise your blood pressure to keep the kidneys working, as well as decreasing urine production and making you feel thirsty. You may have been prescribed drugs that block the production of these hormones (such as ramipril or losartan) to help control your blood pressure.

The kind of thirst you experience when the level of sodium in your extracellular fluid gets too high

is osmometric thirst. There is a sensor in your brain called the osmostat. Just as the thermostat in a cooling system prevents overheating, your osmostat stops the sodium level in your extracellular fluid getting too high. When your sodium level goes above your set point, the osmostat will compel you to drink.

Figure 1 shows the pre-dialysis sodium levels of 375 haemodialysis patients measured over six months. For each individual, the red dot is the average monthly sodium measurement, and the blue whiskers show how much their sodium varied during that time. For most patients the variation was only a few mmol/l. The wide variation between patients is partly due to the difference in their individual osmostat set points. A low pre-dialysis sodium level is usually due to high fluid intake, although it can also be due to low salt intake or sodium loss in urine or via the gut (through a high output stoma or through diarrhoea). People with diabetes tend to have lower sodium levels because high blood sugar levels make you thirsty regardless of your salt intake.

If you use PatientView, you can check your own sodium levels from your monthly blood results. If not, the nursing staff or your dietitian will be able to show you your sodium levels for the last few months.

Do all dialysis patients gain fluid between sessions?

Your IDFG will depend on your daily fluid intake, the time between sessions and how much urine you pass. Some people need dialysis because their kidneys cannot adequately remove toxins from the body, but can still remove enough fluid. For those people, there should be little or no increase in weight between sessions, even if the dialysis machine removes only the minimum amount of fluid.

Most people still produce some urine when they start dialysis. Although this residual kidney

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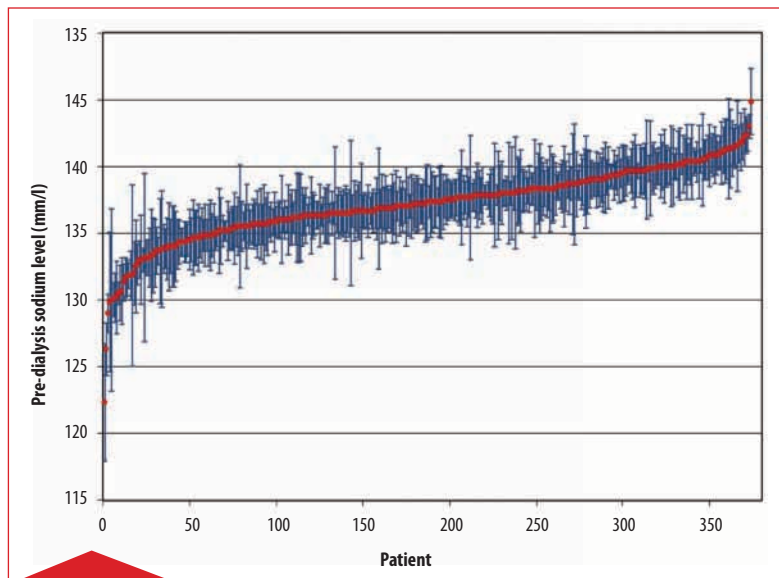
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■ **Figure 1.**

Pre-dialysis serum sodium (Na) levels of 375 haemodialysis patients. Each bar represents the range of six-monthly measurements in a single patient

function can last for years, it normally decreases over time. As the kidneys lose their ability to produce urine, more fluid will accumulate between sessions. People with little or no residual function usually have to restrict their salt and fluid intake to control their IDFG. This is one reason why it is important to make sure that your kidneys keep working for as long as possible, even after you have had to start dialysis.

Residual kidney function decreases rapidly if you become dehydrated at the end of dialysis. Dehydration is not unusual, especially if you have gained flesh weight since your target weight was set, or if you have high blood pressure and your doctor is ensuring that you are not fluid overloaded.¹ It is important to let the nursing staff know if the amount of urine you are passing drops markedly, especially if this happens just after your target weight has been reduced or you think you have put on weight.

What should my interdialytic fluid gain be?

The current guidelines from the UK Renal Association suggest that the rate of fluid removal during haemodialysis is kept at less than 10 ml/kg/hour.² This corresponds to a maximum IDFG of approximately 1% of target weight per hour of dialysis. For a person who weighs 70 kg and dialyses for four hours, this works out at 2.8 litres. In our unit, an allowance of 0.4 litres is made for drinks and the fluid used to wash the blood back from the dialyser, giving a maximum IDFG of 2.4 kg for a person who weighs 70 kg.

In practice, you and the staff at your dialysis unit will usually come up with a maximum IDFG based on the amount of fluid you can remove during dialysis. This will depend on how long your sessions are and

how well you tolerate fluid removal.

It is important to remember that the amount of fluid you can remove without feeling unwell will depend on the amount of excess fluid in your body. It is usually much easier to remove fluid if you are very overloaded, and much harder if you are close to normal hydration. Other factors that affect how well you tolerate fluid removal include your overall fitness and blood pressure medication.

How can I reduce my interdialytic fluid gain?

The majority of patients who come for dialysis have sodium levels above 135 mmol/l. These patients should focus on cutting out salt to decrease IDFG, as it is almost impossible not to drink when your sodium level is high. To quote Dr Charlie Tomson, 'Asking patients with severe thirst to drink less than one litre a day is illogical, inhumane, and should become part of the history of dialysis.'³

Your osmostat only makes you thirsty if your sodium level goes above your set point. For example, if you have a typical post-dialysis sodium level of 138 mmol/l and your set point is also 138 mmol/l, consuming 16 grams of salt between dialysis sessions will mean that you will need to take in at least two litres of water to keep your sodium level below your set point, as there are 138 mmol of sodium in eight grams of salt. The water can be taken at any time and be in any form (for example, tea, coffee, soft drinks, wine, soup, gravy or custard) that fits with your potassium and phosphate restrictions. Drinks are usually low in salt, so most or all of the water they contain is available to dilute salt from other sources. However, some of the

water in fluids like soups and gravies is needed to dilute the salt they contain. Figure 2 shows some meals that have matching water and salt content.

Whenever your water intake has not been enough to match your salt intake, your osmostat will be triggered so that you drink enough to return your sodium level to below 138 mmol/l. If your water intake is more than the two litres needed to match the 16 grams of salt, your pre-dialysis sodium will be a little lower than 138 mmol/l.

If you are unable to remove two litres of fluid during dialysis, you will have to reduce the amount of salt in your diet. Reducing your salt intake from 16 to 12 grams between sessions should mean that you can reduce your IDFG to less than 1.5 litres. Reducing the sodium level in the dialysis fluid (for example, to 135 mmol/l) can also help reduce IDFG, but you should discuss this with your doctor, as drops in blood pressure are more common with low sodium dialysis fluid.

Fluid gained between dialysis sessions is mostly extracellular fluid



■ **Figure 2.** Four meals and snacks with similar salt and water content: a bacon roll with ketchup, apple juice and a mug of tea with milk (3.2 g salt, 400 ml water); pepperoni pizza with side salad and a large glass of soft drink (2 g salt, 250 ml water); buttered crumpet with jam and a white coffee (1.8 g salt, 225 ml water); cheese with crackers and a glass of wine (1.4 g salt, 17 ml water)

A daily intake of six grams of salt, as recommended by the UK Food Standards Agency, should result in an IDFG that most dialysis patients can tolerate. Many foods now have labels to show how much salt (or sodium) they contain, either in grams or as a percentage of this allowance. Your dietitian will be able to advise you on foods to limit or avoid, and how to read the labels.

Should I have a daily fluid allowance and how do I monitor my fluid intake?

If you want to decrease your IDFG but your pre-dialysis sodium levels are already low, cutting out salt may not be the answer. If you are thirsty because you have high blood sugar, you may need help from a diabetes specialist. If a dry mouth (xerostomia) is making you drink, your doctor may be able to prescribe a gel or spray. Your dietitian will be able to help you to identify ways to reduce your fluid intake.

Trying to restrict your fluid intake can make you feel thirstier just because you are thinking about not drinking. Keeping track of the amount of fluid you have consumed is useful when trying to reduce your salt intake as it can help you to identify meals that are high in salt. It is important to monitor the whole period between dialysis sessions, as water

consumed in the evening can dilute the salt in your breakfast the next morning.

The easiest way to monitor your fluid intake is to use your IDWG: one litre of fluid gain will result in 1 kg of weight gain. Recently, dietitians at the dialysis unit in Southend have identified a small group of patients with high fluid gains and gave them a chart on which to plot their weight changes. The patients received education on the relationship between salt and fluid beforehand, but had no input from the dietitians once they started using the charts. After only two weeks, the average IDFG for the group had decreased from 4.1 to 2.8 litres.⁴

If you want to monitor your IDWG, make sure you get your actual post-dialysis weight (do not assume you finished dialysis at your target weight). Your IDWG will give the best estimate of your IDFG if everything else that affects your weight is the same for the sessions before and after the interdialytic interval. Ideally, you should be wearing similar clothes and have similar meals and drinks just before and during dialysis ■

Declaration of interest

The authors declare that there is no conflict of interest.

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Key points

- Interdialytic weight gain (IDWG) is the increase in weight between the end of one dialysis session and the start of the next.
- Although you may sometimes put on 'real' weight, the weight increase between dialysis sessions is usually due to the accumulation of fluid. This means that your IDWG, measured in kilograms, will be the same as your interdialytic fluid gain (IDFG), measured in litres.
- For most patients on haemodialysis, the best way to reduce IDFG is to cut down on salt-containing foods.
- Monitoring your IDWG can give you continuous feedback on the salt in the meals that you have eaten between sessions, enabling you to identify foods with lower salt content.
- If your thirst is not due to salt intake, talk to your doctor, nurse or dietitian, as there may be a solution.