

# Salt and the Kidneys

## 1. Kidney Disease

Your body removes unwanted fluid by filtering your blood through your kidney, via osmosis, to draw excess water out of your blood. This requires a balance of sodium and potassium to pull the water across the wall from the bloodstream into a collecting channel in the kidney. A high salt diet will alter this sodium balance, causing the kidneys to have reduced function and remove less water resulting in higher blood pressure. This puts strain on the kidneys and can lead to kidney disease.

A high salt intake has been shown to increase the amount of protein in the urine which is a major risk factor for the decline of kidney function. There is also increasing evidence that a high salt intake may increase deterioration of kidney disease in people already suffering from kidney problems.

Over 3 million people (1-4 people per 1000 people<sup>1</sup>) in the UK are at risk of Chronic Kidney Disease. 3% of the NHS budget is spent treating kidney failures<sup>2</sup> and it is believed that 37,800 adults in the UK are receiving renal replacement therapy. 1,800 kidney replacements are carried out each year with a further 6,909 patients on a waiting list.<sup>3</sup>

### Who is most at risk of kidney disease?

People of Black African and South Asian descent are 3-5 times more likely to suffer from kidney failure (requiring dialysis) compared to white Caucasians. South Asian patients with diabetes are 10 times more likely to go on to have kidney failure. High blood pressure also puts the kidney under excess stress leading to deterioration of function.<sup>3</sup>

### How does salt contribute?

Animal studies have shown that increasing salt intake increases the amount of protein excreted in the urine and markedly increases the rate of deterioration of renal function in experimental forms of renal disease. Studies where salt intake has been reduced in animals with experimental renal disease show a slowing of the rate of progression of the disease.

Studies in humans have now shown that salt intake increases the amount of urinary protein<sup>4,5</sup> which is a major risk factor for developing kidney disease and cardiovascular disease. Reducing salt intake from 10 to 5g/day in a double blind study was shown to reduce urine protein excretion by 19.4% (Fig 1<sup>6</sup>). A further double blinded study in a larger number of individuals showed that even a more modest reduction in salt intake (i.e. from 9.7g to 6.5g/day) reduced 24hr urinary albumin excretion in all three ethnic groups with mildly raised blood pressure.<sup>7</sup>

Therefore, individuals with kidney disease should restrict their salt intake because in nearly all forms of kidney disease the kidney retains sodium and water in the body, causing further deterioration of renal function.

## Salt Reduction and Urine Protein Excretion

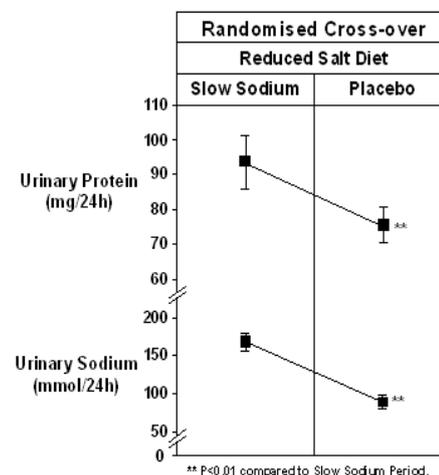


Figure 1. Change in urinary sodium and protein excretion with a modest reduction in salt intake in 40 hypertensive blacks. (Adapted from reference 6)

## 2. Kidney (renal) stones

Renal stones are relatively common. Over a lifetime, 6% of women and 12% of men will have renal stones at least once. Although common, renal stones are painful and can cause nausea, difficulty passing urine and may progress to kidney disease if there is a blockage.<sup>8</sup>

As well as being a risk factor for kidney disease, a high salt diet has been associated with renal stones. Urinary calcium, the main constituent of renal stones, is increased by a high salt diet and this increases the risk of stones forming. A number of studies have successfully shown that a reduction in salt consumption can reduce calcium excretion, and reduce reoccurrence of renal stones.<sup>9</sup> Hypercalciuria is present in 80% of renal stone patients and it has also been found that individuals with raised blood pressure are more likely to develop renal stones.<sup>10</sup> A reduction in salt intake may therefore be of particular benefit to these people as it not only lowers blood pressure but can also reduce urinary calcium excretion. A diet designed to reduce hypertension (the DASH diet) has been found to be associated with a marked decrease in kidney stone risk.<sup>11</sup>

### Who is most at risk of kidney stones?

People with high blood pressure, persistent urinary infections and Crohns disease are at greater risk of renal stones. Also, white British men between the ages of 30-60, and those with a family history of kidney stones are at greater risk.<sup>12</sup>

### Current salt intake & dietary advice

Almost everyone in the UK (and the rest of the Western world) eats too much salt. The daily recommended amount in the UK is no more than 6 grams a day; the current average salt intake is 8.6g salt a day although many people are eating more than this.

People with or considered at risk of kidney disease or renal failure should ensure that they keep their salt intake below the recommended maximum of 6g. This can be achieved by simple changes, such as consuming less processed foods and checking product labels before purchase.

### References

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