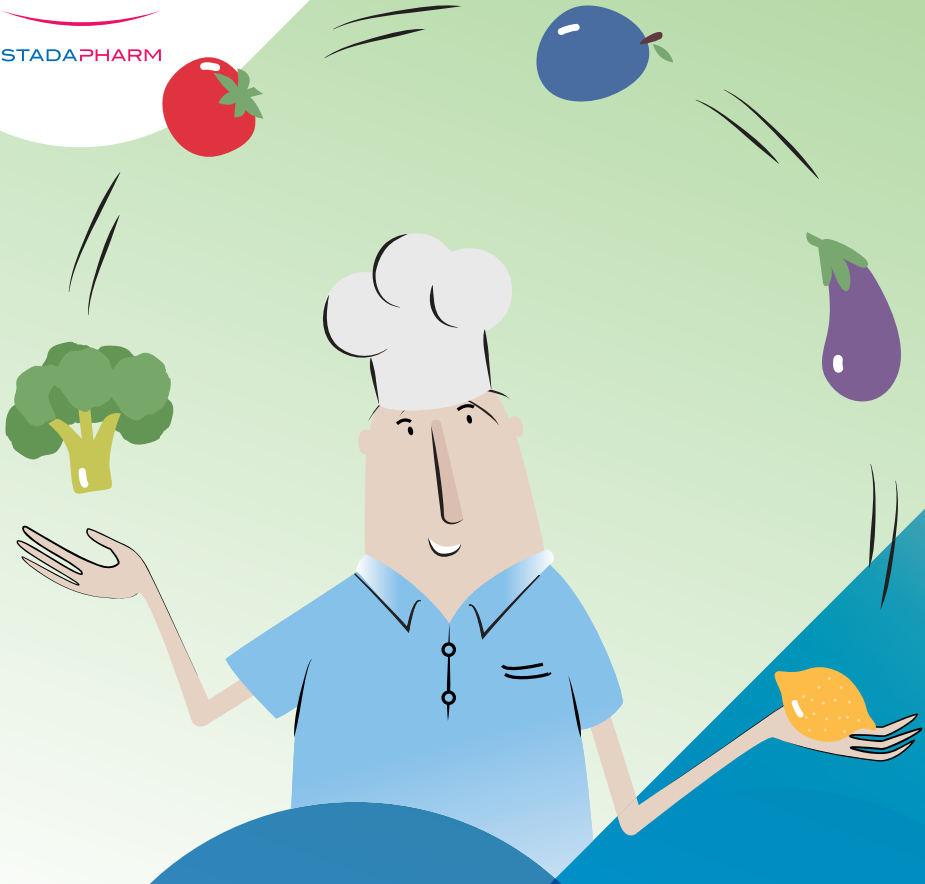
FOR PATIENTS

STADA

STADAPHARM



Nutritional guide **Dialysis**

Information, tips and ideas for patients on dialysis therapy and their families

Caring for People's Health **www.stadapharm.de**

Introduction

Dear Reader,

With some kidney diseases, there comes a point when the kidneys can no longer clean the blood adequately. At this point, dialysis takes over this job by providing regular, life-sustaining blood purification.

Dialysis changes your daily life. Appointment schedules set the rhythm, and habits need to be adjusted. This takes patience – both from you and your family. The transition is not easy, but it is manageable.

We would like to support you as you adjust to this new way of life. After all, there is a lot you can do yourself by ensuring adequate protein intake, keeping an eye on your fluids and, above all, following a diet that prevents certain substances or salts from building up in the blood. This doesn't mean you have to give up on enjoyment. On the contrary: eating well and enjoying your food are still very much a part of it.

This nutritional guide contains practical tips on diet, as well as ideas for kidney-friendly cooking. It is suitable for everyday use and when you want a real treat.

We hope you enjoy reading, cooking and eating.

All the best from your STADAPHARM team

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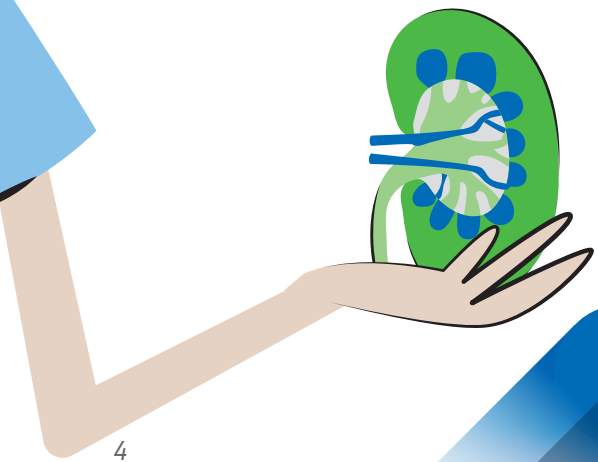
Dr Susanne Fleig
Susanne is a consultant in the Department of Nephrology and Hypertension at Aachen University Hospital, and she leads the Nutrition Committee of the German Society of Nephrology (DGfN). She is passionate about sharing and putting into practice the latest research findings on nutrition for people with kidney disease: a healthy diet can have a positive impact on the progression of kidney disease.

Small but mighty

Structure of the kidneys

A kidney is bean-shaped, about the size of a fist, and weighs between 120 and 200 grams. We have two kidneys – they are located on either side of the spine, roughly level with the lower ribs. They do amazing things: around a fifth of the body's total blood volume flows through them at all times.

Each kidney consists of around one million small functional structures known as renal corpuscles or nephrons. Each nephron contains a renal corpuscle and a tubule. The renal corpuscle is also known as the glomerulus, and it looks like a cluster of tiny blood vessels. It is in these tiny blood vessels that fluid and small particles in the blood are filtered out under pressure. Large particles, such as cells and proteins, are kept in the bloodstream. The fluid that comes out on the other side of the filter is known as primary urine, and it undergoes further changes in the subsequent system of tubes in the kidney ("renal tubules"): important substances such as sugar and salts, as well as 99% of the fluid, are absorbed back into the blood. Substances that the body does not need or that are harmful to it are eventually excreted as waste products in the urine.



An organ for (almost) every eventuality

Functions of the kidneys

The kidney performs many vital functions. Here are a few examples.

Cleaning the blood: Our kidneys work tirelessly behind the scenes, day in, day out. Around 1,800 litres of blood are pumped through them every day. As this happens, the kidneys clean the blood of harmful waste products produced during normal metabolism. One example is urea, a breakdown product of protein. These substances are normally excreted in the urine. If this process does not function properly, toxins build up in the body, which can have dangerous consequences for your health.

Filter function: The renal corpuscles act as a filter: they only let through water and waste products that the body wants to eliminate. Important components such as proteins and blood cells, on the other hand, remain in the body. However, if this filter is damaged, proteins and blood cells can also end up in the urine. This is a warning sign of possible kidney disease and should not be ignored.

Regulating water and salt balance: The kidneys also help to keep the body's fluid balance in check. When there is excess fluid, they excrete more minerals such as sodium, potassium and calcium along with the fluid. If fluid levels are low, they retain both minerals and fluid.

Regulation of blood pressure: The kidneys also help to regulate blood pressure. If the pressure is too high, they release more water and salts, which causes the pressure to drop. If it is too low, they retain both, causing blood pressure to rise. In addition, the kidneys produce an enzyme called renin. This hormone plays a key role in regulating blood pressure.

The kidneys are also involved in blood formation. They produce the hormone erythropoietin, which stimulates the production of red blood cells in the bone marrow. A deficiency of this hormone can lead to anaemia (low red blood cells).

Dialysis –
What does this mean?

Some kidney diseases are chronic. They progress slowly and are irreversible. Over time, the kidneys are no longer able to perform their main functions well enough, and they can't properly filter out harmful substances and remove excess water. As a result, substances that should normally be excreted in the urine build up in the body. If kidney function falls below critical levels, this can be life-threatening. In this situation, **dialysis** is necessary. This medical procedure takes over some of the functions of the kidneys. There are two types of dialysis, both of which have the same objective: to cleanse the blood and maintain metabolic balance.

Haemodialysis: During haemodialysis, the patient's blood circulation is connected to a machine. The blood flows through what is known as a dialyser; this is essentially a filter made up of many fine hollow fibres. A special dialysis fluid flows over these fibres and carries away the substances to be removed. This eliminates breakdown products, salts and excess water. The purified blood is then returned to the body. The treatment usually lasts between four and five hours and takes place three times a week at the dialysis centre. Following appropriate training, **home haemodialysis** is also possible.

Peritoneal dialysis: In peritoneal dialysis, the abdominal lining (peritoneum) acts as the filter. The dialysis fluid is fed into the abdominal cavity via a catheter (plastic tube). Waste products and excess fluid pass from the blood into the dialysis fluid via the thin peritoneal membrane. There are two types:

CAPD (continuous ambulatory peritoneal dialysis):
The spent dialysis solution is replaced manually several times a day.

APD (automated peritoneal dialysis):
A machine ("cycler") performs the replacement, usually at night.

Which method is right for me?
Both dialysis methods have their pros and cons. Which option is right for you depends on your state of health, your daily routine and your personal preferences. Your doctor will take the time to discuss the various options with you, and they will work with you to choose the treatment that suits you best.

Good health
starts with your diet

When kidney function declines, it is not just their filtering ability that is affected. The body's mineral balance is also disrupted. Dialysis helps to flush out toxic substances, but in doing so it also removes valuable nutrients. This is why dialysis patients need a higher amount of some nutrients than others. At the same time, they need to avoid foods that the body can no longer eliminate effectively.

Therefore, good dialysis treatment doesn't start with the machine, but on your plate. Your diet should support your body, provide sufficient energy, and supply it with all the essential nutrients it needs every day. If you are unsure, speak to a dietitian who specialises in kidney disease. They will help you learn what is good for your body, and what is best avoided.



Fluids –
drink mindfully

Dialysis removes excess fluid from the body when the kidneys are no longer able to perform this function. If you have chronic kidney disease, it is usually fine to drink as normal. For dialysis patients, this is a little more complicated. As a rule of thumb: use your urine output as a guide, and drink no more than half a litre more than you excrete.



STADAPHARM tip
to ensure you are drinking enough:

Checking the scales regularly can help if you're not sure how much fluid you have consumed or excreted. This is a quick way to see whether your body is retaining or losing fluid. Over time, you will develop a good sense of how much you need to drink.

Optimise your
protein intake

Dialysis patients need more protein than healthy people in order to maintain their muscle mass. During dialysis, amino acids – the building blocks of protein – pass through the membrane into the dialysis fluid. They are then no longer available to the body. In peritoneal dialysis, this loss is often even greater, as the peritoneum is more permeable than the filter used in haemo-dialysis.

In addition, advanced kidney disease accelerates the breakdown of protein in the body. Age also plays a role, as people over 65 years do not metabolise protein from food as effectively as younger people. Therefore, a daily intake of around one gram of protein per kilogram of body weight is recommended. Older people and patients with other medical conditions usually require about 1.2 grams per kilogram of body weight. It is best to talk to your doctor about what the right amount is for you.

For a balanced diet, it is a good idea to combine plant-based and animal-based sources of protein. To get an estimate of how much protein your meals contain, you can use the following portion sizes and the typical protein content of the various food groups as a guide:

Protein content per serving	
1 slice of bread (50 g)	4 grams
1 slice of cheese (30 g)	8 grams
1 slice of cold cut (25 g)	4 grams
1 portion of meat, fish or poultry (150 g)	30 grams
1 egg (60 g)	8 grams
1 pot of yoghurt (150 g) (milk, buttermilk, kefir and soured milk are similar)	6 grams
1 pot of quark (150 g) (Skyr or cottage cheese are similar)	18 grams
1 portion of fruit (150 g)	1 gram
1 portion of vegetables, mushrooms (150 g)	3 grams
1 portion of pulses (150 g)	14 grams
Potato (200 g)	4 grams
Pasta, cooked (200 g)	7 grams
Rice, cooked (200 g)	4 grams
1 handful of nuts (30 g)	5 grams

Meeting your ***calorie*** *requirements*

It is important that you consume enough calories along with the protein. If the body does not get enough calories, it uses the protein as fuel and may break down muscle tissue. This can increase the protein deficiency. A high-calorie diet containing sufficient protein helps to counteract this. As a guideline, 25 to 35 calories per kilogram of body weight are recommended. If your weight remains stable over a long period – without increased water retention – this is a good sign that your calorie and protein intake is just right.

Although fats provide a lot of calories, not all fats are equally beneficial. Therefore, pay attention to quality. Vegetable oils such as rapeseed or olive oil, for example, are a good choice. The fats found in salmon, herring, almonds and avocados also have a positive effect on blood lipid levels. On the other hand, animal fats and saturated fats, such as those found in cream, butter, crème fraîche, cheese, sausage and baked goods, are not recommended.



STADAPHARM tip
for getting enough calories

You can easily estimate the calorie content of your diet using a calorie chart or an app. Make sure you get enough protein. If you have any questions, your nutritionist will be happy to help.

Cut down on

salt

Most people eat too much salt. The German Nutrition Society (DGE) recommends no more than 6 grams per day, although the actual consumption in Germany is significantly higher.

Salt (sodium chloride) is the main source of sodium. The body only needs small amounts of sodium. One gram of sodium is equivalent to 2.5 grams of table salt.

Too much salt causes the body to retain water and leads to an increase in blood pressure. In dialysis patients, it also increases thirst – cutting back on salt makes it easier to keep to your fluid allowance.

Around 80 per cent of daily salt intake comes from processed foods such as bread and rolls, cheese, cold cuts and ham, ready-made sauces and condiments, ready meals such as frozen pizza, and snacks such as crisps. Effervescent tablets, energy drinks and protein shakes often contain salt as well.



STADAPHARM tips

for reducing salt intake

- *Use salt sparingly and avoid ready-made stocks and sauces.*
- *Drain the liquid from tinned foods.*
- *Use fresh herbs, lemon juice or lime juice instead of salt.*
- *If you choose thinner or smaller slices of cold cuts or cheese to cut down on salt, make sure you make up for the lower protein intake at another meal.*
- *Why not try some porridge for breakfast? It is high in fibre and contains no added salt. You can find a delicious recipe further on in this booklet.*

Avoid
too much phosphate

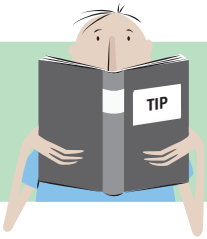


Phosphate is a mineral that builds up in the blood when the filtering function of the kidneys starts to decline. If phosphate levels rise, the mineral balance in the bones is disrupted. Calcium is released from the bones, binds with the excess phosphate, and forms calcium phosphate, which then deposits outside the bones – for example in the skin, joints or blood vessels.

Possible symptoms include itching, pain and lumps under the skin. Calcified blood vessels restrict blood flow and increase the risk of heart attack and stroke. You can counteract this by keeping your phosphate levels within the normal range as far as possible. So-called phosphate binders play an important role in this. These bind phosphate from food, thus preventing it from entering the bloodstream.

Phosphorus is found mainly in protein-rich foods. How much the body absorbs depends on the source: around 20 to 50 per cent is absorbed from plant-based foods, and around 40 to 70 per cent from animal-based foods. Phosphates from additives, on the other hand, are almost entirely absorbed into the bloodstream.

It is precisely these added phosphates that you should avoid. You can identify them using the E numbers on the ingredients list. Common ingredients containing phosphates are **E322 (lecithin), E340 (potassium phosphate), E450–452 (di- and polyphosphates)** as well as modified starches such as **E1410, E1412–1414 and E1442**. These additives are found in many processed foods, such as ready meals, sausages and meat products, baked goods, dairy products, processed cheese and soft drinks.



STADAPHARM tips
for making better choices

- *Choose soft cheese instead of hard cheese, and eat thinner slices or smaller portions. Make up for the lower protein and calorie content at another meal.*
- *Try cottage cheese, skyr or quark instead of yoghurt.*
- *Choose cold cuts and other meat products without added phosphates.*
- *Avoid processed foods and ready meals containing phosphate additives.*
- *Take phosphate binders correctly – they bind phosphate from food and are excreted along with it.*

Potassium **–** *Important, but only in moderation*



Potassium is an essential mineral. It keeps the nerves and muscles functioning properly – especially the heart. Our body needs potassium, but only in moderation. Too much or too little potassium can be dangerous and lead to muscle weakness or heart rhythm disorders and, in the worst case, heart failure. Healthy kidneys help maintain a balanced potassium level. If your kidneys are weak, this balancing function is impaired – and this is dangerous, as levels that are too low or too high can trigger life-threatening heart rhythm disorders.

How much potassium do we consume?

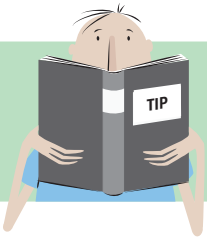
Potassium is found in almost all foods. However, what matters is not necessarily the value per 100 grams, but the portion that is actually eaten. Bananas, potatoes, rocket and turkey breast all contain a similar amount of potassium per 100 grams. A medium-sized potato and a small banana weigh about 100 grams. A portion of rocket, on the other hand, weighs only about 30 g, whereas a portion of turkey breast weighs between 125 and 150 g. And what about parsley? Although it contains twice as much potassium as the other foods listed here, it is only consumed in very small quantities. Together, portion size and potassium content determine how much potassium a meal provides. There is another point to consider: the body does not absorb all potassium to the same extent.

Not all potassium is the same

It is important to consider where the potassium comes from Only between 50 and 60 per cent of the potassium found in high-fibre plant-based foods is absorbed. In contrast, between 70 and 90 per cent of the potassium from animal-based foods such as meat, cheese or milk enters the bloodstream. Crucially, over 90 per cent of the potassium from additives in ready meals or processed food is absorbed. Anyone who needs to keep an eye on their potassium levels should eat a high-fibre diet and avoid processed foods with added potassium wherever possible.

Identifying additives containing potassium
Look out for: **E202 (potassium sorbate), E249 (potassium nitrite), E252 (potassium nitrate), E340 (potassium phosphate), E450 (diphosphate), E501 (potassium triphosphate), E508 (potassium chloride), E515 (potassium sulphate) and E525 (potassium hydroxide)**.

These substances are often found in meat and sausage products, baked goods, ready-made soups, cheese products, effervescent tablets and sports drinks. Some also contain phosphate – another reason to avoid them if your levels are high. Making informed purchasing decisions protects not only your kidneys but also your overall health.



STADAPHARM tips

- *Choose fresh fruit and vegetables, pulses and wholegrain products. They are high in fibre and low in salt.*
- *Avoid fruit juices and highly processed foods.*
- *If your potassium levels are high, eat only small portions of fresh foods that are particularly high in potassium, such as tomatoes, potatoes, avocados and bananas, and spread these out throughout the day.*
- *Put a note listing the additives in your wallet, or save the list on your mobile phone. This way, you will always have the information handy.*

A healthy gut
protects the kidneys

You can have a significant impact on the development of kidney disease by controlling your diet. To understand this, it is worth taking a look at where it all begins: in the gut. Billions of micro-organisms live in our gut – mainly bacteria. These "microbiota" help us break down food and make nutrients available to the body. At the same time, they live off what we eat.

Every person carries hundreds of different types of bacteria. Some of these are useful because they produce substances that are beneficial to our health. Others, however, produce toxins that are normally excreted via the kidneys. However, if the kidneys are damaged, these substances build up in the body. They are thought to accelerate calcification of the arteries and increase the risk of cardiovascular disease.

Our diet directly influences which types of bacteria thrive in our gut. Bacteria react very quickly: if they have enough food, they can double in number within 20 to 60 minutes. Therefore, our diet has a direct impact on the composition of our gut microbiota. Dietary fibre – plant-based carbohydrates that the human body cannot digest itself – plays a key role in this. For many beneficial gut bacteria, fibre is the most important source of food. A diet rich in fibre and plant-based foods promotes the growth of the very bacteria that can break down this fibre. This produces short-chain fatty acids, which keep the gut healthy and make sure that the gut microbiota remains in balance.



Why too much animal protein is harmful to the gut

A diet high in animal protein promotes the growth of other bacteria in the gut, known as proteolytic bacteria. These are specialised in breaking down protein. If they are given too much "food", they multiply rapidly and can crowd out other, beneficial bacteria. The problem is that these proteolytic bacteria produce uraemic toxins. If not excreted in sufficient quantities, they can damage the intestinal barrier, promote inflammation in the body, and have a long-term negative impact on health.

Important: build up slowly!

If you haven't been eating much fibre up to now, you should start gradually. This is because the microbiome needs a little time to adapt. Switching too quickly can lead to increased gas and bloating. This is harmless, but can be unpleasant.

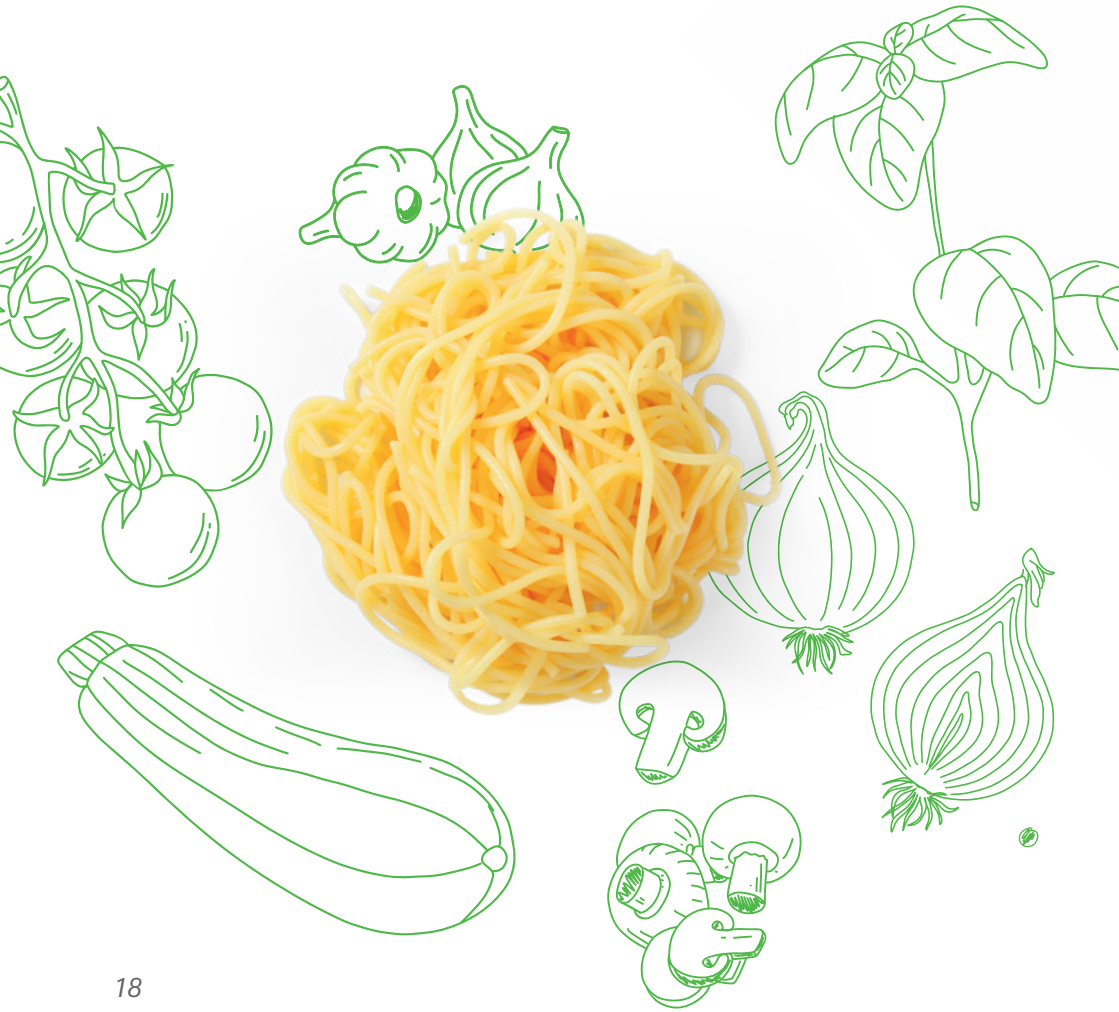
Boosting gut health with fibre

Not all fibre is broken down by gut bacteria. Some of it leaves the body unchanged, which has a positive effect. These types of indigestible fibre increase stool volume and help food move through the gut more quickly. This is beneficial because the less time food spends in the gut, the less time the body has to absorb potassium and phosphate. With constipation, the opposite is true: Food remains in the gut for longer, and more potassium and phosphate are absorbed. This can be a problem for people with kidney disease.

Enjoy your meal:

Recipes for dialysis patients

A balanced diet is important for dialysis patients. Meals should provide enough nutrients and minerals without placing too much strain on the kidneys. A colourful, varied diet helps you enjoy your day to the full. Here are a few recipes to try:



Overnight oats
(porridge reloaded…)

Easy to prepare, and a real powerhouse to start your day.
Play around with the ingredients; there are no limits to your creativity.

INGREDIENTS
for one serving

50 g rolled oats (fine or jumbo)
150 ml milk or a plant-based alternative (e.g. oat or almond drink)
50 g blueberries
50 g yoghurt
1 tbsp nuts
Optional
1 tsp chia seeds or flaxseed
1 tsp honey, maple syrup or agave syrup
1 pinch of cinnamon or vanilla

PREPARATION

Put the oats, milk and seeds (if using) into a glass or bowl. Sweeten and season to taste (for example, with cinnamon or vanilla). Mix everything together well, cover and leave to stand in the fridge overnight (at least 6 hours). The next morning, stir and top with fresh fruit, nuts or yoghurt.

Nutritional values per serving

Calories	425 kcal
Protein	16 g
Fibre	10 g
Salt	trace amounts
Potassium	630 mg
Phosphate	410 mg

A colourful explosion of flavour:
Pasta salad with grilled vegetables

Pasta is always a good choice. Here is a vitamin-packed version made with seasonal vegetables. Perfect as a side dish or a light main course.

INGREDIENTS
for six servings

250 g pasta,
e.g. spaghetti
2 medium courgettes
1 small fennel bulb
8 button mushrooms
1 red onion
8 cherry tomatoes
1 bunch of basil

Dressing:
2 cloves of garlic
1 tsp Dijon mustard
1/4 cup lime juice
1/2 tsp black
pepper, coarsely
ground

PREPARATION

Crush the garlic and mix it with the other dressing ingredients in a large bowluntil combined. Wash the vegetables. Cut the courgettes and fennel into bite-sized pieces. Cut the mushrooms into quarters. Slice the onion into half-moons. Cut the cherry tomatoes in half. Add the vegetables to the bowl with the dressing and mix well. Leave to stand for five minutes. Cook the pasta according to the packet instructions. Heat a frying pan (on the hob) or a grilling basket (on the barbecue). Drain the vegetables briefly over the bowl and brown them in a frying pan or grilling basket. Mix the grilled vegetables, the warm pasta and the chopped basil thoroughly with the remaining dressing. Leave to stand for five minutes, then serve garnished with fresh basil leaves and halved cherry tomatoes.

Nutritional values per serving
Calories: 215 kcal; Protein: 8 g; Fibre: 4 g;
Salt: 0.1 g; Potassium: 490 mg;
Phosphate: 160 mg

Aromatic
oven-baked chicken breast

Chicken is easy to prepare and a good source of protein. Why not try it fresh from the oven? A simple marinade adds just the right touch. This goes well with a fresh salad.



INGREDIENTS
for four servings

4 chicken breast fillets
2 tbsp Dijon mustard
3 tsp honey
1 tsp lime juice
1 tsp curry powder

PREPARATION

Rinse the chicken breast fillets and pat them dry. Mix the remaining ingredients together in a bowl and pour into a freezer bag. Add the chicken breast fillets and ensure that the meat is completely covered in the marinade. Seal the freezer bag tightly and leave in the fridge for half an hour to marinate.
Preheat the oven to 180 degrees Celsius. Remove the chicken breast fillets from the marinade and place them in a baking dish. Bake in the oven for about 30 minutes until golden brown.

Nutritional values per serving
Calories: 175 kcal; Protein: 36 g; Fibre: 0 g
Salt: 0.5 g; Potassium: 430 mg;
Phosphate: 330 mg

Mexico's fastest ***salsa***

A sauce can enhance the flavour of simple dishes. Try this version as a vegetable dip, with barbecued meat, or simply with toasted bread.



INGREDIENTS
for eight servings

4 ripe plum tomatoes
2 spring onions
1–3 cloves of garlic – to taste
1/2 green pepper
1 fresh chilli – to taste
1/2 bunch of coriander
1/4 cup fresh oregano
1/2 tsp cumin

PREPARATION

Wash and chop the vegetables; chop the herbs. Blend all the ingredients in a food processor or using a hand blender, pulsing until the vegetables remain slightly chunky. Serve cold.

Nutritional values per serving

Calories	16 kcal
Protein	1 g
Fibre	1 g
Salt	trace amounts
Potassium	145 mg
Phosphate	16 mg

The perfect combination:

Berry and tofu smoothie

Berries provide valuable vitamins and energy, while tofu is a good source of plant-based protein. Together they make a quick breakfast or snack – and with frozen berries, they can even be turned into a quick ice cream dessert.



INGREDIENTS for one serving

125 g seasonal berries (fresh or frozen)
100 g silken tofu
50 ml water or (almond) milk
Optional: 1/2 tsp vanilla extract, 1 tbsp rolled oats or 1 tsp ground flaxseed

PREPARATION

Blend the ingredients in a food processor or using a hand blender on a high setting until smooth and creamy. If the shake is too thick, add a little more liquid. Serve chilled and enjoy!

Nutritional values per serving

Calories	125 kcal
Protein	7.5 g
Fibre	8 g
Salt	0.1 g
Potassium	370 mg
Phosphate	140 mg

A service provided by STADAPHARM

Disclaimer

This information is of a general nature and should not be regarded as specific advice for any individual patient. For personalised advice, please speak to your nutritionist.

You can find further information and advice on living with kidney disease at ***www.dialyse-und-ich.de***

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