



Training program for people  
with diabetes and an increased  
risk of diabetic kidney disease



# Page Overview

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# Welcome to the course: This is what awaits you!

Everything worth knowing about the kidney

Treatment options for  
diabetic kidney disease

Learn more about your  
personal risk

Special features of nutrition  
in diabetic kidney disease



Motivation for treatment

Opportunities for  
self-management

Dealing with  
kidney disease

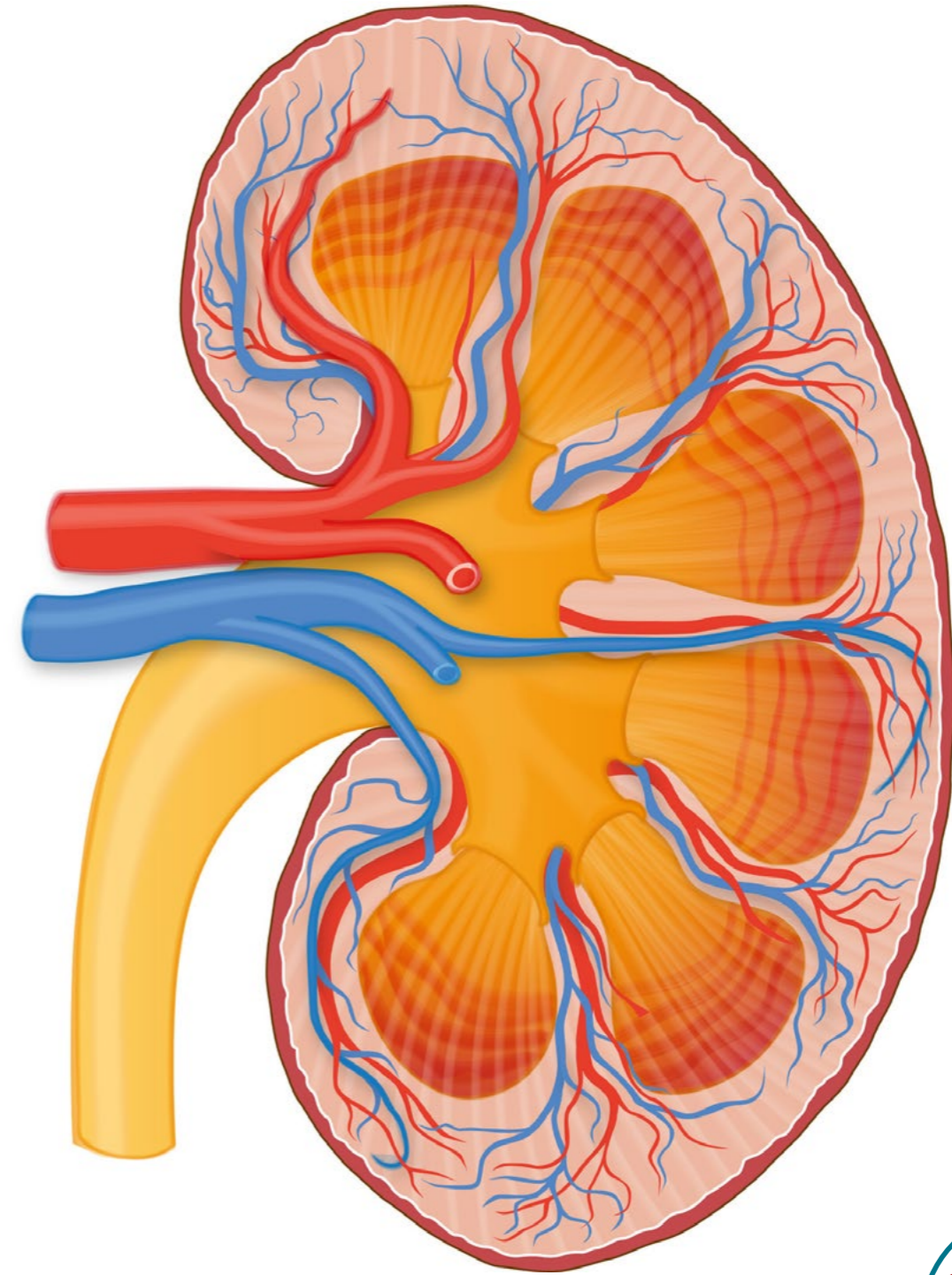
# About you and your diabetes

- Who are you?
- Since when have you had diabetes?
- Since when have you had problems with your kidneys?
- What medications are you taking?
- How satisfied are you with your diabetes treatment?

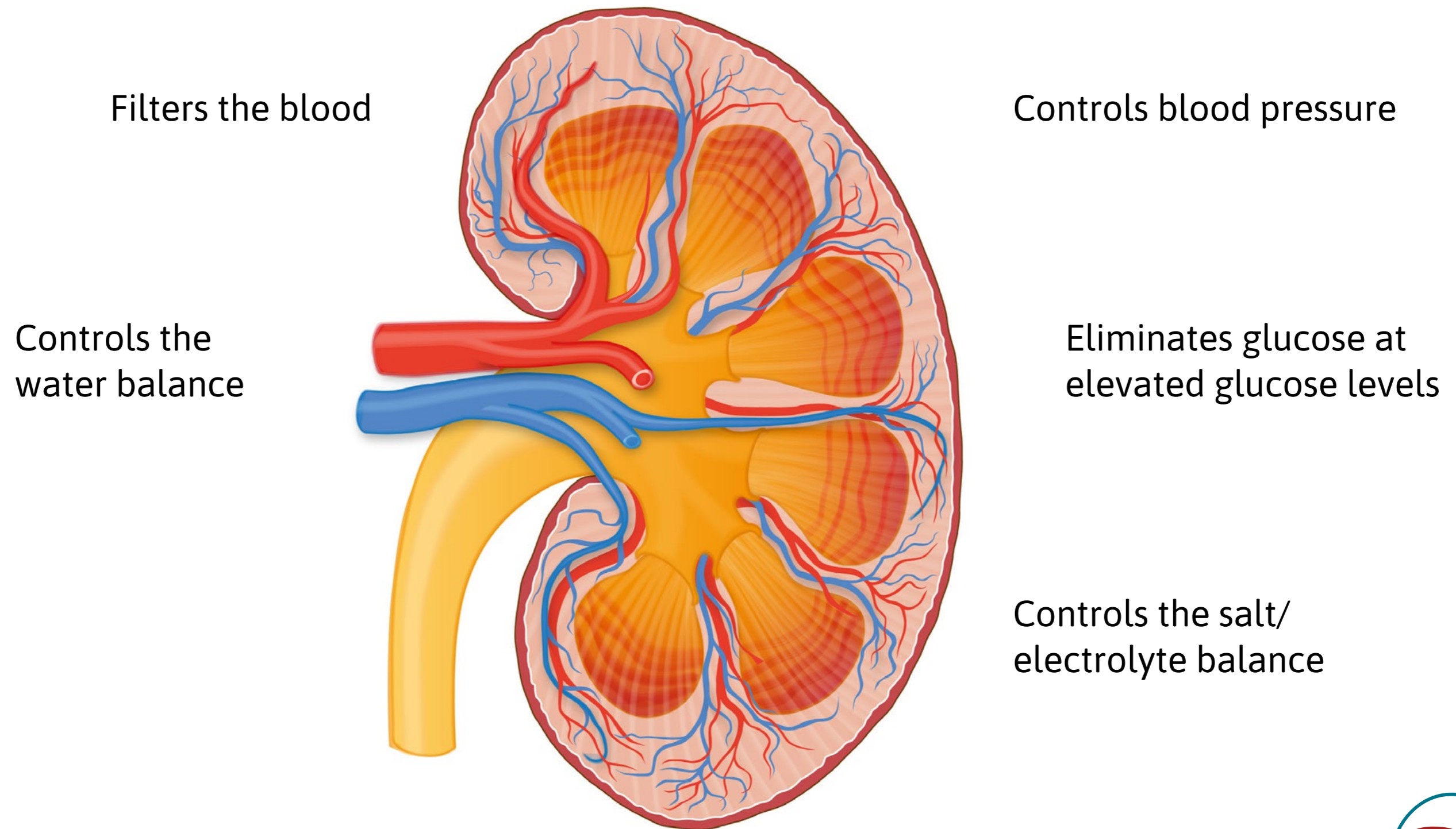


# Kidney profile

- A kidney is about the size of your fist
  - approx. 150 grams, approx. 12 cm long and approx. 4 cm thick
- Every person has about 6–7 liters of blood in their body
- Three hundred times a day, the two kidneys filter the blood
- Approximately 1,800 liters of blood flow through the kidney every day



## These are the most important functions of the kidney



# How the healthy kidney filters the blood

- The kidney consists of many small blood vessels (glomeruli) that are able to separate blood and urine
- Glomeruli filter the blood and excrete waste products via the urine
- Larger components dissolved in the blood, such as proteins, are retained and returned to the body
- Smaller components dissolved in the blood, such as electrolytes/salts, are filtered out of the blood and then excreted



# How the healthy kidney controls the salt/electrolyte balance

- Electrolytes (e.g., potassium, sodium) take on important tasks in the body
  - e.g., control of the water balance, acidity of the blood
- In case of disturbances of the electrolyte balance, there may be health impairments
  - e.g., cardiac arrhythmias, blood pressure fluctuations, hyperacidity of the blood

**T**he kidney ensures that the right amount of electrolytes is always present in the blood!



# How the healthy kidney controls the water balance

- The kidney deprives the body of water or can hold it back
- The kidney controls urination, so that there is always the right amount of water in the body – not too much and not too little
- As a result, the concentration of the excreted products in the urine is influenced by the kidney



# How the healthy kidney controls blood pressure

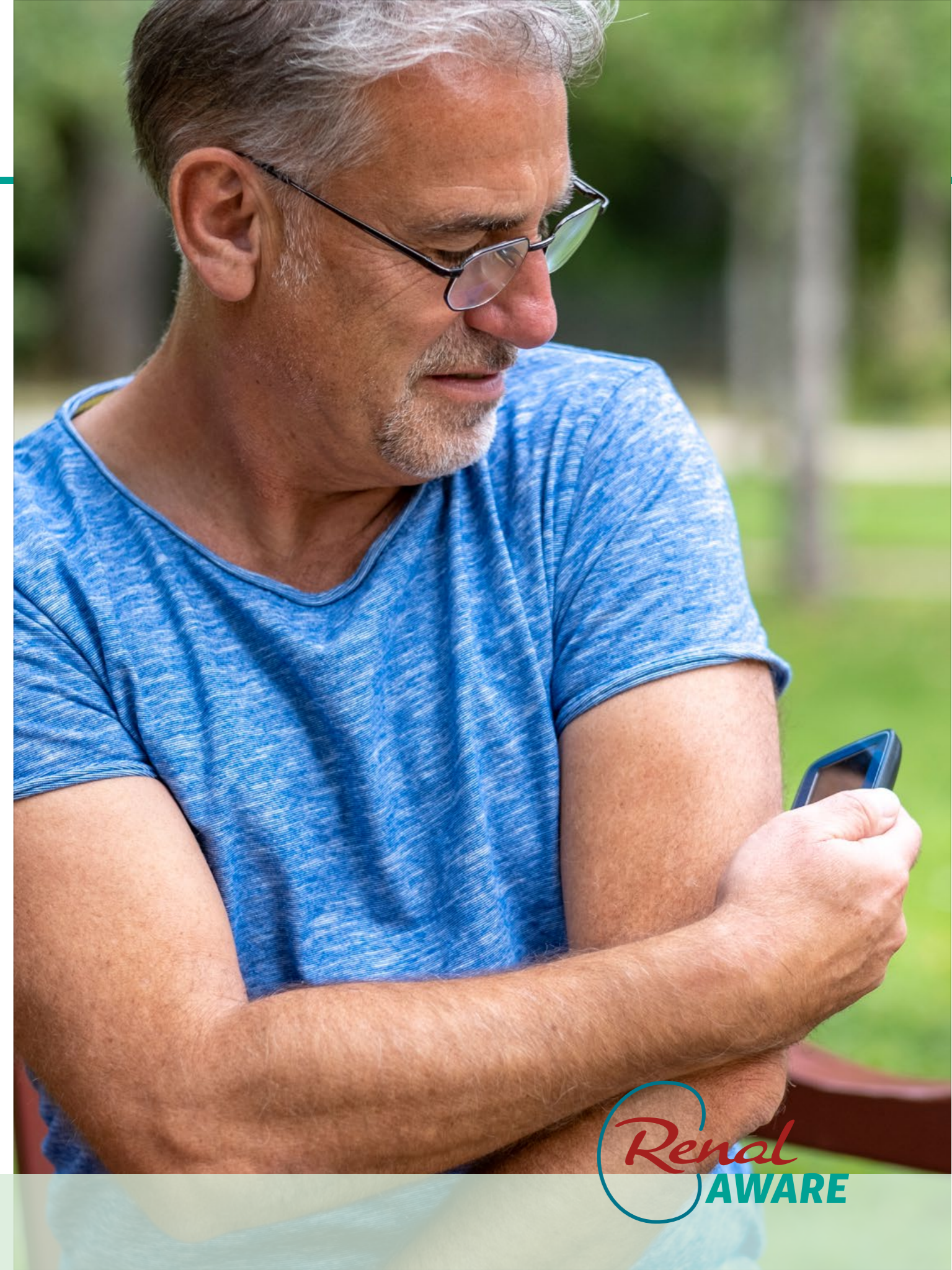
- The kidney controls how large the total amount of blood is
- If less salt is excreted via the kidney, the amount of blood, among other things, increases
- The greater the amount of blood, the higher the blood pressure

**K**idney diseases often affect blood pressure –  
high blood pressure can also damage the kidney!



# How the healthy kidney controls glucose

- The kidney is also involved in the control of glucose levels
- If the glucose rises above a certain value (approx. 180 mg/dl), more glucose is excreted in the urine
- Increased glucose levels usually lead to an increased urge to urinate



# How do you assess your personal risk?



I think my risk is very high because I have a stressful job and I have hardly paid attention to my blood pressure and nutrition.

I am already showing signs of early kidney damage – I am afraid it will get worse.

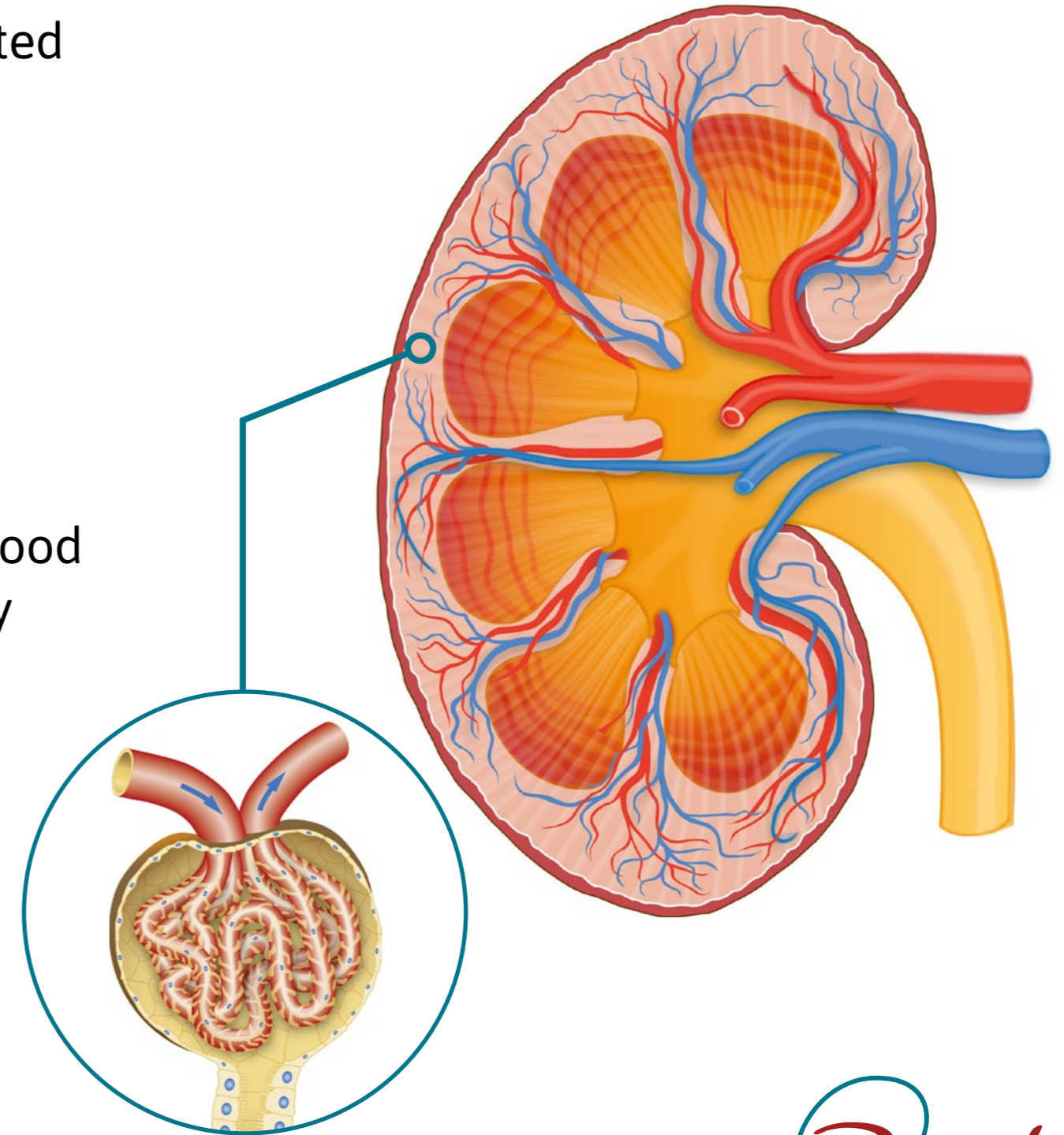


I consider my risk to be low, as my blood pressure and diabetes are being treated effectively.

# Renal disease

- Proteins (e.g., albumin) that the body actually needs are excreted
- First, small amounts of protein are excreted in the urine = microalbuminuria
- As kidney disease progresses, larger amounts of protein are excreted in the urine = macroalbuminuria
- At the same time, toxins can no longer be filtered out of the blood as effectively = decrease in the filtration function of the kidney
- Renal failure occurs in the final stage of the disease

**E**ven with small amounts of protein in the urine (microalbuminuria), there is already an increased risk of heart disease and stroke!

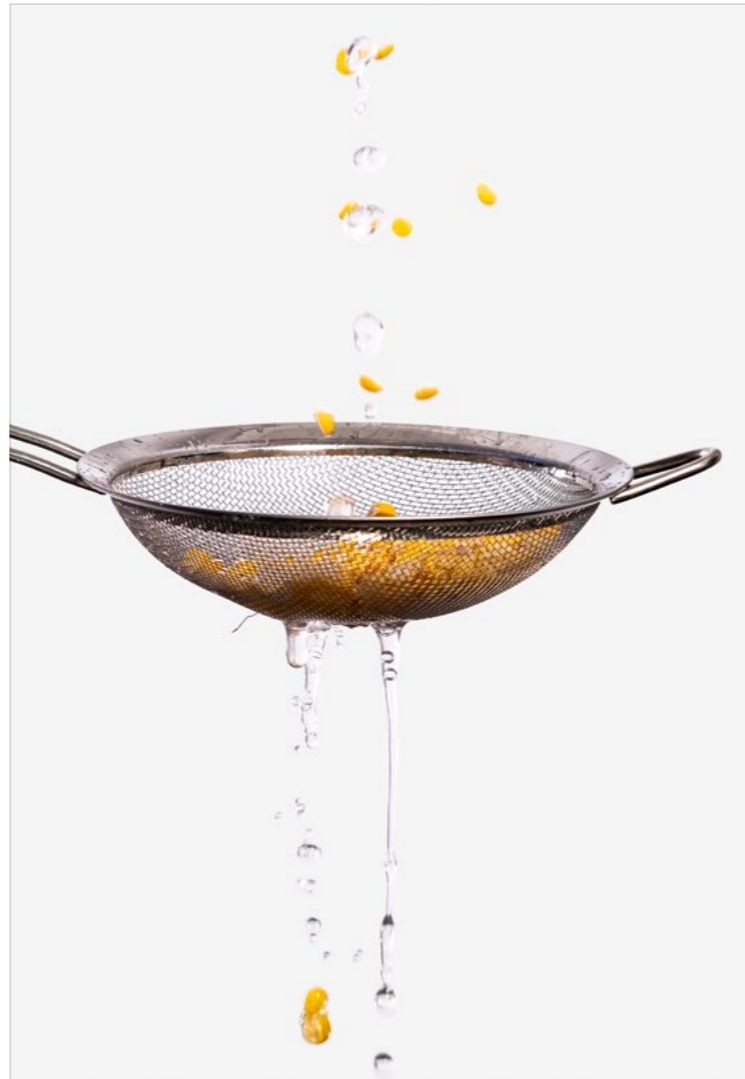


# Renal disease

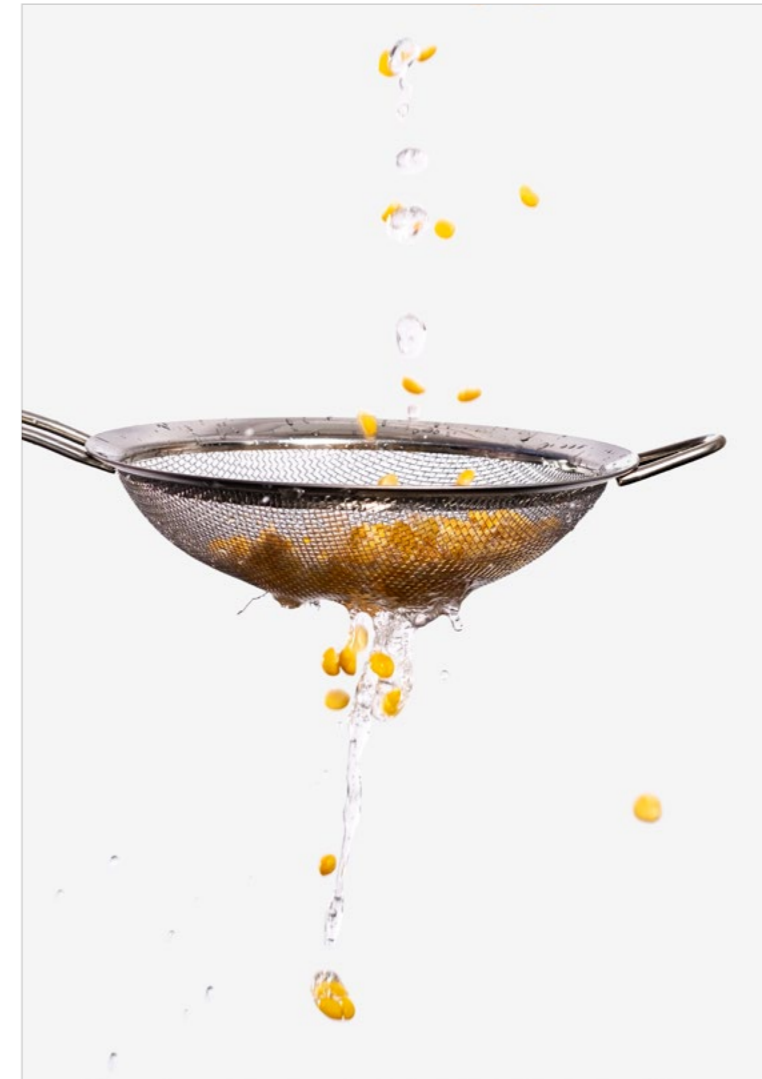
No protein excretion



Low protein excretion  
(microalbuminuria)



High protein excretion  
(macroalbuminuria)



# Recognize kidney problems

- Signs of kidney problems can take a long time to notice
- Therefore: Have the kidney function checked at least once a year (more often in case of abnormal findings)
  - Protein and creatinine content in urine
  - Blood creatinine, filtration function (eGFR)
- If untreated, the renal function deteriorates further: Kidney failure is imminent
- Kidney disease often indicates that other organs in the body (e.g., heart, eye) are also affected

**T**he sooner kidney problems are detected, the sooner progression can be prevented or stopped with proper treatment!



# How good is your kidney function?

The most important measure of kidney function is its ability to filter blood

○ Glomerular filtration rate (eGFR): Indicates how many milliliters of blood the kidney can filter in a minute

eGFR	Risk of an unfavorable course
> 90: normal renal function	Low
60 – 89: slight functional impairment	Low
45 – 59: slight to medium functional impairment	Moderate
30 – 44: medium to severe functional impairment	High
15 – 29: severe functional impairment	Very high
< 15: renal failure	Very high

# What is the extent of your kidney disease?

## The most important measure of kidney disease is the excretion of protein in the urine

- Normally, important building blocks of the body (e.g., proteins) are not excreted by the kidney
- The amount of proteins excreted can be used as an indication of kidney damage
- Albumin-Creatinine Ratio (UACR): Indicates how many milligrams of protein (albumin) are contained in the urine per gram of creatinine

UACR	Extent of kidney damage
< 30 mg/g: no kidney damage	Low
30 – 300 mg/g: microalbuminuria	Moderate
> 300 mg/g: macroalbuminuria	Severe

# Kidney disease: Possible causes

Persistently  
high blood pressure



Permanently  
high glucose levels



Inflammatory  
processes



Other causes



# Kidney disease: High blood pressure

## High blood pressure

- Constantly high blood pressure damages the fine blood vessels in the kidney (glomeruli)
- Renal circulation is impaired
- Renal function decreases
- Decreasing filter performance has an unfavorable effect on blood pressure → vicious circle

**G**ood blood pressure control is very important to prevent the progression of kidney disease!



# Kidney disease: High glucose levels and inflammatory processes

## Permanently high glucose levels

- Long-term elevated glucose levels lead to circulatory disorders in the fine blood vessels (glomeruli) of the kidney
- As a result, the blood can no longer be filtered as effectively
- Kidney filtration function decreases

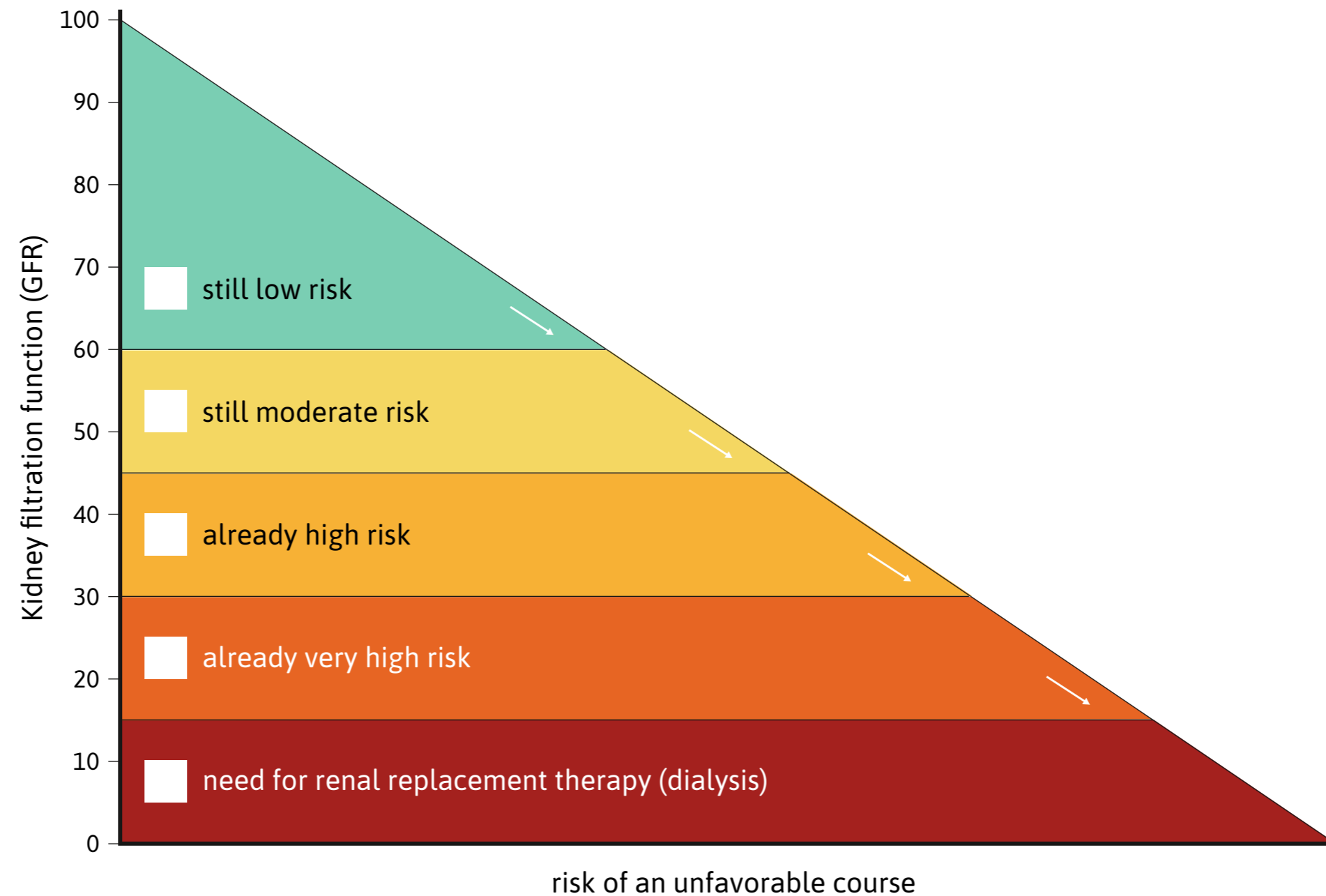
## Inflammatory processes

- Inflammation and excessive proliferation of connective tissue (fibrosis) develops in the damaged kidney tissue
- Kidney tissue continues to be damaged and kidney function decreases
- Urinary protein excretion may be a sign of these processes in the kidney and heart



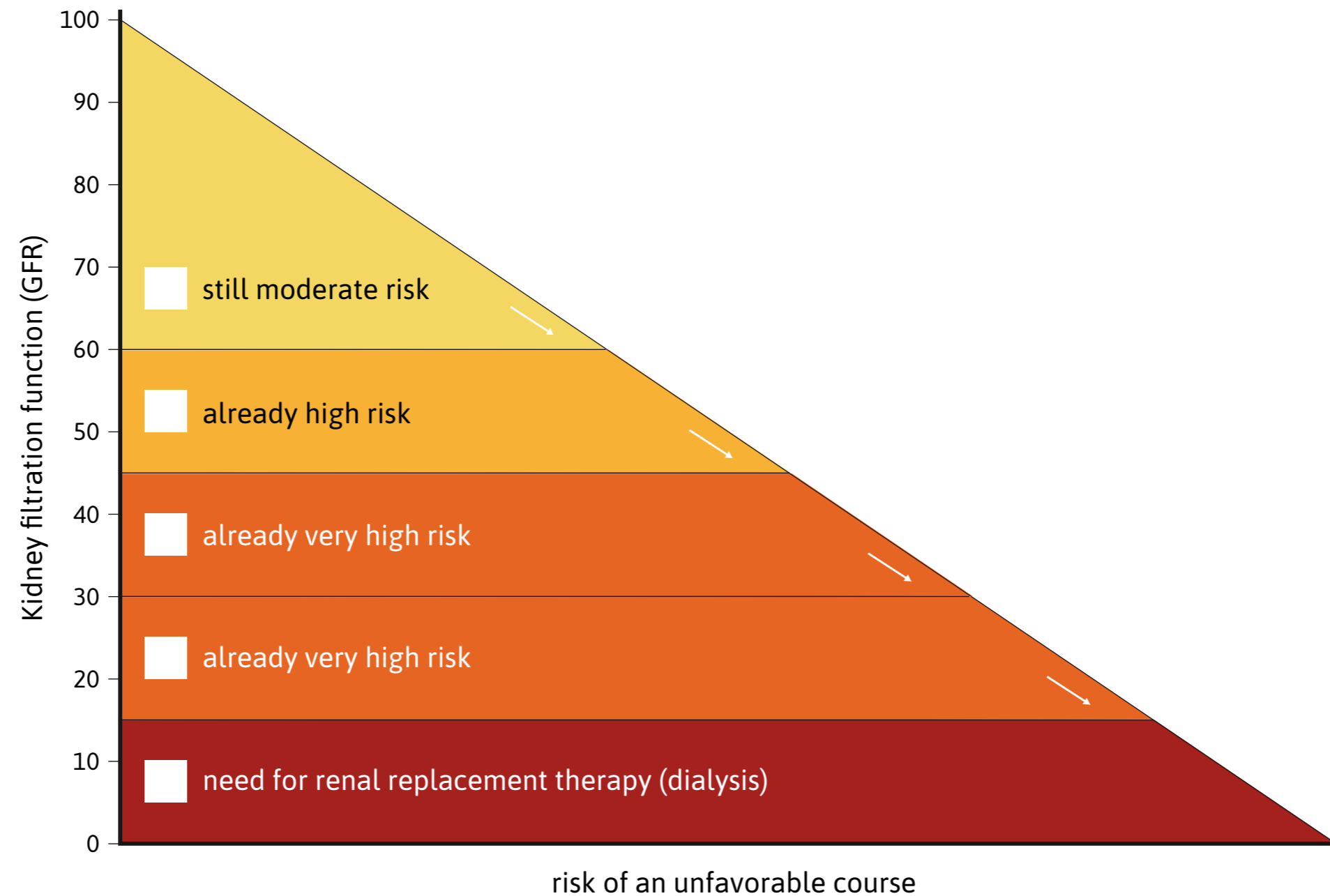
# Kidney problems – Where do you stand?

## No protein excretion in the urine – no albuminuria



# Kidney problems – Where do you stand?

## Already excreted protein in urine – albuminuria



# Maintain kidney function

## Attention

- Untreated kidney disease may result in rapid loss of renal function

## But

- It's possible to positively influence the course of kidney disease – the earlier, the better

## Get active

- At any stage of kidney disease, you still have a chance to favorably influence its course
- Regularly check how the kidney is performing
- Additionally involving a kidney specialist in your treatment may be useful

**T**here's a lot you can do yourself to protect your kidneys!



# How to protect your kidneys

- Kidney-friendly lifestyle
  - Avoid smoking
  - Healthy nutrition
  - Get enough exercise
  - Drink enough
- Aim for blood pressure values that are close to the standard range (< 140/< 90 mmHg)
- Glucose values close to the standard range
- Medicines that help protect the kidneys



# Quit smoking to protect the kidneys

- Smoking with diabetes causes additional kidney damage – even passive smoking!
- Abstaining from smoking may delay kidney function from worsening
- If you smoke:
  - What could motivate you to quit?
- There are extensive aids and methods for smoking cessation
  - Self-help books or brochures
  - Smoking cessation courses
  - Nicotine substitutes
  - Support with medications



# Also pay attention to protein and salt consumption

## Protein

- If you eat a lot of protein, the kidney has to work more
- Protein-adapted diet reduces the risk of kidney function deterioration
- For existing kidney problems: 0.8 g of protein per kg of body weight per day
  - e.g., 64 g of protein per day at 80 kg body weight

## Salt

- The more salt in the body, the higher the amount of fluid
- The more fluid, the higher the blood pressure
- A low-salt diet can reduce blood pressure



# Good blood pressure to protect the kidney

## This is how blood pressure develops

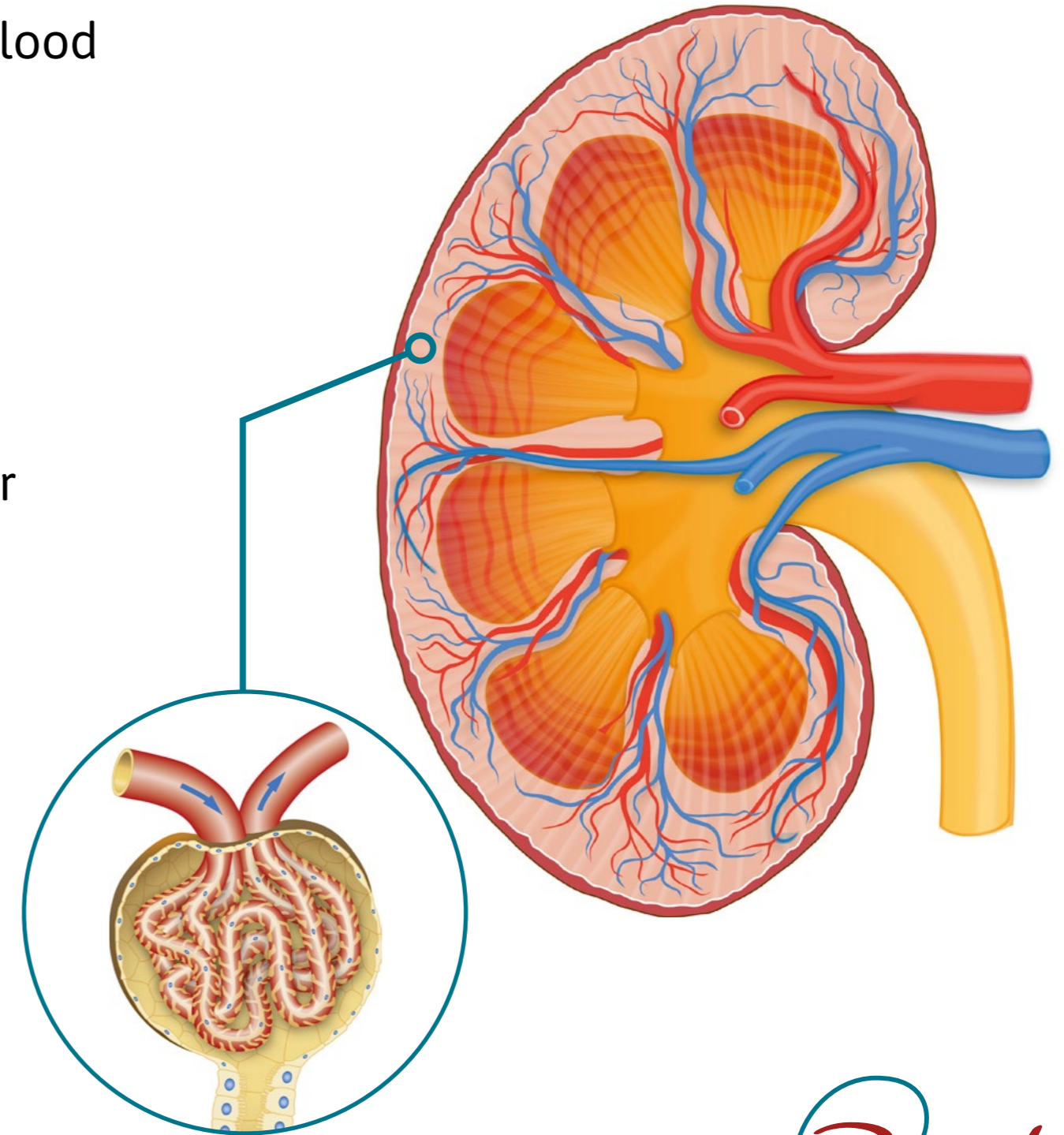
- Heart creates pressure so that the blood flows and reaches all parts of the body
- Systolic blood pressure = upper value
  - Heart tightens, pumps blood into the blood vessels, blood pressure rises
- Diastolic blood pressure = lower value
  - Heart relaxes, heart refills, blood pressure drops

**Ideally, the blood pressure should be below 140/90 mmHg, or even better, below 130/80 mmHg!**



# High blood pressure: Possible consequences

- Constant high blood pressure can reduce the elasticity of all blood vessels
- Blood vessels become rigid and porous
- Especially the small blood vessels in the kidney are damaged
- Particular susceptibility to inflammatory processes that further damage the blood vessels
- At high risk for:
  - Kidney disease, kidney failure
  - Eye disorders
  - Cardiac disorders, e.g., heart failure, heart attack
  - Stroke



# Measuring blood pressure yourself: This is what you should pay attention to

- Regularly measure your blood pressure yourself and document the values
- Tips for getting the blood pressure measurement right:
  - If possible: always under the same conditions
  - Best measured when sitting
  - Sit down and relax for 5 minutes before measuring
  - Always measure in the same place on the same arm
  - Cuff should be at heart level
  - Sit still during the measurement and do not talk
  - Use only calibrated blood pressure monitors

**24**-hour blood pressure measurement  
delivers the most reliable results!



# High blood pressure: Causes

- Organ damage, e.g., kidney disease
- Being overweight
- Smoking
- Hereditary factors
- Excessive salt consumption
- Excessive alcohol consumption
- Stress



# High blood pressure: Treatment options

- Medications (regular intake important)
- Weight loss
- Reduce salt consumption
- Get regular exercise
- Quit smoking
- Reduce alcohol consumption
- Active relaxation
- Reduce stress



# Medications for high blood pressure: This is how they work

## **ACE inhibitors & AT-1 receptor antagonists (sartans)**

- Inhibit a hormone that narrows blood vessels
- Small blood vessels dilate and blood pressure drops

## **Diuretics**

- Promotes salt and water excretion via the kidneys
- Blood volume decreases, blood pressure drops

## **Calcium antagonists**

- Acting on the muscle cells of the heart and vessels
- Vascular tension is reduced, blood pressure drops

## **Beta blockers**

- Inhibit adrenaline and lower heart rate
- Reduced heart rate has positive effects on blood pressure

**O**ften, several medications are needed in order to effectively lower blood pressure!



# Medications for high blood pressure: Here's what you should know...

## **Blood pressure medications are usually well tolerated**

- The body first has to get used to the lowering of the blood pressure
- Side effects are possible, especially in the acclimatization phase, such as:
  - Fatigue
  - Dizziness
  - Drop in performance
  - Circulatory problems
  - Erectile dysfunction

## **Blood pressure medications usually need to be taken permanently**

- Do not discontinue blood pressure medications for a short period of time, otherwise a rapid increase in blood pressure may occur



# Elevated blood pressure: Also pay attention to lipids in the blood

## Increased lipids (cholesterol) in the blood put additional strain on the blood vessels

- Cholesterol may settle on the walls of blood vessels
- This can trigger inflammatory processes and promote circulatory disorders

## Therapy

- LDL cholesterol in particular should be lowered
  - Target value: LDL cholesterol < 100 mg/dl
- Regular monitoring of blood lipid levels every 3–6 months
- Medications (statins) as first-line therapy
- Ensure a healthy diet



# Optimal glucose levels to protect the kidney

## Optimal glucose control

- Can reverse first slight changes in the kidney
- Protects the kidney from further damage
- Protects blood vessels

## Target values

- HbA1c: 6.5–7.5 %
- With existing kidney damage: HbA1c < 7.0%
- With existing damage to the large blood vessels: 7.0–7.5%
- Select target values depending on the personal risk of hypoglycemia

**D**iscuss personal glucose targets  
with the diabetes team!



# Your glucose control: Room for improvement?

## What is your current glucose level and how satisfied are you with it?

- How high is your HbA1c?
- How many hypoglycemic events have you had in the last 14 days?
- Do you use a method for continuous glucose monitoring (CGM)?
  - How many glucose levels are between 70–180 mg/dl (time in range, TiR)?
  - How many glucose levels are above 180 mg/dl (time above range)?
  - How many glucose levels are below 70 mg/dl (time below range)?

## Where do you see potential for improvement?

- |                           |                         |
|---------------------------|-------------------------|
| ○ Fasting glucose levels? | ○ Hypoglycemia?         |
| ○ Before dinner?          | ○ Glucose fluctuations? |
| ○ After dinner?           |                         |



# Kidney protection at a glance: Diabetes Health Passport

## Information

- Date and outcome of the kidney protection check-ups

## Dokumentation

- Overview of kidney function (GFR) and kidney damage (micro-/macroalbuminuria)
- Overview of other risk factors (e.g., blood pressure, lipid levels in the blood)

## Treatment Objectives

- Setting goals for the next year/quarter

## Communication

- Treatment outcomes can be shared with other people (e.g., kidney specialist)

The image shows two versions of the 'Gesundheits-Pass Diabetes' (Diabetes Health Passport) booklet. The left version is in German, and the right version is in Turkish ('Diyabet Kimlik Kartı'). Both booklets are published by the Deutsche Diabetes Gesellschaft (DDG) and the diabetesDE DEUTSCHE DIABETES HILFE. The booklets contain a table for recording kidney function and other health data over time.

Jahr	Datum (Tag/Monat)	I. Quartal	II. Quartal	III. Quartal	IV. Quartal
Vereinbarte Ziele für dieses Jahr					
Jahresziele	In jedem Quartal				
kg	Körpergewicht/Taillenumfang	/	/	/	/
/ mmHg	Blutdruck (5 Min. Ruhe)	/	/	/	/
von bis	Glukosewert nüchtern/postpr. (s. auch Selbstkontrollwerte)	/	/	/	/
	HbA <sub>1c</sub>				
	Schwere Hypoglykämien				
pro Woche	Häufigkeit Selbstkontrolle				
	Spritzstellenkontrolle				
	Rauchen (ja/nein)				
Einmal im Jahr					
<	Gesamt-Cholesterin				
> / <	HDL-/LDL-Cholesterin	/	/	/	/
<	Triglyzeride nüchtern				
	Mikro-/Makroalbuminurie				
	Kreatinin/glomeruläre Filtrationsrate (GFR)	/	/	/	/
	Körperliche Untersuchung (einschl. Gefäße)				
	Fußinspektion				
	Periph./Auton. Neuropathie				
	Techn. Untersuchungen (z.B. Lebersonographie (a), EKG (b), Langzeit-RR (c))				
	Gripeschutzimpfung				
	Wohlbefinden (Seite 29)				
Alle 2 Jahre					
	Augenbefund				

# Medications to protect the kidneys

## Blood pressure medication

- ACE inhibitors, sartans and renin inhibitors effectively lower blood pressure
- In addition, they inhibit the progression of kidney disease

## Diabetes medication

- SGLT-2 inhibitors and GLP-1 RA effectively lower glucose levels
- SGLT-2 inhibitors additionally protect the kidney and heart, lower blood pressure
- GLP-1 RA protects the heart and can have positive effects on the kidney



# Medications to protect the kidneys

## Anti-inflammatory and anti-fibrosis medication

- Non-steroidal medications (mineralocorticoid receptor antagonists, nsMRA)
- Regulate the water and electrolyte balance in the kidney
- Have an anti-inflammatory and anti-fibrotic effect
- Lower blood pressure
- Protect the heart
- Protect the kidney

**If you protect your kidneys, you also protect your heart and circulatory system!**



# What you should know about anti-inflammatory and anti-fibrosis medications

- nsMRA medications may increase blood potassium levels
- Increased potassium may cause cardiac arrhythmias

**Before starting therapy, discuss with your treating physician whether:**

- Blood potassium levels are increased
- Different medications that could increase potassium levels are being taken at the same time

**In addition, before starting therapy, discuss whether:**

- There are any liver problems
- You are planning to have a baby, are currently pregnant, or are breastfeeding



# What you should know about anti-inflammatory and anti-fibrosis medications

## During therapy with nsMRA medications, note:

- Regularly determine potassium levels
- If potassium levels are elevated, do not eat foods rich in potassium in large quantities:
  - Dried fruit, fruit
  - Vegetables (mainly cabbage vegetables, legumes, potatoes)
  - Nuts
  - Whole grains (e.g., spelt, rye, buckwheat)
  - (Dark) chocolate
- Cut vegetables into small pieces and cook in plenty of water
  - Drain water afterwards as potassium dissolves in water
  - Rinse off cooked vegetables
- For canned fruit, drain the juice and wash the fruit



# What you should know about anti-inflammatory and anti-fibrosis medications

- Regular use is important
  - Do not take a double dose to make up for a missed dose
- Discontinue medication only after consulting with your doctor
- Do not consume grapefruit and grapefruit juice
- Discuss possible interactions with other medications, vitamins, or dietary supplements with your doctor



# My personal check-up

	Good	Could be improved	Actions to improve?	Implementation in everyday life?
Blood pressure:				
HbA1c:				
Protein excretion in the urine:				
Regular check-ups:				
No smoking:				
Healthy nutrition:				
Plenty of exercise:				
Taking medication (if prescribed):				
Protein-reduced diet (if necessary):				
Quality of life:				

# Treat kidney problems – What are your takeaways from the course?



I am highly motivated by the knowledge that I can do a lot to protect my kidneys.

Changing my diet presents a real challenge for me.



So far, I have mainly kept an eye on my glucose levels – I now want to pay much more attention to my blood pressure.

**Take care!**



# Imprint

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Diabetes-Akademie Bad Mergentheim

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