Getting to know your kidney bloodwork

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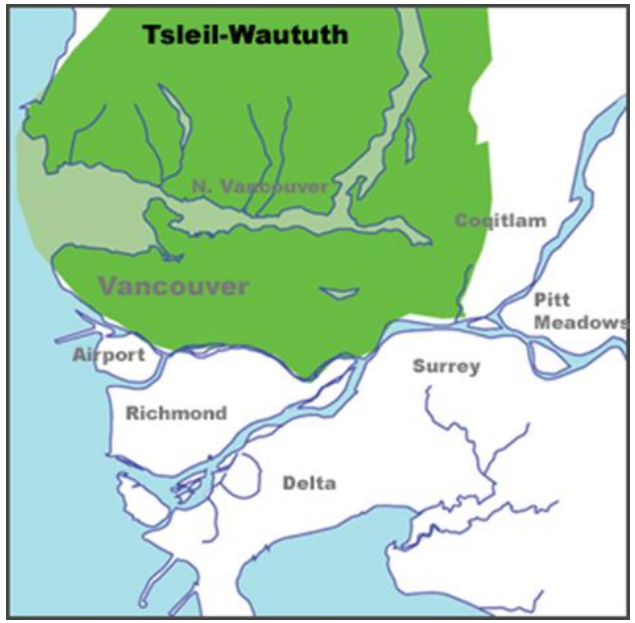
We recognize that our place of work lies on the traditional territories of the Musqueam, Squamish and Tsleil-Waututh peoples.

Source: www.johomaps.net/na/canada/bc/vancouver/firstnations/firstnations.html



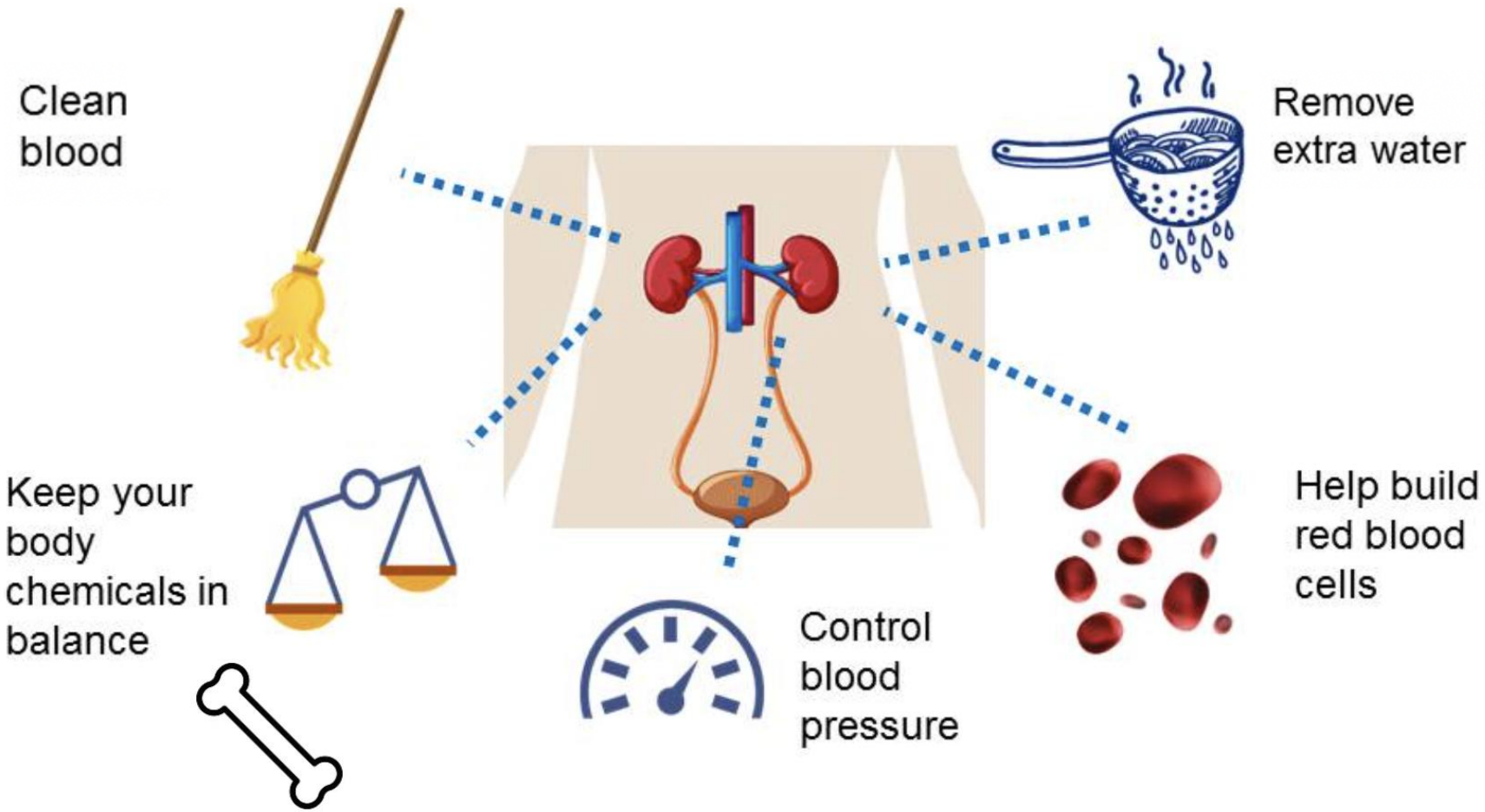
Outline for today's talk

- Kidneys and kidney disease: the basics
- How well are your kidneys working?
- What is anemia?
- What important minerals do the kidneys handle?
- Why is the acid level in the blood important?
- What does the albumin level mean?

Kidneys and kidney disease

The basics

What do the Kidneys do?



What is Chronic Kidney Disease (CKD)?

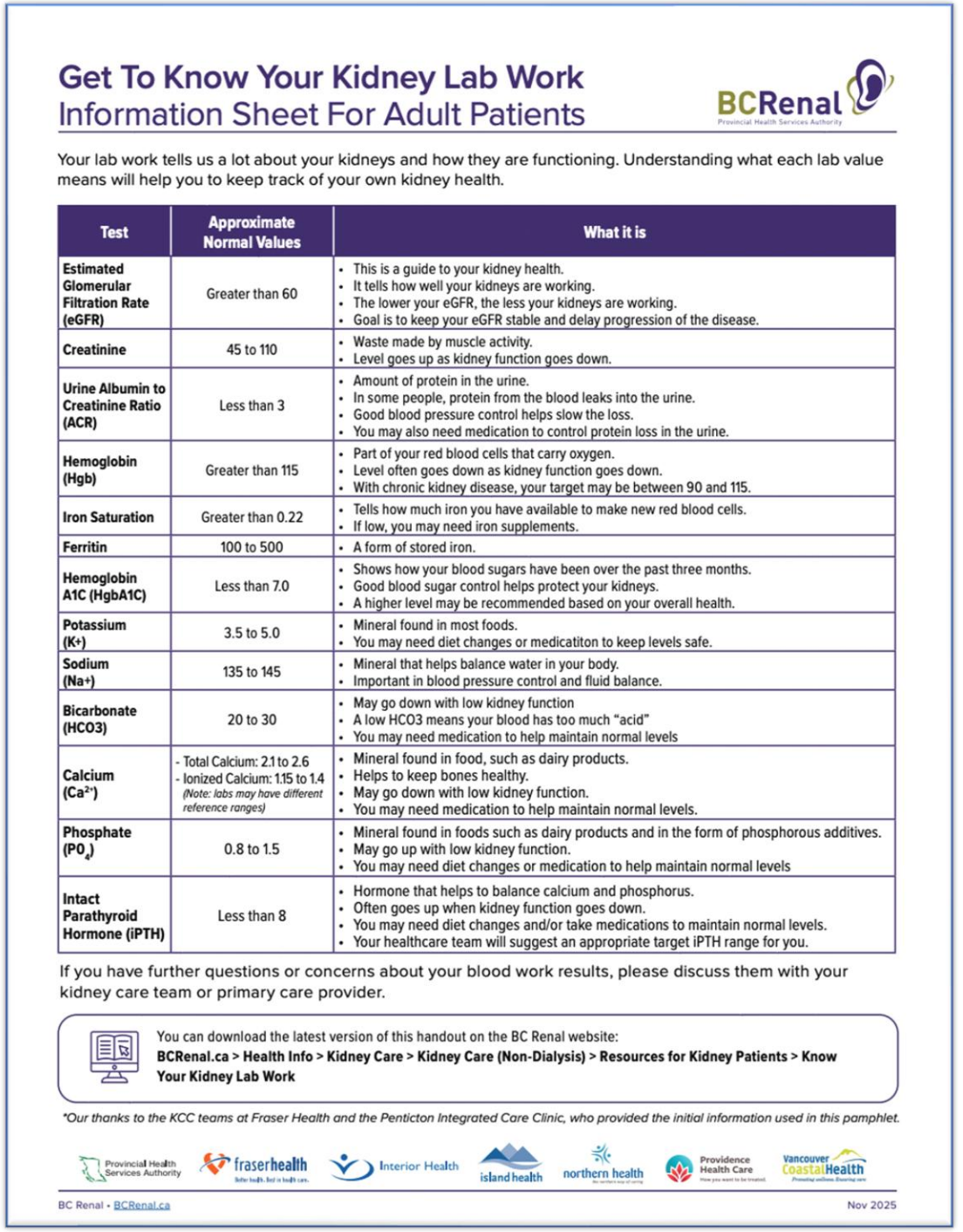
- Damage to the kidneys that occurs over a period of months to years

- CKD is permanent, but often the damage can be slowed down through changes in your lifestyle and with medications

- When your kidneys are not working well, this can cause:
  - A build up of fluid and waste
  - High blood pressure
  - Imbalance of minerals (such as potassium and phosphorus)
  - Anemia (low number of red blood cells)
  - Problems with your bones

“Get To Know Your Kidney Lab Work”

Information sheet can be found on the BC Renal website



Get To Know Your Kidney Lab Work
Information Sheet For Adult Patients

BCRenal
Provincial Health Services Authority

Your lab work tells us a lot about your kidneys and how they are functioning. Understanding what each lab value means will help you to keep track of your own kidney health.

Test	Approximate Normal Values	What it is
Estimated Glomerular Filtration Rate (eGFR)	Greater than 60	• This is a guide to your kidney health. • It tells how well your kidneys are working. • The lower your eGFR, the less your kidneys are working. • Goal is to keep your eGFR stable and delay progression of the disease.
Creatinine	45 to 110	• Waste made by muscle activity. • Level goes up as kidney function goes down.
Urine Albumin to Creatinine Ratio (ACR)	Less than 3	• Amount of protein in the urine. • In some people, protein from the blood leaks into the urine. • Good blood pressure control helps slow the loss. • You may also need medication to control protein loss in the urine.
Hemoglobin (Hgb)	Greater than 115	• Part of your red blood cells that carry oxygen. • Level often goes down as kidney function goes down. • With chronic kidney disease, your target may be between 90 and 115.
Iron Saturation	Greater than 0.22	• Tells how much iron you have available to make new red blood cells. • If low, you may need iron supplements.
Ferritin	100 to 500	• A form of stored iron.
Hemoglobin A1C (HgbA1C)	Less than 7.0	• Shows how your blood sugars have been over the past three months. • Good blood sugar control helps protect your kidneys. • A higher level may be recommended based on your overall health.
Potassium (K^+)	3.5 to 5.0	• Mineral found in most foods. • You may need diet changes or medicatiton to keep levels safe.
Sodium (Na^+)	135 to 145	• Mineral that helps balance water in your body. • Important in blood pressure control and fluid balance.
Bicarbonate ($HCO3$)	20 to 30	• May go down with low kidney function • A low HCO3 means your blood has too much “acid” • You may need medication to help maintain normal levels
Calcium (Ca^{2+})	- Total Calcium: 2.1 to 2.6 - Ionized Calcium: 1.15 to 1.4 *(Note: labs may have different reference ranges)*	• Mineral found in food, such as dairy products. • Helps to keep bones healthy. • May go down with low kidney function. • You may need medication to help maintain normal levels.
Phosphate (PO_4)	0.8 to 1.5	• Mineral found in foods such as dairy products and in the form of phosphorous additives. • May go up with low kidney function. • You may need diet changes or medication to help maintain normal levels
Intact Parathyroid Hormone (iPTH)	Less than 8	• Hormone that helps to balance calcium and phosphorus. • Often goes up when kidney function goes down. • You may need diet changes and/or take medications to maintain normal levels. • Your healthcare team will suggest an appropriate target iPTH range for you.

If you have further questions or concerns about your blood work results, please discuss them with your kidney care team or primary care provider.

You can download the latest version of this handout on the BC Renal website:
BCRenal.ca > Health Info > Kidney Care > Kidney Care (Non-Dialysis) > Resources for Kidney Patients > Know Your Kidney Lab Work

Our thanks to the KCC teams at Fraser Health and the Penticton Integrated Care Clinic, who provided the initial information used in this pamphlet.

How well are your kidneys working?

- Tests to measure kidney function:
  - Blood Tests
  - Urine Test

- What can you do to slow down kidney damage?

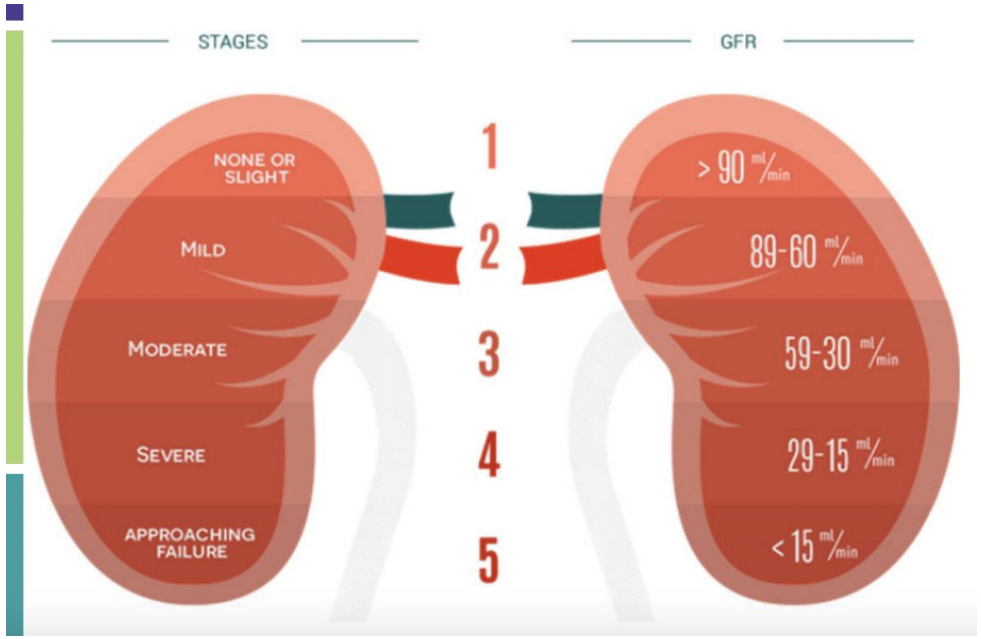
Blood tests that measure kidney function

- Blood tests that measure kidney function:
  - Creatinine
  - Estimated Glomerular Filtration Rate (eGFR)

- Tells us how well your kidneys are cleaning your blood

What do the different levels of kidney function (eGFR) mean?

- Lower eGFR means less kidney function
- CKD is divided into 5 stages according to the eGFR blood test result



Example:
Someone with eGFR of 35 mL/min/1.73m^2

Has about 35% of normal kidney function =

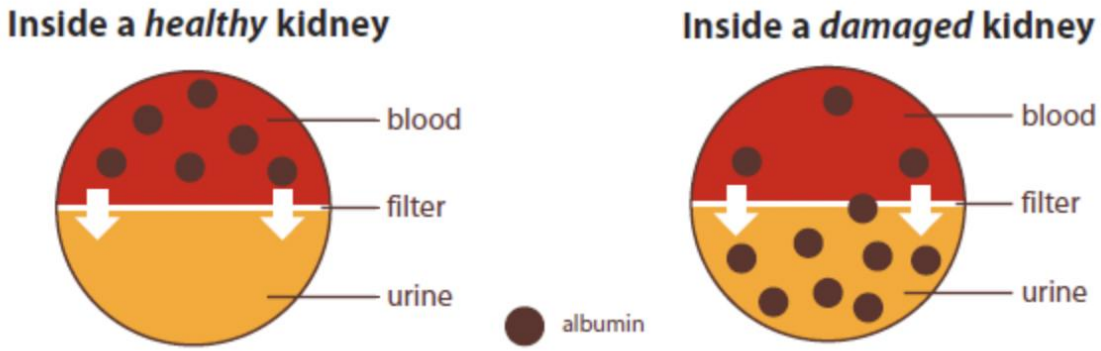
Stage 3 Chronic Kidney Disease

kidneyfailurerisk.com

Signs of kidney damage can be found in the urine

- Damaged kidneys can leak protein into the urine
- One of these proteins is called ALBUMIN
- Urine test that tells us about kidney damage:
  - Urine albumin to creatinine ratio (urine ACR)

Urine test for kidney damage:
Urine Albumin to Creatinine Ratio (urine ACR)



Healthy kidneys eliminate almost no albumin in the urine

Albumin stays in the blood

Urine ACR is less than 3 mg/mmol

Damaged kidneys may leak a high amount of albumin in the urine

Urine ACR is 3 mg/mmol or higher

Urine may look “frothy” or “foamy”

What treatments can help to slow down kidney damage?

To slow down the damage to your kidneys from chronic kidney disease:

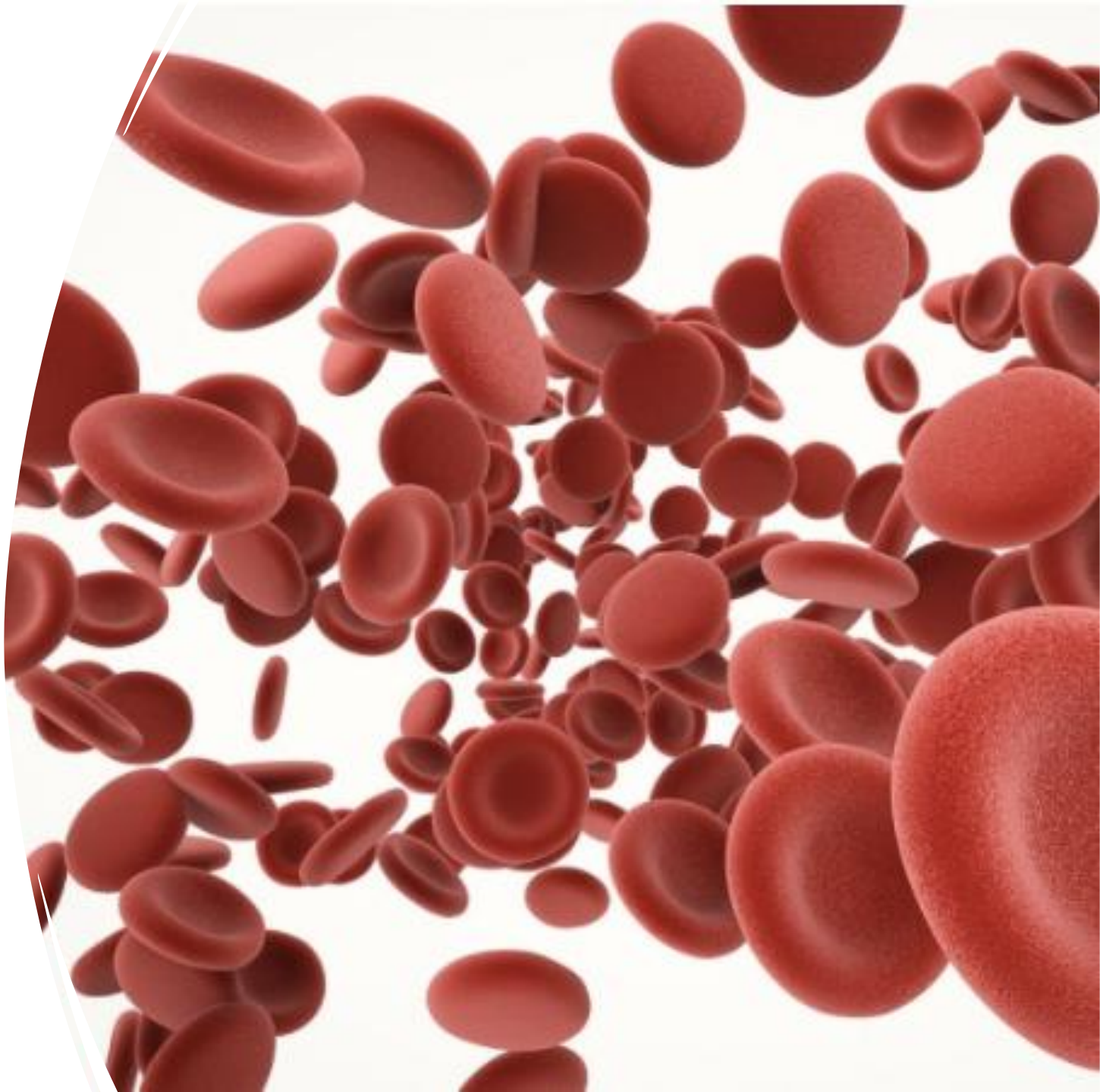
- Quit smoking
- Maintain a healthy weight and lifestyle
- Control your blood pressure
- Control your blood sugar if you have diabetes
- Avoid medications that can damage kidneys, such as NSAIDs (e.g. ibuprofen, naproxen)

- Certain medications help slow down kidney damage – talk to your Nephrologist/Kidney Care Clinic team about which medications are right you

Anemia

What is anemia?

What is the treatment for anemia?



What is anemia?

- Red blood cells carry oxygen to the tissues
- Oxygen is carried on a protein called hemoglobin
- Anemia is a low number or red blood cells, or a low hemoglobin
- **Blood test:** Anemia is diagnosed with a "CBC" (complete blood count)
  - Hemoglobin less than about 115 g/L in females and 135 g/L in males is "anemia"
- Anemia can cause symptoms such as fatigue and shortness of breath

What causes anemia? (Low hemoglobin)

- The most common causes of anemia are:
  - Low iron (iron deficiency) – iron is needed to make hemoglobin
  - Low erythropoietin (low EPO) – EPO is a hormone produced by the kidneys that increases red blood cell production by the bone marrow. When kidney function goes down, less EPO is made → this causes anemia
- There are many other causes of anemia
- Your doctor will recommend the tests to investigate your anemia

Blood tests to diagnose iron deficiency (low iron)

- Many proteins are involved in absorbing, transporting, and storing iron in the body.

- Iron saturation
  - Tells us how much iron is circulating in the blood attached to a protein called transferrin
  - In people with CKD, usually consider normal above 0.20 (and less than 0.50)

- Ferritin
  - Ferritin is a protein that stores iron
  - In people with CKD, usually consider normal above 100 (and less than ~500)

What is the treatment for anemia?

- If your iron is low:
  - You may need more tests to determine why your iron is low
  - You may need an **iron supplement** - tablet or intravenous formulations

- If your iron level is okay, but you still have anemia:
  - Mild anemia usually does not cause symptoms
  - If your hemoglobin is less than about 95-100, your Nephrologist may recommend medication to treat anemia to improve your quality of life
  - **Medications**: erythropoietin or darbepoetin – injection under the skin

Minerals

What important minerals do the kidneys handle?

Why are the minerals important?

What can you do to treat abnormal blood levels of minerals?

Important minerals handled by the kidneys

- Potassium
- Sodium
- Calcium
- Phosphorus

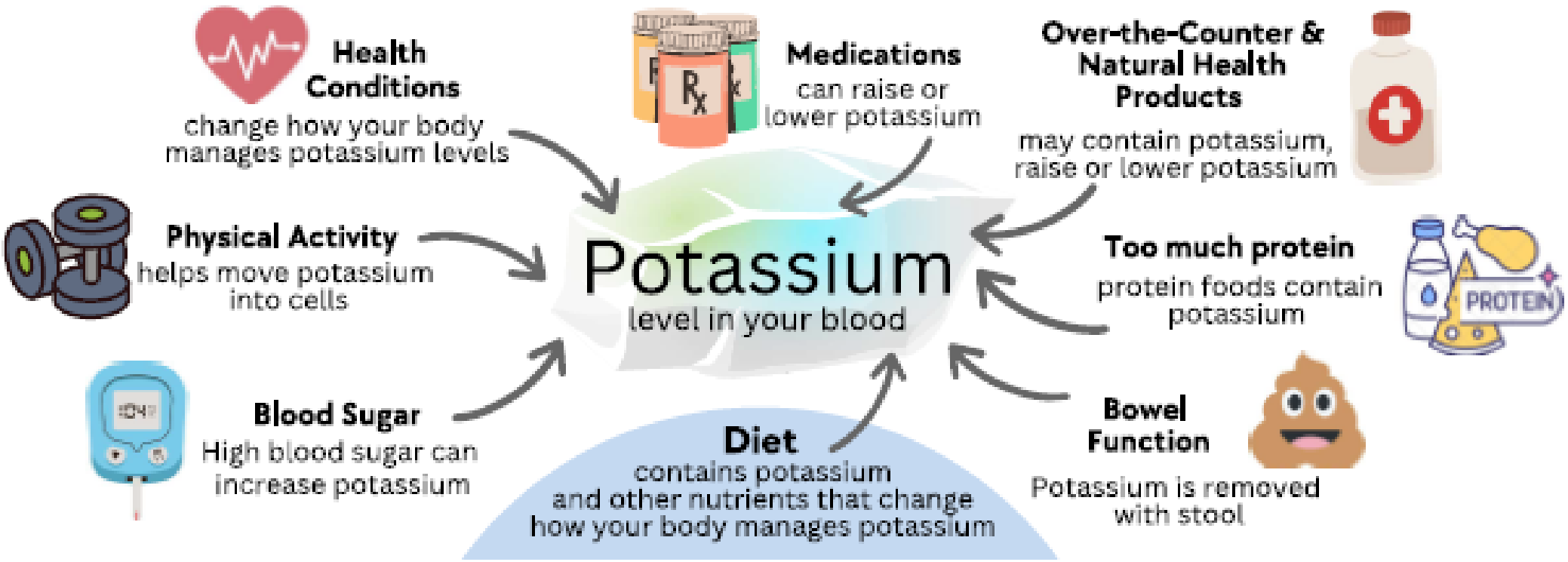
Potassium

Why is potassium important?

- Potassium is a mineral found in many foods
- Important for the function of the heart, muscles, and nerves
- Kidneys eliminate excess potassium in the urine
  - When kidney function goes down, the ability to eliminate potassium in urine is reduced, which can lead to high potassium in the blood
- **Blood test**: normal potassium is 3.5 – 5 mmol/L
- Very high potassium (higher than 6 mmol/L) can be dangerous because it can cause muscle weakness and affect the heart's ability to beat normally

What can you do to treat a high potassium level?

What Affects Potassium Levels?



Choose fresh foods most often

1 medium orange
3 grams of fiber
Low potassium

1 cup juice (250ml)
0 grams of fiber
High potassium

Choose fresh foods most often

1 small tomato
1.2 grams of fibre
Low potassium

1/2 cup tomato sauce
1.9 grams of fibre
High potassium

Examples of High Potassium Foods

These foods are most likely to affect your potassium level. Limit these foods if your potassium level is high. Talk to your dietitian about your food choices.

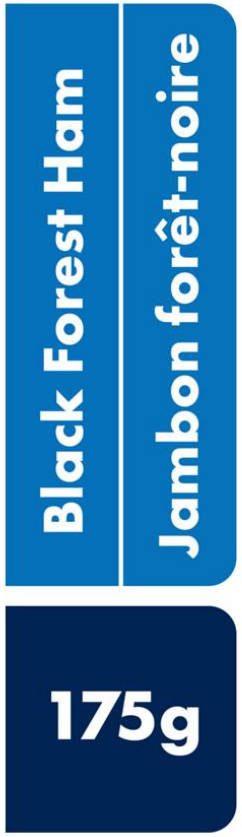
Minimally processed or whole foods	Processed	Processed with potassium additives
 Potatoes (unless double boiled)	 Chocolate bars	 Salt substitutes
 Tomato sauce	 Tomato-based soups	 Processed meats/ Ham / Hot dogs
 Dried fruits	 Fruit/vegetable juices	 Low sodium dill pickles
 Coconut water/ Coconut milk	 Chocolate milk	 Low sodium canned soups
 Dairy products/ Soy milk (Limit to 1 cup/day)	 Potato chips	 Low Sodium V8 Juice
 Coffee (Limit to 2 cups/day)	 French fries	 Breaded strips/ Nuggets

What about potassium additives?

Ingredients

Chicken Broth (water, chicken stock), Seasoned Chicken (soy), Carrots, Celery, Noodles (wheat flour, whole egg, egg white), Potato Starch, Salt, Chicken Fat, Yeast Extract, Potassium Chloride, Dried Onion, Dried Parsley, Dried Garlic, Flavour, Beta Carotene

What about potassium additives?



Ingredients

Pork, Water, Potato Starch, Modified Vinegar, Salt, Cultured Celery Extract, Potassium Chloride, Smoke Flavour, Sugars (maltodextrin), Cherry Powder, Spice Extract, Smoke

Enjoy protein foods in moderation

- Eating too much protein can raise your potassium level

- Replace some of your meats with plant-based protein like lentils, legumes, tofu, nut butters

Boost your fibre intake

- Eat whole grains, fruits, vegetables and legumes to keep bowels movements regular

- Regular bowel movements remove potassium from the body

Potassium is affected by how food is prepared

Cooking

½ cup cooked spinach is high in potassium

½ cup raw spinach is low in potassium

Double Boiling

Peel, cube or slice potato.

Put potatoes in a pot with lots of water (twice as much water as potato!).

Bring to a boil.

Drain the hot water and add fresh water.

Bring to a boil again and finish cooking.

Drain and serve

Potassium is affected by portion sizes

Low Potassium

5 strawberries

High Potassium

25 strawberries

What can you do if your potassium level is too HIGH?

- Choose fresh foods more often
- Boost your fibre intake
- Limit potassium additives
- Enjoy protein foods in moderation
- Cooking methods
- Be active every day
- Keep blood sugars in target range

What else can be done to treat a high potassium level?

- Some common medicines reduce the ability of the kidneys to eliminate potassium in the urine
  - Examples: ramipril, candesartan, spironolactone, finerenone
  - These medicines may need to be changed if your potassium is too high

- “Potassium binder” medications: stick to potassium in the bowels and cause it to be eliminated in the stool
  - Your Kidney Care Clinic team will recommend this if you need it

Sodium

Why is sodium important?

- Sodium is a mineral found in many foods
- Sodium is important for the body's fluid balance, and for muscle and nerve function
- **Blood test**: normal sodium is 135 – 145 mmol/L

What does the sodium level mean?

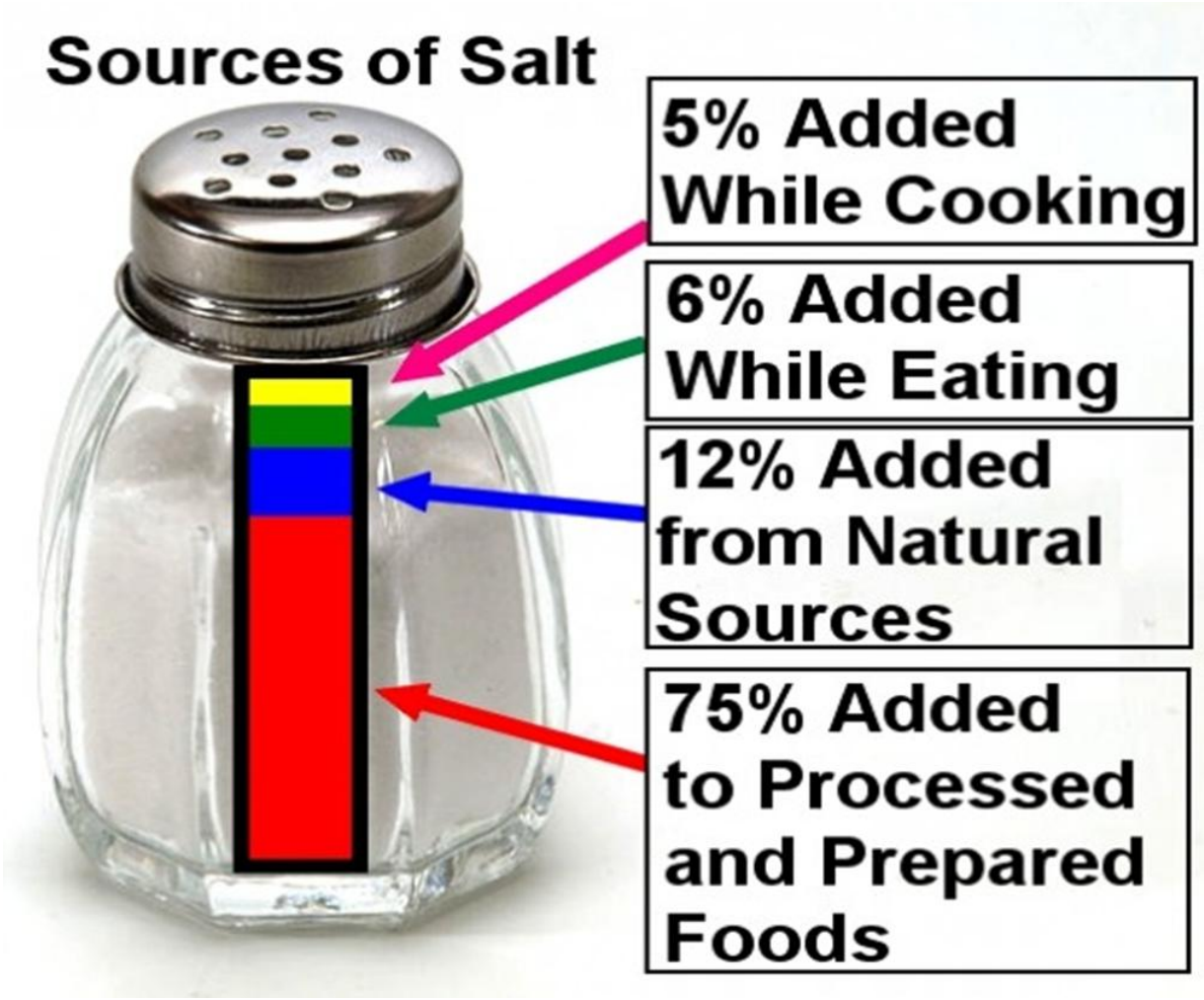
- A normal sodium test result does NOT tell us that the amount of sodium in your diet, or in your body, is just right
- Taking too much sodium in your diet can cause high blood pressure and swelling (edema)
- A low sodium level (less than 135) may be a signal you are drinking too much fluid, and a high sodium level (higher than 145) may be a signal that you not drinking enough fluid
- Abnormal sodium levels can also be a signal of illness, or that your medications need to be adjusted, such as diuretics (“water pills”)

Most people have too much sodium in their diet

Recommended intake is less than 2000mg sodium per day from **all sources**

1 teaspoon of salt =
2300mg sodium

How does sodium get into our food?



Processed foods are high in sodium

2 mg

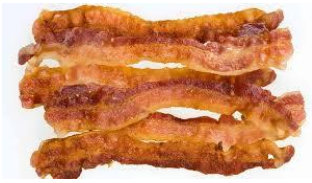
6 mg

59 mg

Low Sodium

928 mg

935 mg



548 mg

1114 mg

High Sodium

Read labels to reduce sodium in your diet

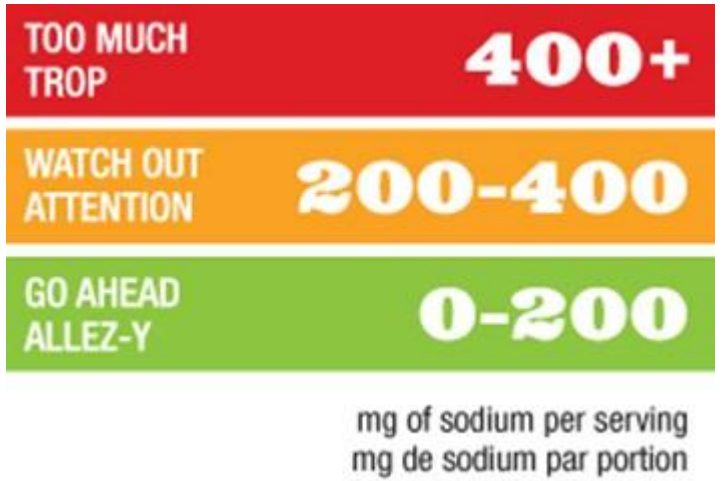
Nutrition Facts

Serving Size 1 slice g (30g)
Serving Per Container 12

Amount Per Serving

Calories 89	Calories from Fat 9
	% Daily Values*
Total Fat 1g	**2%**
Saturated Fat 0g	**0%**
Trans Fat 0g	
Sodium 100mg	**4%**
Total Carbohydrate 18g	**6%**
Dietary Fiber 3g	**12%**
Sugars 1g	
Protein 2g	**4%**

*Percent Daily Values are based on a 2,000 calorie diet.



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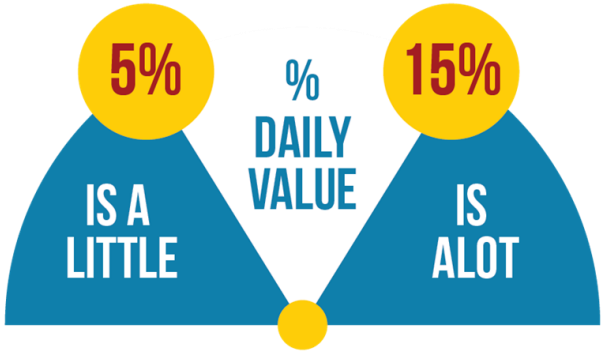


Use the % Daily Value to tell you if there is a little or a lot of sodium

Tips to reduce the sodium in your diet

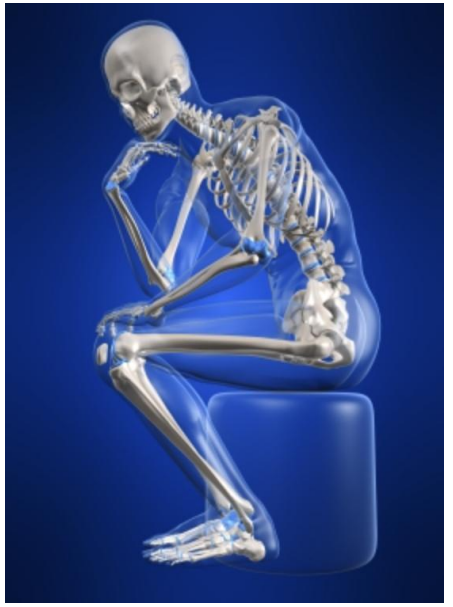
- Fresh is best
  - Limit salty processed foods such as
  - frozen dinners and mixed dishes such as pizza, packaged mixes, canned soups or broths, and salad dressings
- Avoid foods that are marinated, canned, smoked, brined (pickles, olives, sauerkraut), or cured (bacon, ham), and condiments
- Ask for less salt or sauces on the side when eating out
- Choose low- or reduced-sodium, or no-salt-added versions of foods
  - Read labels and compare similar product
- Shop the outside aisles at the grocery store

Tips to reduce the sodium in your diet

- Subtract, don't add
  - Rinse canned food
  - Cook rice, pasta, and hot cereals without salt
- Spice it up
  - Boost flavour with herbs, spices, lemon, lime, vinegar, or salt-free seasoning
- Start by cutting salt in half and work your way toward healthy substitutes

Tips to reduce the sodium in your meals when you are eating out

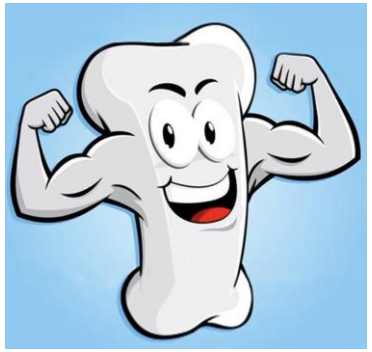
- Go online and check the menu - avoid items that are pickled, cured, smoked or with soy sauce
- Get sauces and dressing on the side
- Limit the use of condiments
- Choose restaurants where you can order from a menu



Calcium and Phosphorus

The kidneys regulate minerals and hormones that are important for bone and blood vessel health

- **Blood tests**:
  - Calcium (normal is 2.1 – 2.6 mmol/L)
    - Mineral found in food
    - Can go **down** with low kidney function
  - Phosphate (normal is 0.8 – 1.5 mmol/L)
    - Mineral found in food
    - Can go **up** with low kidney function
  - Parathyroid hormone (or PTH) (normal is less than 7 pmol/L)
    - A hormone that regulates calcium and phosphorus
    - Can go **up** with low kidney function



Phosphorus

- Phosphorus can be found naturally in foods
- Also used as an additive - we call this Hidden Phosphorus

Hidden phosphorus

- Phosphate is added to food during processing to add colour, flavour and stability
- Common foods that have added phosphates are processed, convenience and fast foods
- These foods are usually high in sodium as well
- Not found on the “Nutrition Facts Label” but listed under the ingredient section of the label

Tips to reduce hidden phosphorus in your diet

- It is important for you to know how to read a label for phosphorus additives

- Most foods do not list phosphorus in the Nutrition Fact Table, so you need to read the ingredient list

- Look for ”PHOS” in the ingredient list. Examples:

  calcium phosphate

  sodium phosphate

  phosphoric acid

Foods with hidden phosphorus

Sodium phosphate

Calcium phosphate

Phosphoric acid

Dipotassium phosphate

Foods with hidden phosphorus

Sodium
phosphate

Monocalcium
phosphate

Sodium
phosphate

Look for **PHOS**

Ingredient List
Coca Cola Classic™

ingredients: carbonated water, sugar/glucose-fructose, caramel color, **phos**phoric acid, natural flavors, caffeine.

What treatments are used for bone health?

- Your Kidney Care Clinic team will advise if you need medications to regulate the minerals and hormones for your bones. You may need:
  - Calcium
  - Vitamin D
  - Other medicines

- Exercise!

Acidity

The kidneys play an important role in balancing the body’s pH (acid level)

Why is the acid level in the blood important?

- When the kidneys are not working well, the acidity of the blood can increase. This can lead to:
  - More kidney damage
  - Damage to the bones and muscles

- **Blood test**: bicarbonate (normal is about 24 mmol/L)

What treatments can be used for a low bicarbonate level (high blood acidity)?

- Increase your intake of fruits and vegetables
- Choose plant-based proteins (low acid) more often than animal proteins (high acid)
- If your bicarbonate level is low, you may need a bicarbonate supplement, such as sodium bicarbonate

Albumin & Protein

What does the albumin level mean?

How much protein should you eat?

What is albumin?

- Albumin is a protein made by the liver that is found in the blood
- It helps to keep fluid inside the blood vessels, and it transports many substances in the body
- **Blood test:** normal albumin is 35 g/L or higher

What does a low albumin level mean?

- There are many causes of a low blood albumin level including liver disease, “nephrotic syndrome”, inflammation, and malnutrition

- A low blood albumin level does NOT necessarily mean you are not eating enough protein

Is the amount of protein in your diet important?

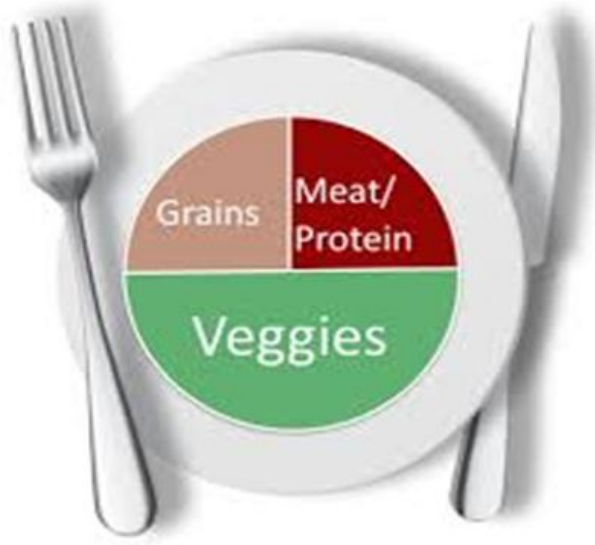
- Yes!
- There are benefits to limiting the amount of protein in your diet
  - May lower the risk of kidney failure
  - May improve cholesterol levels
- It is recommended that people with kidney disease avoid high protein diets

How much protein should you eat?

Watch your portions

A serving of meat, chicken and fish is 75 g, a palm sized piece, or about the same as a deck of cards or a ¼ of your plate

Limit to 2 servings a day of animal protein



Sources of protein

1 oz / 30g
cooked fish

¼ cup
canned fish

1 egg

¼ cup
egg whites

1 oz / 30g
cooked chicken

1 oz / 30g
cooked beef

1 oz/ 30g
cooked lamb

1 oz / 30g
cooked pork

1 oz / 30g cooked
game meat

1 oz / 30g / 2 cooked
jumbo shrimp

Sources of vegetarian protein

¼ cup firm tofu
½ cup soft tofu

½ cup cooked beans/lentils

2 tbsp nut butter

¼ cup unsalted nuts

1 cup milk / soy milk

1 cup yogurt
1/3 cup Greek yogurt

¼ cup cottage cheese

1 oz / 1” cube cheese

Protein sources to avoid

ham/
deli meats

bacon

pepperoni

salami/
sausages

hot dogs

fish sticks

chicken strips
& nuggets

SPAM and
canned meats

dried or
smoked meat
or fish

processed cheese

Is the type of protein in your diet important?

- Yes!

- A high intake of animal protein can:
  - Make your blood more acidic – leads to inflammation, loss of muscle mass
  - Increase cholesterol levels
  - Increase risk for gout and kidney stones
  - Make the kidneys work harder

- It is recommended that people with kidney disease eat more plant-based protein foods

Sources of vegetarian protein

¼ cup firm tofu
½ cup soft tofu

½ cup cooked beans/lentils

2 tbsp nut butter

¼ cup unsalted nuts

1 cup milk / soy milk

1 cup yogurt
1/3 cup Greek yogurt

¼ cup cottage cheese

1 oz / 1” cube cheese

Tips to reduce animal protein in your diet

- Meatless ‘More’ Days
- Build meals around vegetables, not meat
- Cut your animal protein serving size in half

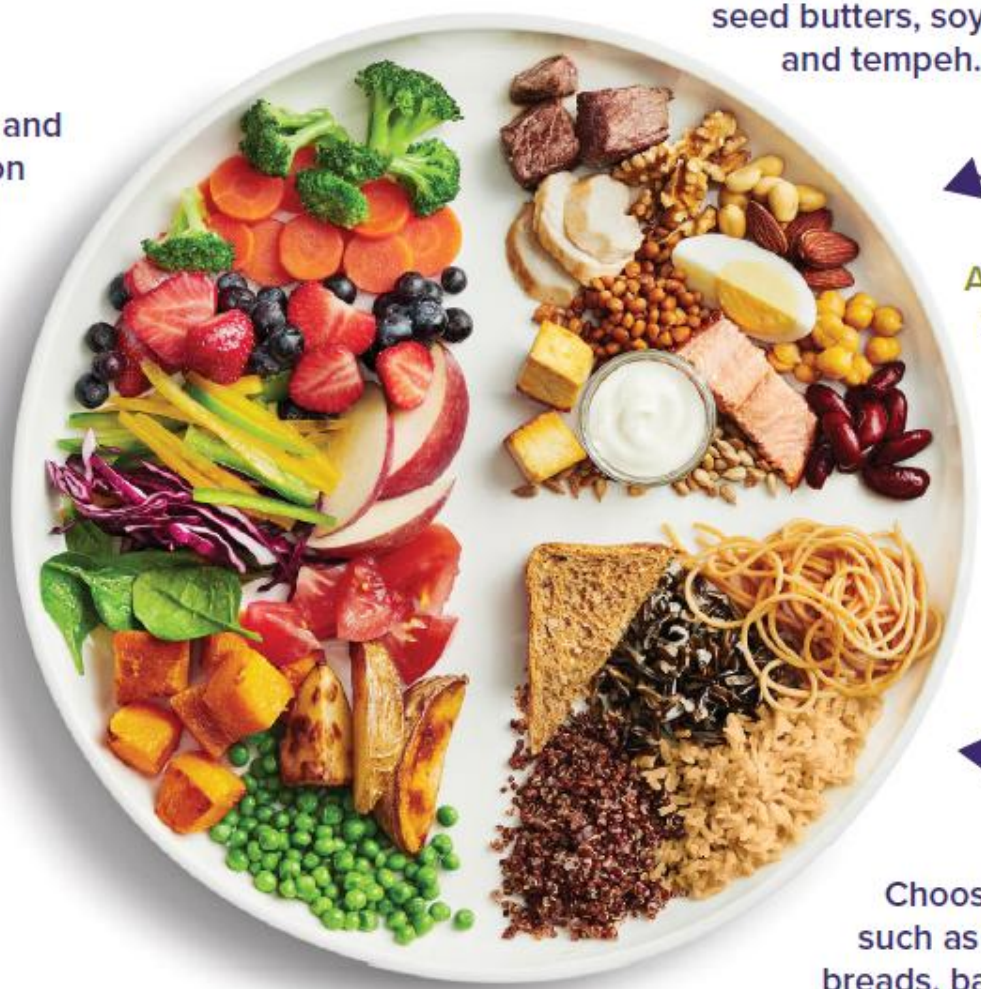
Plant Forward Eating

Use your plate as a guide:

- Half vegetables and fruit
- One quarter whole grains
- One quarter protein

Plant-based proteins include beans, lentils, tofu, nuts, seeds, natural nut/seed butters, soy milk, seitan and tempeh.

Base meals and snacks on vegetables and fruit.



Animal proteins like fish, chicken and lean meats can be part of a plant-based diet. The goal is to focus less on animal proteins and more on plant proteins.

Choose whole grains such as whole grain breads, barley, oats, brown and wild rice.

Useful Resources

Get to know your kidney lab work

You can download the latest version of this handout on the BC Renal website:
BCRenal.ca > Health Info > Kidney Care > Kidney Care (Non-Dialysis) > Resources for Kidney Patients > Know Your Kidney Lab Work

BC Renal Diet Information

http://www.bcrenal.ca/health-info/managing-my-care/diet

Spice It Up – Kidney Friendly Recipes – includes many vegetarian recipes

https://www.myspiceitup.ca/

Kidney Wellness Hub

https://kidneywellnesshub.ca/

Do you have any questions?