

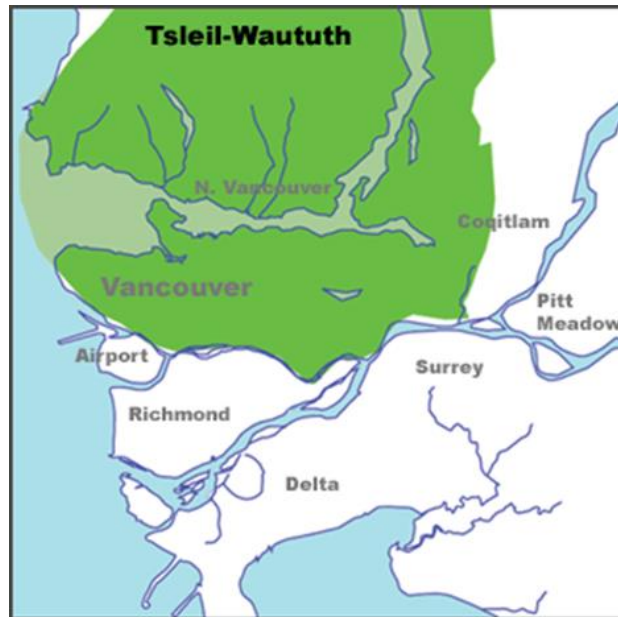
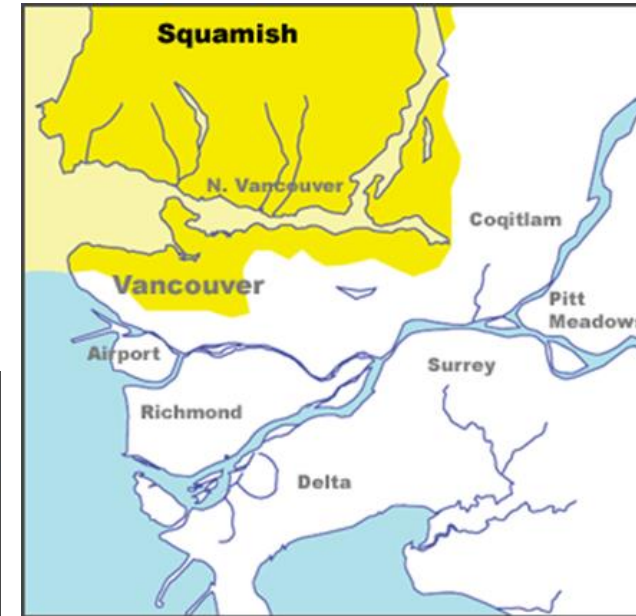
Getting to know your kidney bloodwork

Feb 2, 2024

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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.ijohomaps.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?

Clean
blood



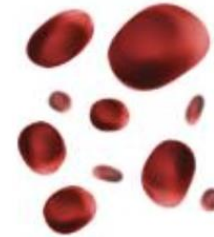
Remove
extra water



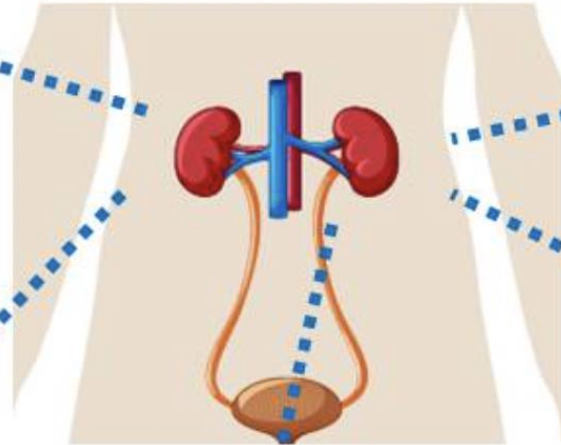
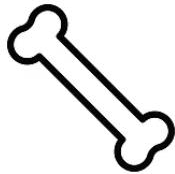
Keep your
body
chemicals in
balance



Help build
red blood
cells



Control
blood
pressure




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** 

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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Waste made by muscle activity. Level goes up as kidney function goes down.
Urine Albumin to Creatinine Ratio (ACR)	Less than 3	<ul style="list-style-type: none"> 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.
Urea	Less than 9	<ul style="list-style-type: none"> Waste made by the body. Level goes up as kidney function goes down.
Hemoglobin (Hgb)	Greater than 115	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Tells how much iron you have available to make new red blood cells. If low, you may need iron supplements.
Ferritin	100 to 500	<ul style="list-style-type: none"> A form of stored iron.
Hemoglobin A1C (HgbA1C)	Less than 7.0	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Mineral found in most foods. You may need diet changes or medication to keep levels safe.
Sodium (Na⁺)	135 to 145	<ul style="list-style-type: none"> Mineral that helps balance water in your body. Important in blood pressure control and fluid balance.
Calcium (Ca²⁺)	2.1 to 2.6	<ul style="list-style-type: none"> 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 (PO₄⁻)	0.8 to 1.5	<ul style="list-style-type: none"> 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.


continued...



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Test	Approximate Normal Values	What it is
Intact Parathyroid Hormone (PTH)	Less than 8	<ul style="list-style-type: none"> 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. If on treatment, your health care team will suggest a target iPTH range for you.
Albumin	Greater than 35	<ul style="list-style-type: none"> Protein in blood that helps fight infections and heal wounds. If too low, ask your dietitian for help.
Bicarbonate (HCO₃)	24 to 40	<ul style="list-style-type: none"> 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

If you have further questions or concerns about your blood work results, please discuss them with your nephrologist, renal nurse practitioner, family physician or your kidney care team.

 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](#) • [Get to Know Your Kidney Lab Work](#)

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

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Get to know your kidney lab work



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How well are your kidneys working?

- Tests to measure kidney function:
 - Blood Tests
 - Urine Test
- What can you do to slow down kidney damage?



Tests to measure kidney function:

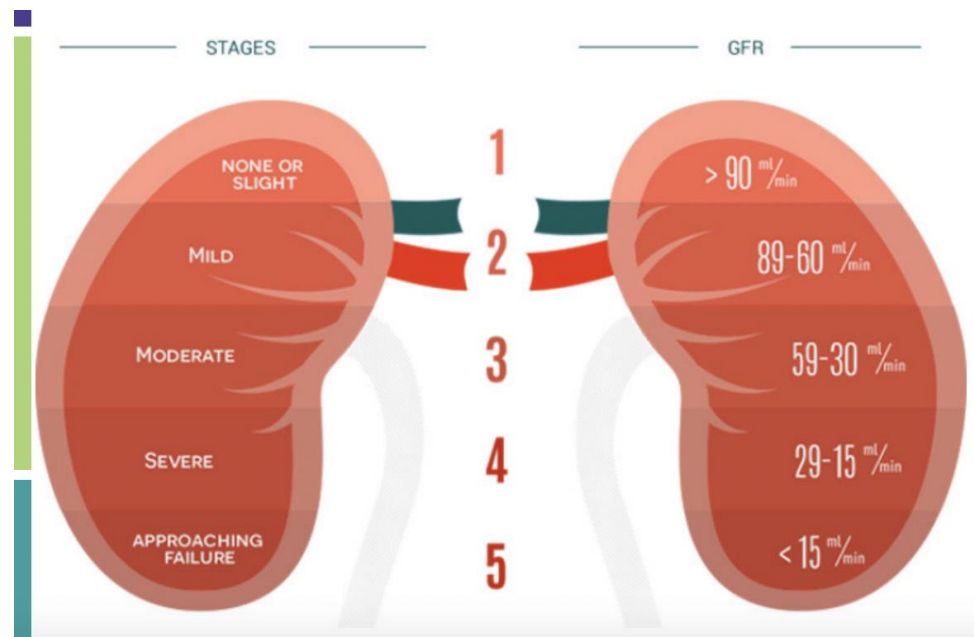
Blood tests

- A blood test can measure your GLOMERULAR FILTRATION RATE
- Tells us how well your kidneys are cleaning your blood
- Blood tests that measure kidney function:
 - Creatinine
 - Estimated Glomerular Filtration Rate (eGFR)



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

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



Example:

Someone with eGFR of 35 mL/min

Has about 35% of normal kidney function =

Stage 3 Chronic Kidney Disease



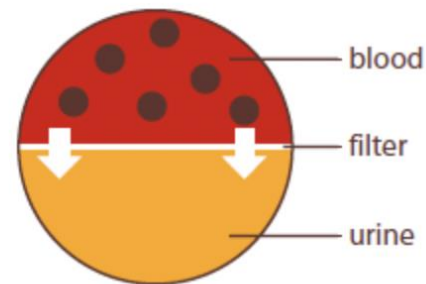
Signs of kidney damage can be found in the urine

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

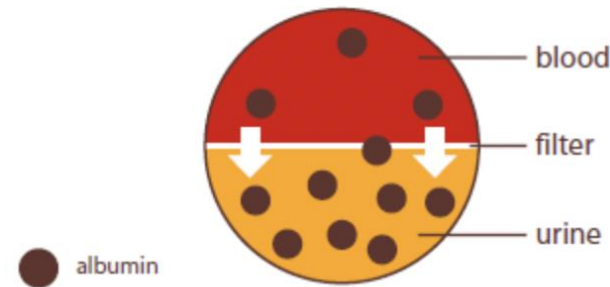


Urine test for kidney damage: Urine Albumin to Creatinine Ratio (urine ACR)

Inside a *healthy* kidney



Inside a *damaged* kidney



Healthy kidneys eliminate almost no albumin in the urine

Albumin stays in the blood

Urine ACR is less than 2 mg/mmol

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

Urine ACR is 2 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:

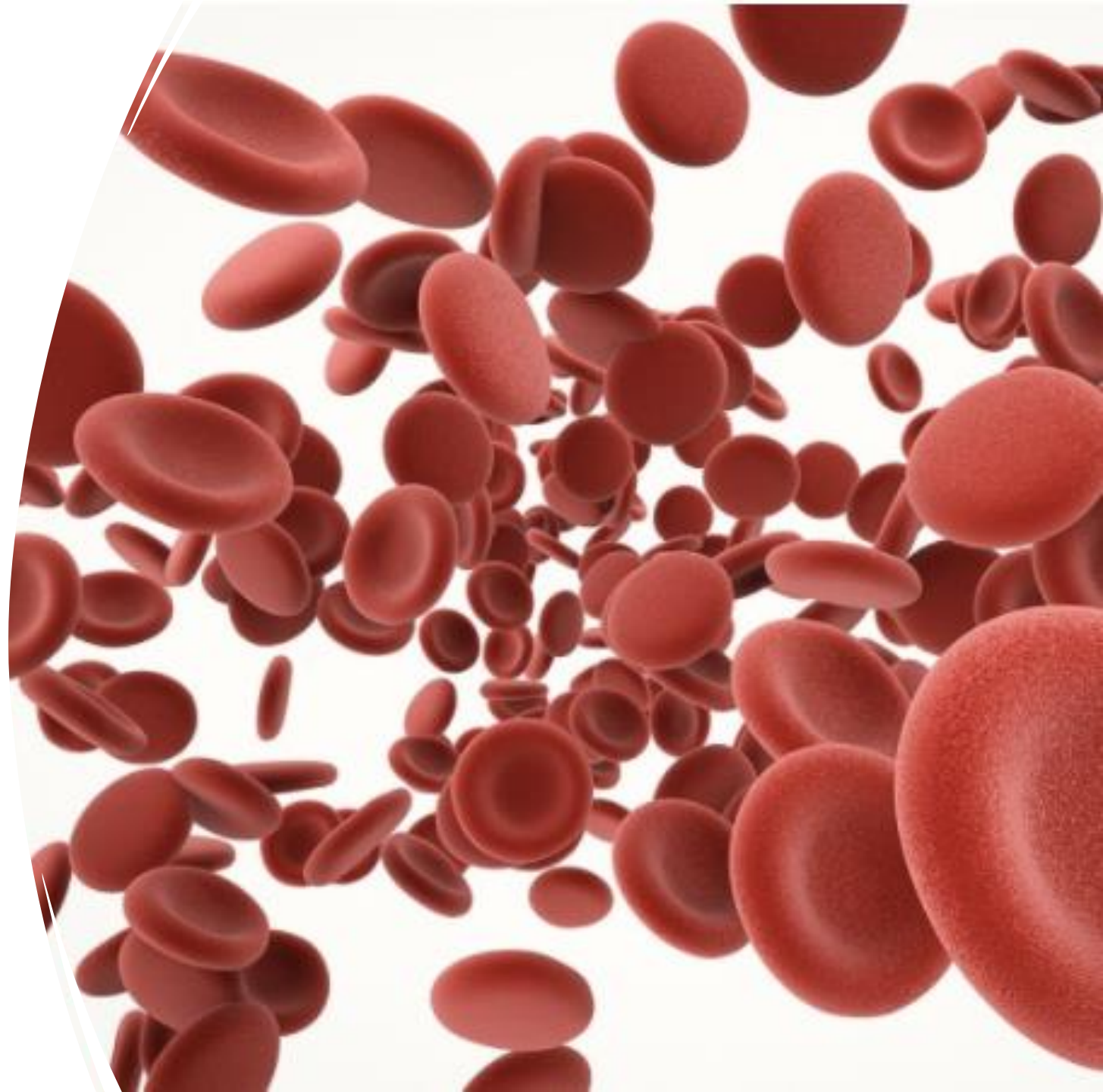
- Control your blood pressure
- Control your blood sugar if you have diabetes
- Quit smoking
- Maintain a healthy weight and lifestyle
- Avoid medications that can damage kidneys, such as NSAIDs (e.g. ibuprofen, naproxen)
- Certain medications can help slow down kidney damage – your Nephrologist/Kidney Care Clinic team will recommend these if they are right for 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 of 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)

- Your doctor will recommend tests to determine why you have anemia
- 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 cells. When kidney function goes down, less EPO is made → this causes anemia



Blood tests to diagnose iron deficiency (low iron)

- Many proteins are involved in absorbing, transporting, and storing iron in the body
- Iron saturation
 - In people with CKD, usually consider normal above 0.20 (and less than 0.50)
- Ferritin
 - 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 form
- If your iron 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 the potassium level important?

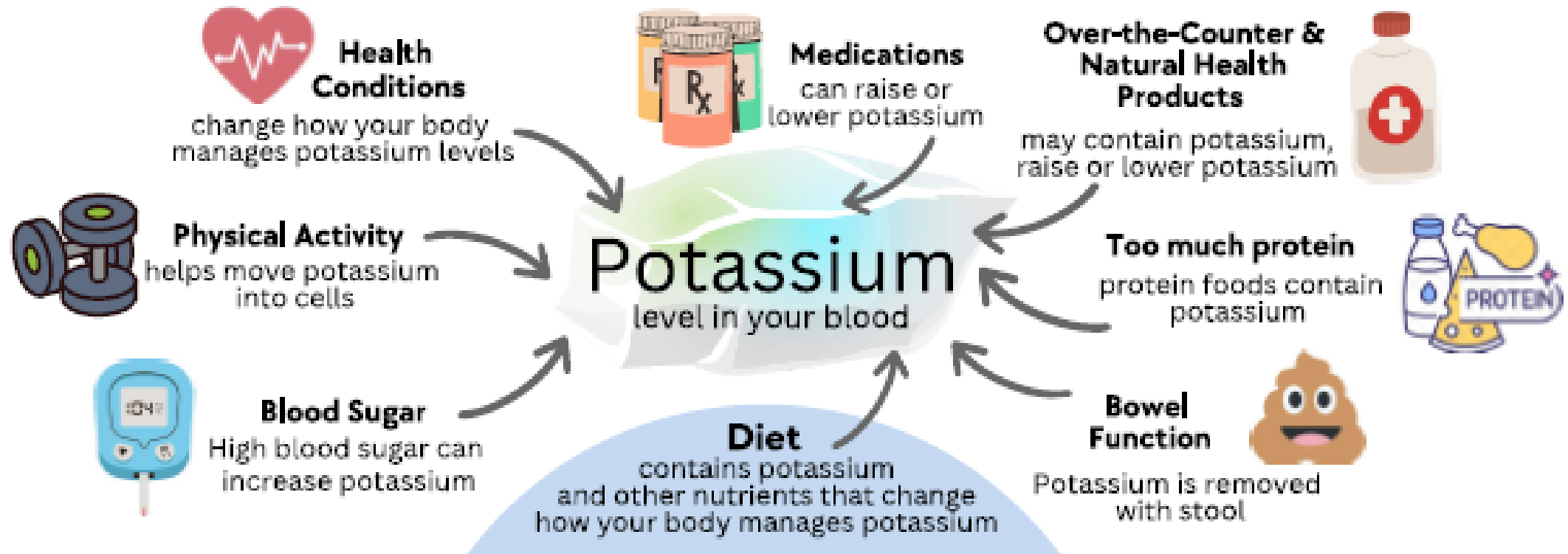
- Potassium is a mineral found in many foods
- Important for the function of the heart, muscles, and nerves
- Kidneys eliminate excess potassium in the urine
 - When kidney function goes down, the ability to eliminate potassium in urine is reduced, which can lead to high potassium in the blood
- **Blood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



What can you do to treat a high potassium level?



What Affects Potassium Levels?



What to do if your potassium level is too HIGH?

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



Choose fresh foods most often



1 medium orange
62 kcal
3 grams of fiber
237 mg potassium



1 cup juice (250ml)
112 kcal
0 grams of fiber
496 mg potassium

Choose fresh foods most often



1 small tomato
18 kcal
1.2 grams of fiber
215 mg potassium



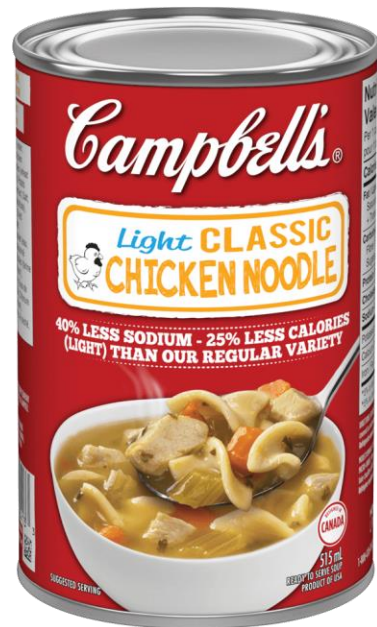
1/2 cup tomato sauce
66 kcal
1.9 grams of fiber
478 mg potassium

Boost your fibre intake

- Eat whole grains, fruits, vegetables and legumes to keep bowels movements regular.
- Regular bowel movements remove potassium from the body.



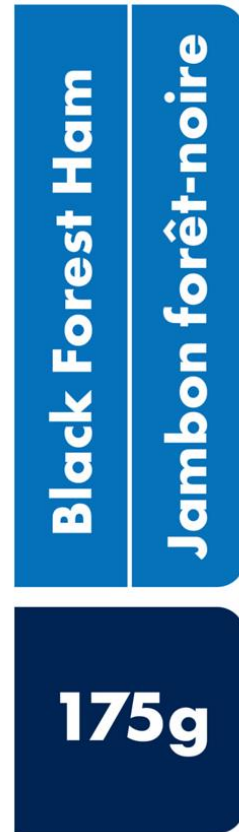
What about potassium additives?



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

Avoid or limit:

Foods with added Potassium

Check labels for ingredients with "potassium" in the name.



Salt Substitutes



Cream soup



Low-Salt Deli Meats



Low-Salt soups



Processed Meats & Vegan Substitutes



Salad Dressing



Pickles

Your dietitian may suggest you limit:

Processed Foods high in Potassium



Coffee



Smoothies



Orange Juice



Tomato Sauce/ Paste, Soup, and Juice



Coconut Milk



Chips



Fries



Chocolate

Whole Foods high in Potassium



Milk



Nuts, trail mix, dried fruit



Potato, Yam, Sweet potato



Banana



Cooked spinach, chard, bok choy



Cantaloupe, Honeydew Melon



Beets



Squash



Avocado

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



Potassium is affected by how food is prepared

Cooking

½ cup cooked spinach is high in potassium

½ cup raw spinach is medium 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
92 mg potassium



High Potassium
15 strawberries
275 mg potassium



Medium Potassium
8 strawberries
147 mg potassium



Very High Potassium
25 strawberries
450 mg potassium

Tips for reducing the potassium in your diet

- Not everyone needs to limit the potassium in their diet
- Use fresh foods most often and avoid processed foods
- Cooking and preparation can change the potassium content of food
 - Double boiling
 - Cooked vs raw
 - Draining and rinsing canned food
 - Juicing
- Portion size counts!



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 medications may need to be changed or stopped 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 2300mg sodium per day from **all sources**



1 teaspoon of salt =
2300mg sodium

How does sodium get into our food?

Sources of Salt



**5% Added
While Cooking**

**6% Added
While Eating**

**12% Added
from Natural
Sources**

**75% Added
to Processed
and Prepared
Foods**



Processed foods are high in sodium



2 mg

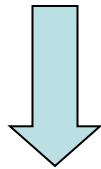


6 mg

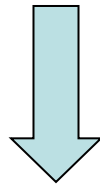


59 mg

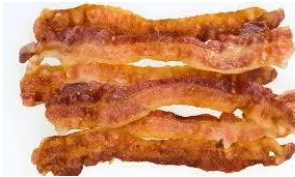
Low Sodium



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.

TOO MUCH
TROP

400+

WATCH OUT
ATTENTION

200-400

GO AHEAD
ALLEZ-Y

0-200

mg of sodium per serving
mg de sodium par portion

Nutrition Facts

Serving Size 1 slice g (30g)

Serving Per Container 12

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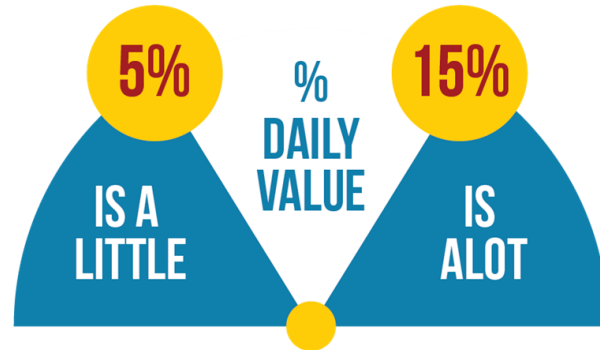
Total Carbohydrate 18g 6%

Dietary Fiber 3g 12%

Sugars 1g

Protein 2g 4%

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



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
 - 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 perimeter at the grocery store



Tips to reduce the sodium in your diet

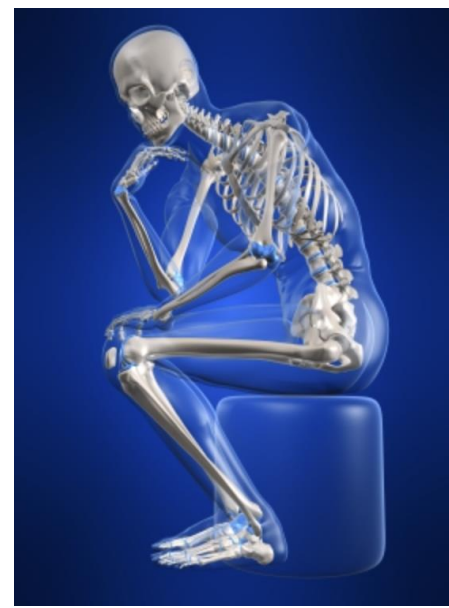
- Subtract, don't add
 - Rinse canned food
 - Cook rice, pasta, and hot cereals without salt
- Spice it up
 - Boost flavour with herbs, spices, lemon, lime, vinegar, or salt-free seasoning
- Start by cutting salt in half and work your way toward healthy substitutes



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

- Go online and check ahead and avoid items that are pickled, cured, smoked or with soy sauce
- Get sauces and dressing on the side, and 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

Foods with hidden phosphorus



Phosphoric acid

Dipotassium
phosphate

Sodium
phosphate

Calcium
phosphate

Foods with hidden phosphorus



Sodium
phosphate



Monocalcium
phosphate



Sodium
phosphate



Look for PHOSPH



Ingredient List

Coca Cola Classic™

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



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 "PHOSPH" in the ingredient list. Examples:
 - calcium phosphate
 - sodium phosphate
 - phosphoric acid



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
- It is recommended that people with kidney disease avoid high protein diets

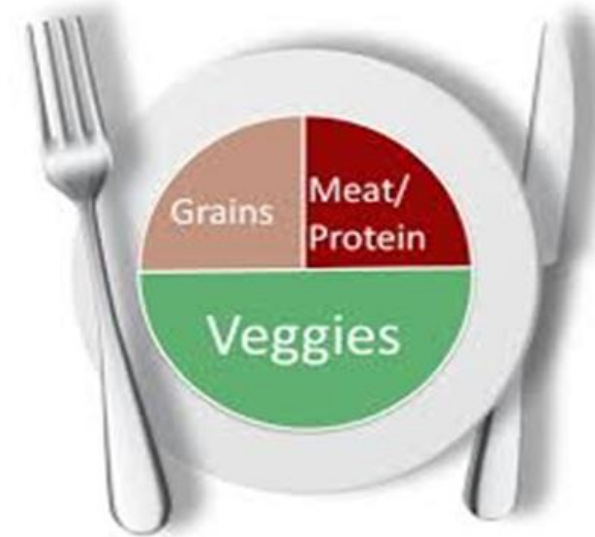


How much protein should you eat?

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 $\frac{1}{4}$ 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

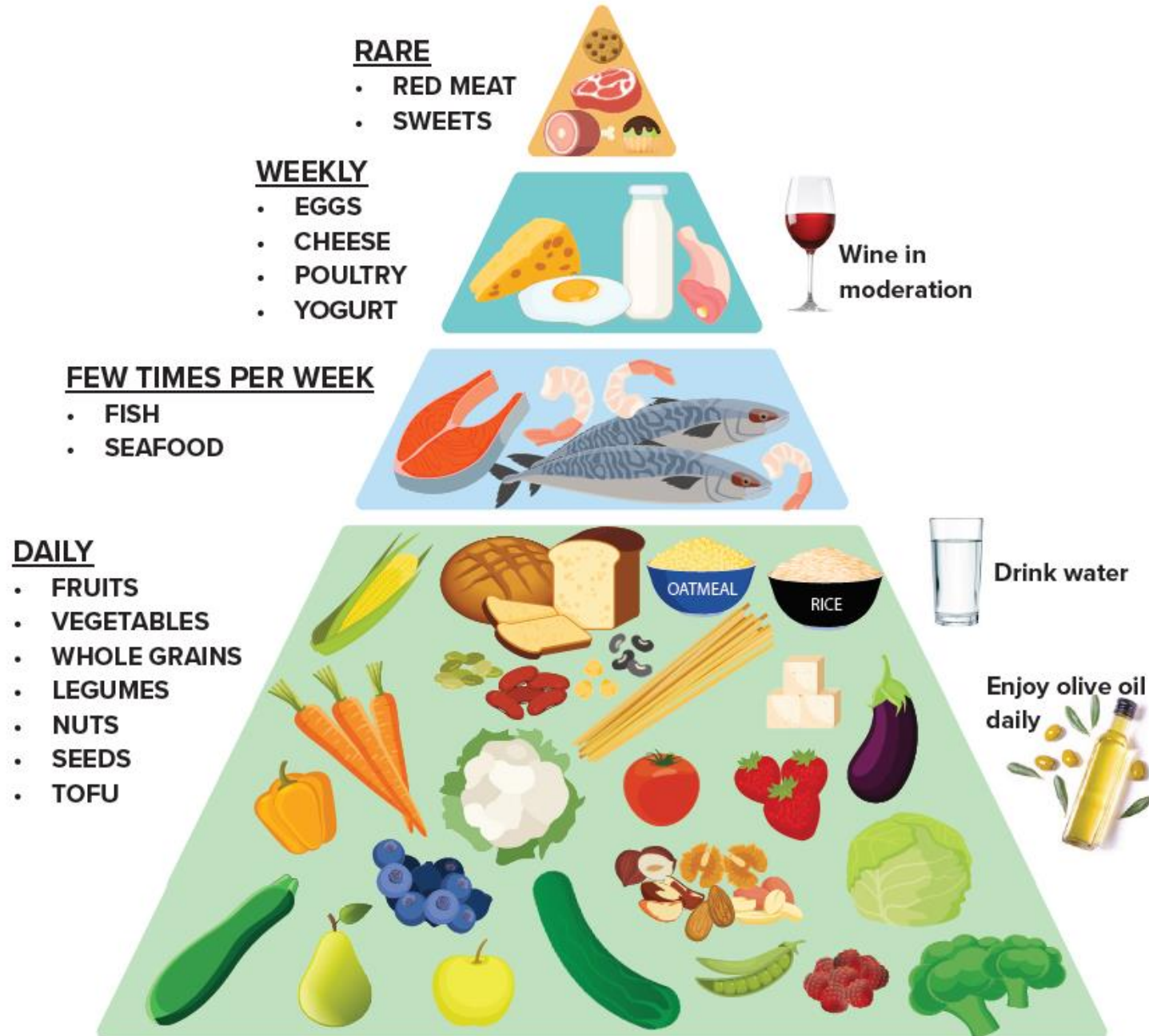


dried or
smoked meat
or fish



processed cheese

The Mediterranean Diet Pyramid



Tips to reduce animal protein in your diet

- Meatless 'More' Days
- Build meals around vegetables, not meat
- Cut your serving size in half



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 ➔ Get to 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/>

Do you have any questions?

