

Nutrition and Exercise Physiology



What is Nutrition?

Why is it important for
massage therapists?

Wise Words

“Let food be thy medicine” – Hippocrates (~400 BCE)

"The doctor of the future will no longer treat the human frame with drugs, but rather will cure and prevent disease with nutrition." —Thomas Edison (early 1900s)

“He who takes medicine and neglects diet wastes the time of the doctor.” – Chinese proverb

“Don’t dig your grave with your knife and fork” - British proverb

Definitions

- **Nutrition** – the study of how food nourishes the body
- **Nutrients** – the components of food that the body requires to function.
- **Diet** – what a person consumes (food and drinks)
- **Malnutrition** – any condition caused by excess or deficient food energy or nutrient intake or an imbalance of nutrients

Why is Nutrition Important?

- - 3 meals x 7 days per week = 21 meals per week
 - 21 meals x 52 weeks = 1092 meals per year
 - 1092 x 80 years =
- **87,360 meals in average lifetime**
- Cumulative effect on the body
- Every cell in your body is built with the molecules and nutrients from your diet
- Food gives more than energy. It gives the body the building blocks for every function
- **Nutrigenomics** – genes are either expressed or not expressed, based on dietary intake of specific nutrients. **The foods you eat affect how your genes express.**

Definitions

- **Essential nutrients** – those nutrients that the body cannot make or cannot produce in sufficient quantities
- **Calories** – unit of energy measurement in foods. Technically it is the amount of heat energy required to raise the temperature of a litre of water 1 degree Celsius.
- **Digestion** – the process within the digestive tract of breaking foods down into absorbable components.

Definitions

- **Absorption** – the process that takes place at the border between the gastrointestinal tract and the bloodstream whereby food crosses from the GI tract into the body
- **Metabolism** – the process within the body's cells that takes the sugars, amino acids, and fatty acids and converts them into energy or vitamins and minerals into usable co-factors

Definitions

- **Energy-yielding nutrients** – nutrients the body can use for energy
- **Macronutrients** – carbohydrates, fats, and proteins. Large amounts needed in the diet (grams +)
- **Micronutrients** – vitamins and minerals that act as co-factors within the body. Small amounts are needed in the body. (mgs or less)
- **Dietary supplements** – pill, liquids, or powders that contain purified nutrients or other ingredients

Definitions

- **Carbohydrate** – compounds composed of a single or multiple sugars. The name means “carbon and water” and the chemical shorthand for carbohydrate is CHO (carbon, hydrogen, and oxygen)
- **Fat** – technically termed lipids, a family of organic compounds soluble in organic solvents but not in water. Lipids include triglycerides (fats and oils), phospholipids, and sterols

Definitions

- **Protein** – compounds composed of carbon, hydrogen, oxygen, and nitrogen and arranged as strands of amino acids
- **Vitamin** – organic compounds that are vital to life and indispensable to body functions but are needed only in minute amounts. They are non-caloric ex. Vitamin C, Vitamin K
- **Mineral** – naturally occurring, inorganic, homogenous substances; chemical elements; non-caloric
Ex. Calcium, Iron

Definitions

- **Dietitian** – a nutrition professional. Requires a 4 year Bachelor of Science and a year long internship. A regulated term. Registered Dietician (RD)
- **Nutritionist** – non-regulated term
- **Certified Holistic Nutritionist** - shorter term course. Non-regulated profession. Voluntary certification exam. Some insurance companies may provide coverage for services.

Definitions

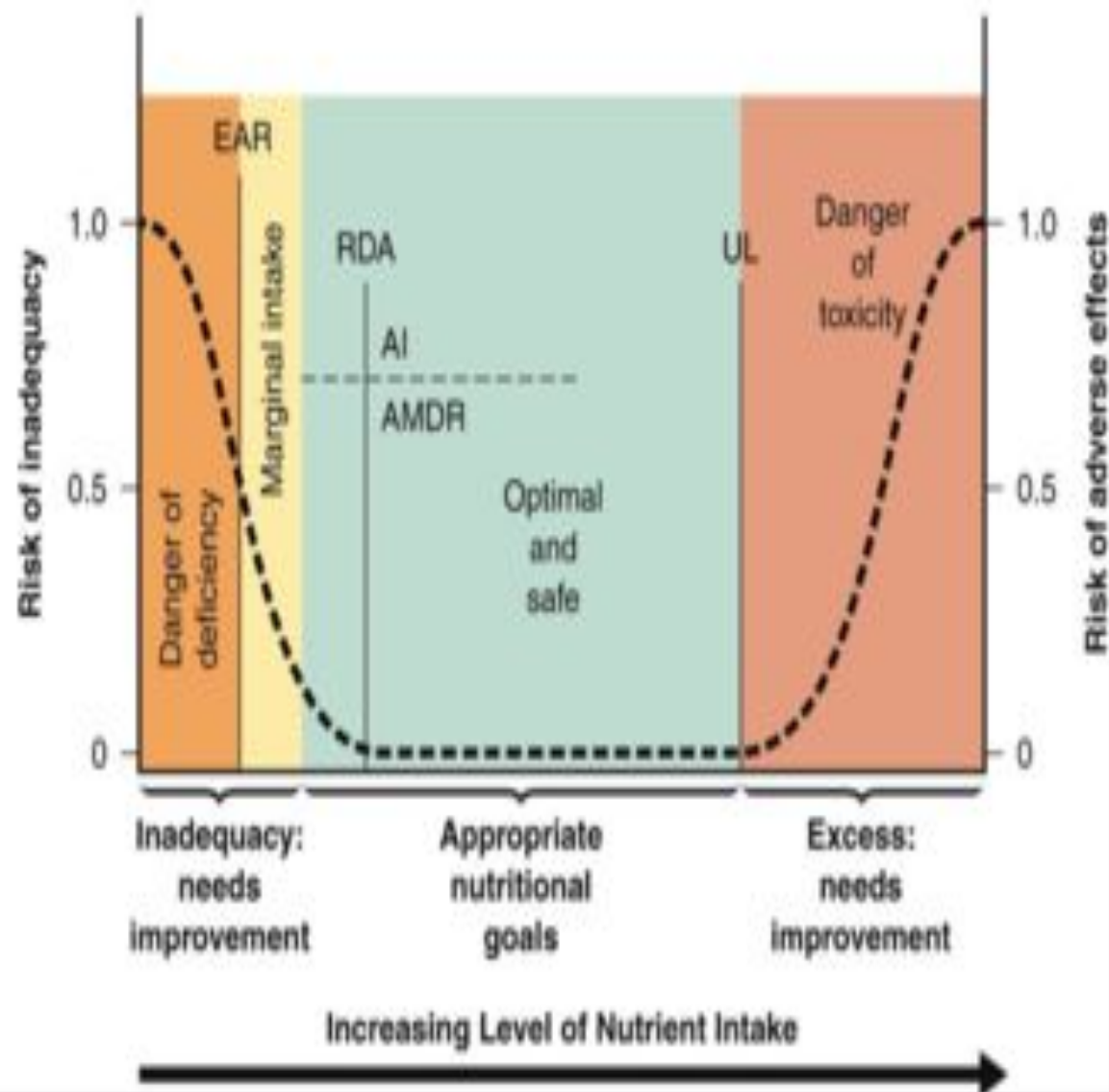
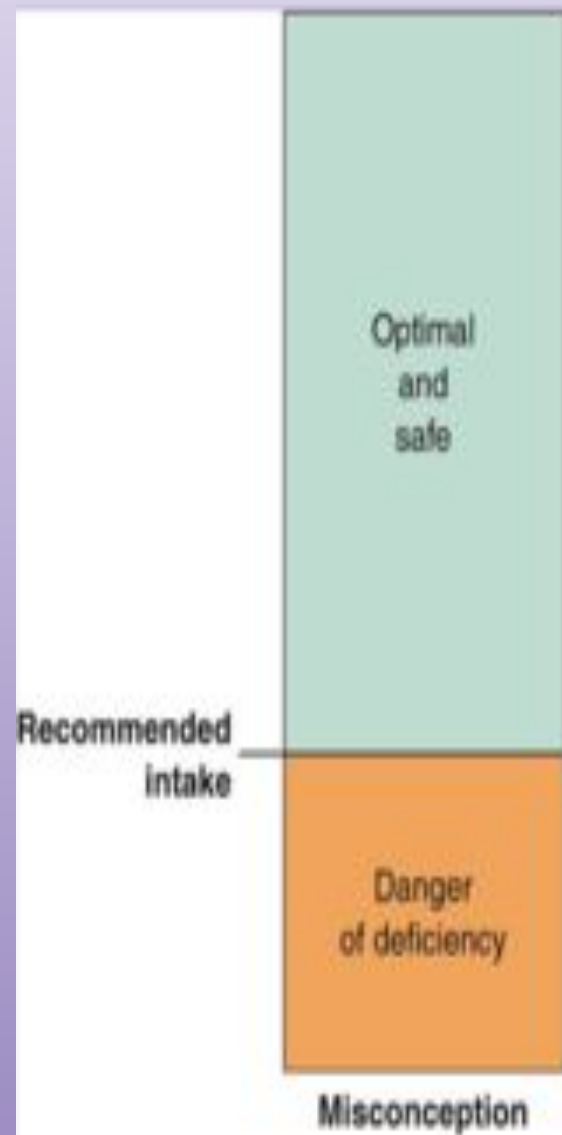
- **DRI (dietary reference intake)** – a set of 4 lists that measure the dietary/nutritional intakes of healthy people in North America
- **RDA (recommended dietary allowance)** – nutrient intake goals for individuals; determined by the average daily nutrient intake that meets the needs of 97-98% of all healthy people in a particular life stage/age and gender group
- **Adequate Intake** – same as RDA but used when there is not enough scientific data to establish an RDA

Definitions

- **Tolerable Upper Intake Levels (UL)** – the highest average daily intake of a nutrient that is likely to pose no risk of toxicity to healthy individuals
- **Estimated Average Requirements (EAR)** – the average daily intake of a nutrient estimated to meet the requirement of **half** of the healthy individuals; used to establish RDA
- <https://youtu.be/236rfyMIGd0?feature=shared>

Definitions

- **Acceptable Macronutrient Distribution Ranges (AMDR)** – values for macronutrients expressed as percentages of total daily caloric intake
- **Daily Values (DV)** – nutrient standards used on food labels; **based on a 2000 calorie/day** diet; allows comparison of nutrient content between products



Factors affecting nutritional status

- Age
- Gender
- Size
- Lifestyle
- Life stage
- Ethnic background
- Genetics
- Socioeconomic status
- <https://youtu.be/767XvUz5Aro?feature=shared>
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Energy content of foods

**** Know these numbers! ****

- **Carbohydrates – 4 calories per gram**
- **Proteins – 4 calories per gram**
- **Alcohol – 7 calories per gram**
- **Lipids – 9 calories per gram**

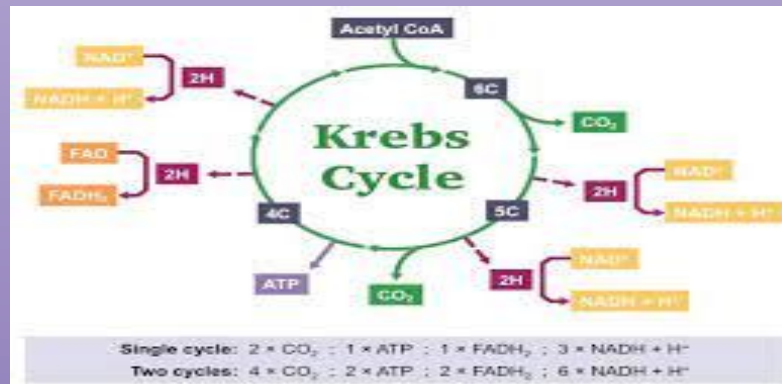


Metabolism

- Refers to all the chemical reactions in the body
- 2 types; anabolic and catabolic
- **Catabolism** – break down complex organic molecules into simpler ones; decomposition
- **Anabolism** – combine simple molecules and monomers to form the body's complex structural and functional components; synthesis

Metabolism

- An energy balancing act between anabolic and catabolic processes
- The main molecule is ATP
- Any molecule synthesized by anabolic processes has a lifespan and will eventually be recycled or broken down again



Factors that affect metabolism

- Metabolic rate depends on numerous factors:
 - Genetics, age, life stage
 - Exercise, activity (sleeping for example)
 - Hormones (thyroid, insulin, testosterone, GH)
 - Nervous system (adrenaline)
 - Body temperature, climate
 - Ingestion of food (food thermogenesis)
 - Nutritional status (malnutrition)

****We will talk more about metabolism & basal metabolic rate later in this course****

Canada's Food Guide - History

First "Food Rules" were given in 1942

CANADA'S OFFICIAL FOOD RULES

These are the Health-Protective Foods

Be sure you eat them every day in at least these amounts.

(Use more if you can)

MILK—Adults— $\frac{1}{2}$ pint. Children—more than 1 pint. And some CHEESE, as available.

FRUITS—One serving of tomatoes daily, or of a citrus fruit, or of tomato or citrus fruit juices, and one serving of other fruits, fresh, canned or dried.

VEGETABLES (In addition to potatoes of which you need one serving daily)—Two servings daily of vegetables, preferably leafy green, or yellow, and frequently raw.

CEREALS AND BREAD—One serving of a whole-grain cereal and 4 to 6 slices of Canada Approved Bread, brown or white.

MEAT, FISH, etc.—One serving a day of meat, fish, or meat substitutes. Liver, heart or kidney once a week.

EGGS—At least 3 or 4 eggs weekly.

Eat these foods first, then add these and other foods you wish.

Some source of Vitamin D such as fish liver oils, is essential for children, and may be advisable for adults.

1961 version

CANADA'S FOOD GUIDE

THESE FOODS ARE GOOD TO EAT.
EAT THEM EVERY DAY FOR HEALTH.
HAVE THREE MEALS EACH DAY.

MILK	Children up to about 11 years	2 1/2 cups (250 ml) each
	Adolescents	4 cups (1000 ml) each
	Adults	1 1/2 cups (375 ml) each
	Expectant and nursing mothers	4 cups (1000 ml) each

FRUIT Two servings of fruit or juice including a satisfactory source of vitamin C (acceptable fruits such as oranges, tomatoes, sterilized apple juice).

VEGETABLES One serving of potatoes, two servings of other vegetables, preferably yellow or green and often raw.

BREAD AND CEREALS Bread (with butter or fortified margarine). One serving of whole grain cereal.

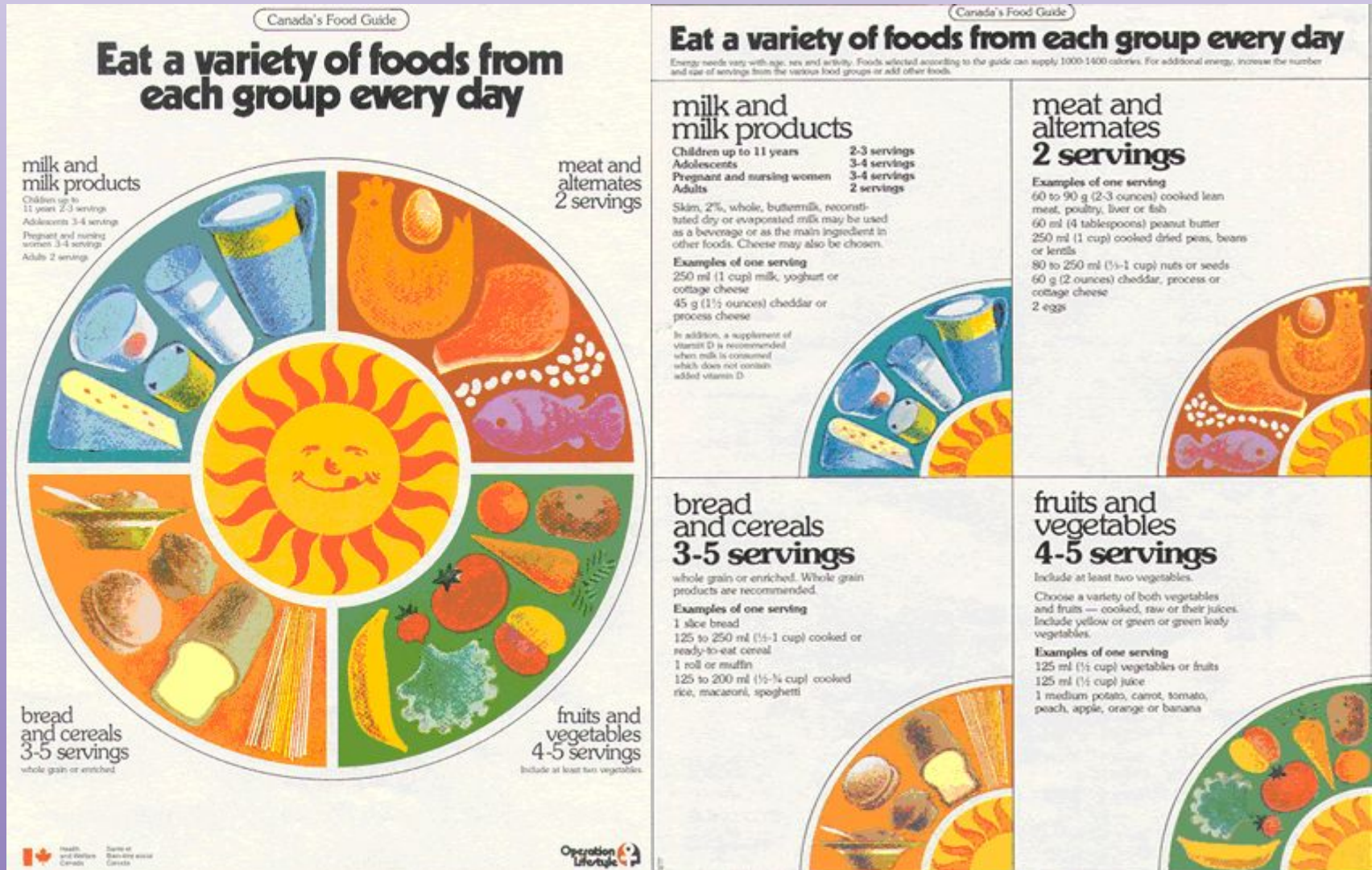
MEAT AND FISH One serving of meat, fish or poultry. Eat liver occasionally. Eggs, cheese, dried beans or peas, may be used in place of meat. In addition, eggs and cheese must at least three times a week.

STANDARD 5 4000 recommended kilocalories for all growing persons and expectant and nursing mothers.

APPROVED BY THE CANADIAN COUNCIL ON NUTRITION, 1961.
NATIONAL NUTRITION, DEPARTMENT OF NATIONAL HEALTH & WELFARE, CANADA

Canada's Food Guide - History

1977 version.



Canada's Food Guide History

1992 Version



Health
Canada

Santé
Canada

CANADA'S

Food Guide

**TO HEALTHY EATING
FOR PEOPLE FOUR YEARS
AND OVER**

Enjoy a variety of foods from each group every day.

Choose lower-fat foods more often.

Grain Products
Choose whole grain and enriched products more often.

Vegetables and Fruit
Choose dark green and orange vegetables and orange fruit more often.

Milk Products
Choose lower-fat milk products more often.

Meat and Alternatives
Choose leaner meats, poultry and fish, as well as dried peas, beans and lentils more often.



Grain Products
5-12
SERVINGS PER DAY

Vegetables and Fruit
5-10
SERVINGS PER DAY

Milk Products
SERVINGS PER DAY
Children 4-6 years: 2-3
Boys 10-14 years: 3-4
Adults: 3-4
Pregnant and Breast-feeding Women: 3-4

Meat and Alternatives
2-3
SERVINGS PER DAY

1 Serving



1 Slice

2 Servings



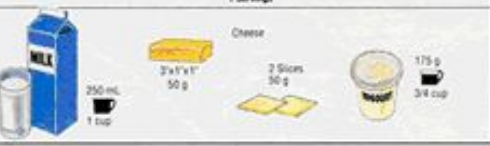
Hot Cereal 175 mL
Cold Cereal 30 g
175 mL
3/4 cup
30 g
1 Bagel, Pita or Bun
250 mL
1 cup

1 Serving



1 Medium Size Vegetable or Fruit
Fresh, Frozen or Canned Vegetables or Fruit 125 mL
1/2 cup
Salad 250 mL
1 cup
Juice 125 mL
1/2 cup

1 Servings



250 mL
1 cup
3/4 x 1" 50 g
2 Slices 30 g
175 g
3/4 cup

1 Serving



Meat, Poultry or Fish 50-100 g
1/3-2/3 Can 50-100 g
1/2-2 Eggs
Beans 125-250 mL
100 g
1/3 cup
Peanut Butter 30 mL, 2 Tbsp

Other Foods

Taste and enjoyment can also come from other foods and beverages that are not part of the 4 food groups. Some of these foods are higher in fat or Calories, so use these foods in moderation.

Different People Need Different Amounts of Food

The amount of food you need every day from the 4 food groups and other foods depends on your age, body size, activity level, whether you are male or female and if you are pregnant or breast-feeding. That's why the Food Guide gives a lower and higher number of servings for each food group. For example, young children can choose the lower number of servings, while male teenagers can go to the higher number. Most other people can choose servings somewhere in between.







Consult Canada's Physical Activity Guide to Healthy Active Living to help you build physical activity into your daily life.

Enjoy eating well, being active and feeling good about yourself. That's **VITALITY**




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Canada's Food Guide- 2020

A big change in format!

**Have plenty of
vegetables and fruits**

Eat protein foods

**Make water
your drink
of choice**

**Choose
whole grain
foods**



Canada's Food Guide

Now includes these recommendations beyond serving recommendations:

- Be mindful of your eating habits
 - Cook more Often
- Enjoy your food
- Eat meals with others
- Use Food Labels
- Limit highly processed foods
- Be aware of marketing/advertising's influence on your food choices



Canada's Food Guide- History

What recommendations have remained similar over the years?

What are some major differences?

What criticisms do you have or have you heard about the Food Guide?

Are you interested in food guidelines around the world? See:

<https://www.fao.org/nutrition/education/food-based-dietary-guidelines>

<https://www.cbc.ca/news/health/canada-food-guide-international-guidelines-1.4962611>

Canada's Food Guide Cont.

What evidence is used to make these recommendations?

<https://www.canada.ca/en/health-canada/services/canada-food-guide/resources/evidence/food-nutrients-health-interim-evidence-update-2018.html>

Health Canada surveys nutritional science to keep an eye on convincing relationships between food intakes and either good or bad outcomes as a result.

Nutrition Facts Labels

The total mass in grams of that category in the serving size

One of the 4 main categories included in the Percent Daily Values

Nutrition Facts			
Serving Size		5 Crackers (15g)	
Servings Per Container		About 22	
Amount Per Serving			
Calories 70		Calories from Fat 30	
		% Daily Value*	
Total Fat	3.5g		5%
Saturated Fat	0.5g		3%
Trans Fat	0g		
Polyunsaturated Fat	2g		
Monounsaturated Fat	1g		
Cholesterol	0mg		0%
Sodium	210mg		9%
Total Carbohydrate	9g		3%
Dietary Fiber	less than 1g		1%
Sugars	1g		
Protein	1g		
Vitamin A	0%	Vitamin C	0%
Calcium	0%	Iron	2%
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:			
		Calories	2,000 2,500
Total Fat	Less than	65g	80g
Sat. Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

This serving size in grams is broken down by the categories below

This is the percent of the Daily Value the serving size fulfills for the corresponding category or subcategory.

One of the 2 subcategories included in the Percent Daily Values

This is the mass recommended per day per person for a 2000 calorie diet for each category or subcategory.

Reading Nutrition Labels Activity

Compare two packaged foods with a vegetable and fruit using the nutrition labels & the nutrient tables at

<https://www.fda.gov/food/food-labeling-nutrition/nutrition-information-raw-vegetables>

Name of Food				
Serving Size- Realistic or not?				
Calories per serving				
Grams of Protein				
Grams of Fat				
Grams of Carbohydrate				
Grams of Fibre				
Grams of Sugar				
Is this food suitable for any of the following diets? Vegan (V) Gluten-free (GF) Keto (K)				