



Canadian Liver Foundation  
Fondation canadienne du foie

*Bringing liver research to life*  
*Donner vie à la recherche sur le foie*



UNIVERSITY OF  
**ALBERTA**

# Liver Health & Nutrition for the Whole Family

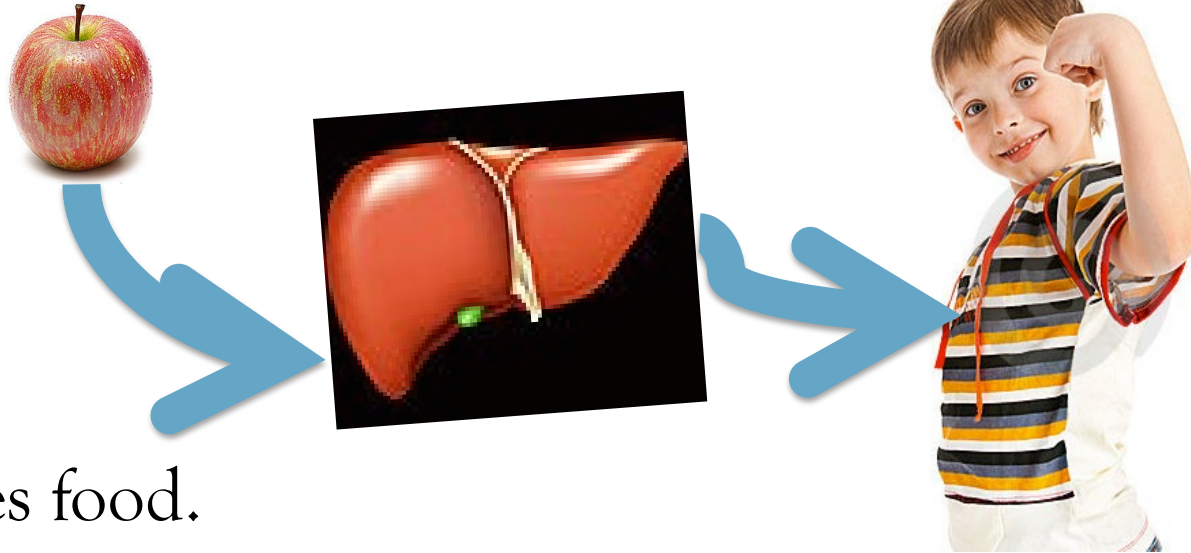
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# The Order of the Day

- Role of the Liver in Health and Wellbeing and the Benefits of Healthy Eating in Chronic Liver Disease
- Fatty Liver Disease and the Link to Poor Eating Habits
- What are your nutritional needs in chronic liver diseases such as Biliary Atresia or Primary Biliary Cirrhosis: What nutrients are Nutrition Labeling
- Canada's Food Guide; with a focus on healthy food choices and portion sizes.
- Daily Movement, Physical Activity & Exercise

# Your Liver



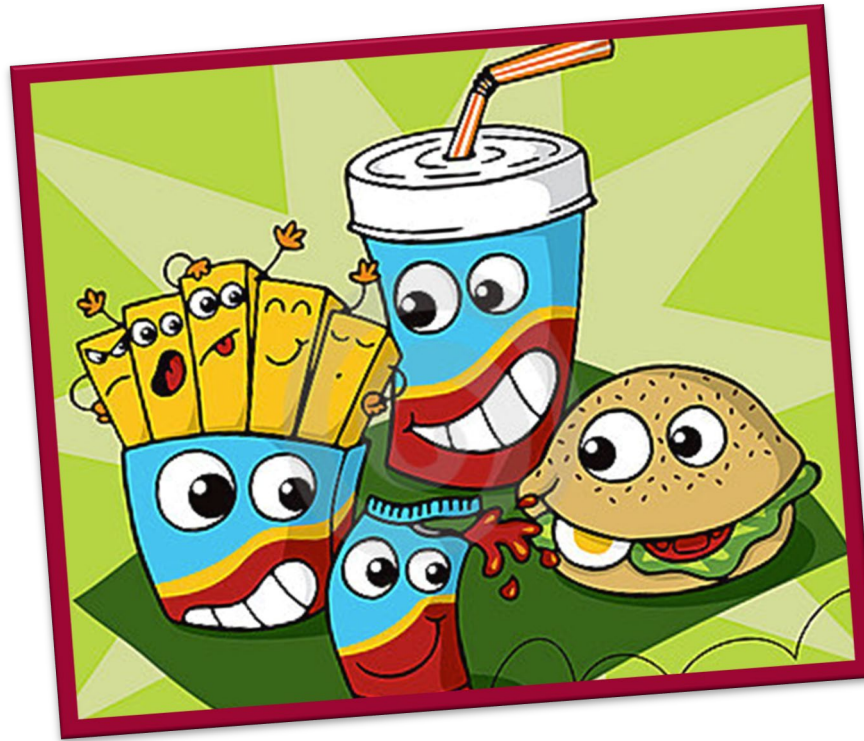
- Processes food.
- Produce important nutrients and growth factors that are important for health and growth.
- Storage of energy, fat, and vitamins and minerals.
- Is a filter to remove toxins
- Protect us from infections.

# Benefits of healthy eating

- Helps your liver to function well
- You will have more energy
- Helps you to have a healthy body weight
- Helps to prevent diseases
- You will look and feel better







Fatty Liver Disease: Are we making  
pate of our livers by eating the wrong  
types of foods?

# NAFLD Spectrum

Diet/Physical Inactivity

Deficits in LCPUFA?

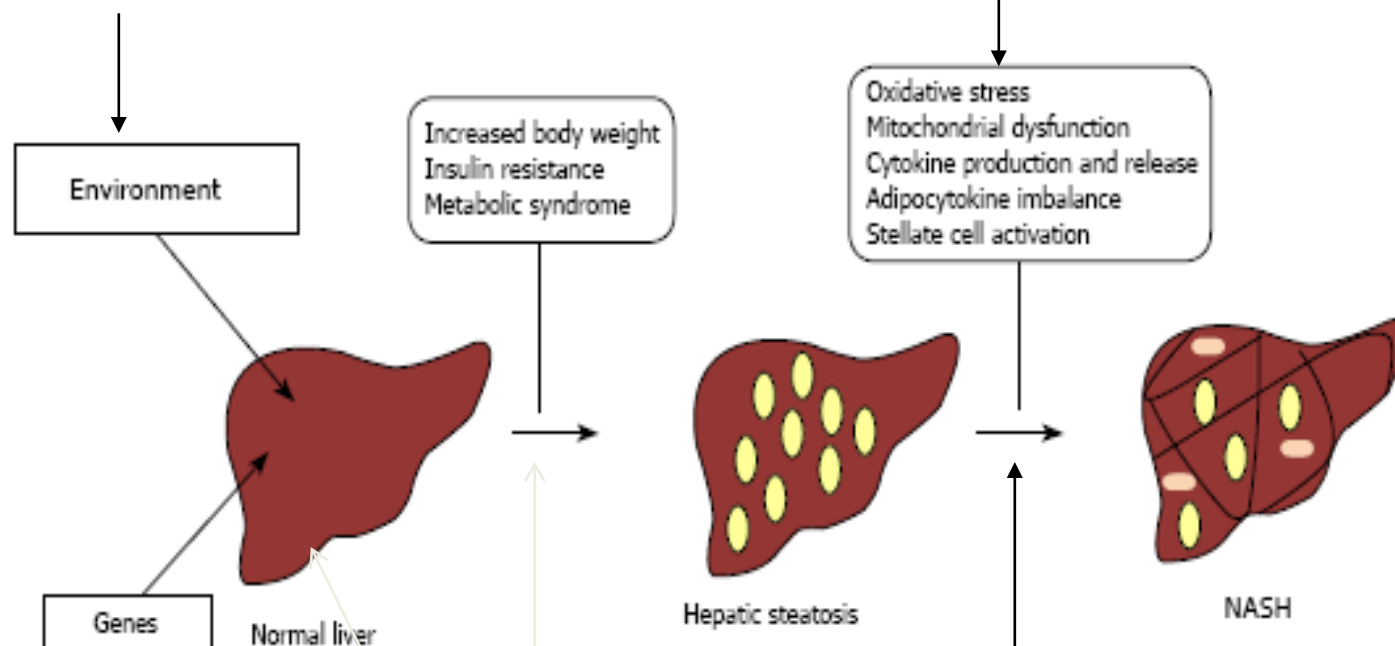


Figure 1 Nonalcoholic fatty liver disease (NAFLD)/nonalcoholic steatohepatitis (NASH) pathogenesis.

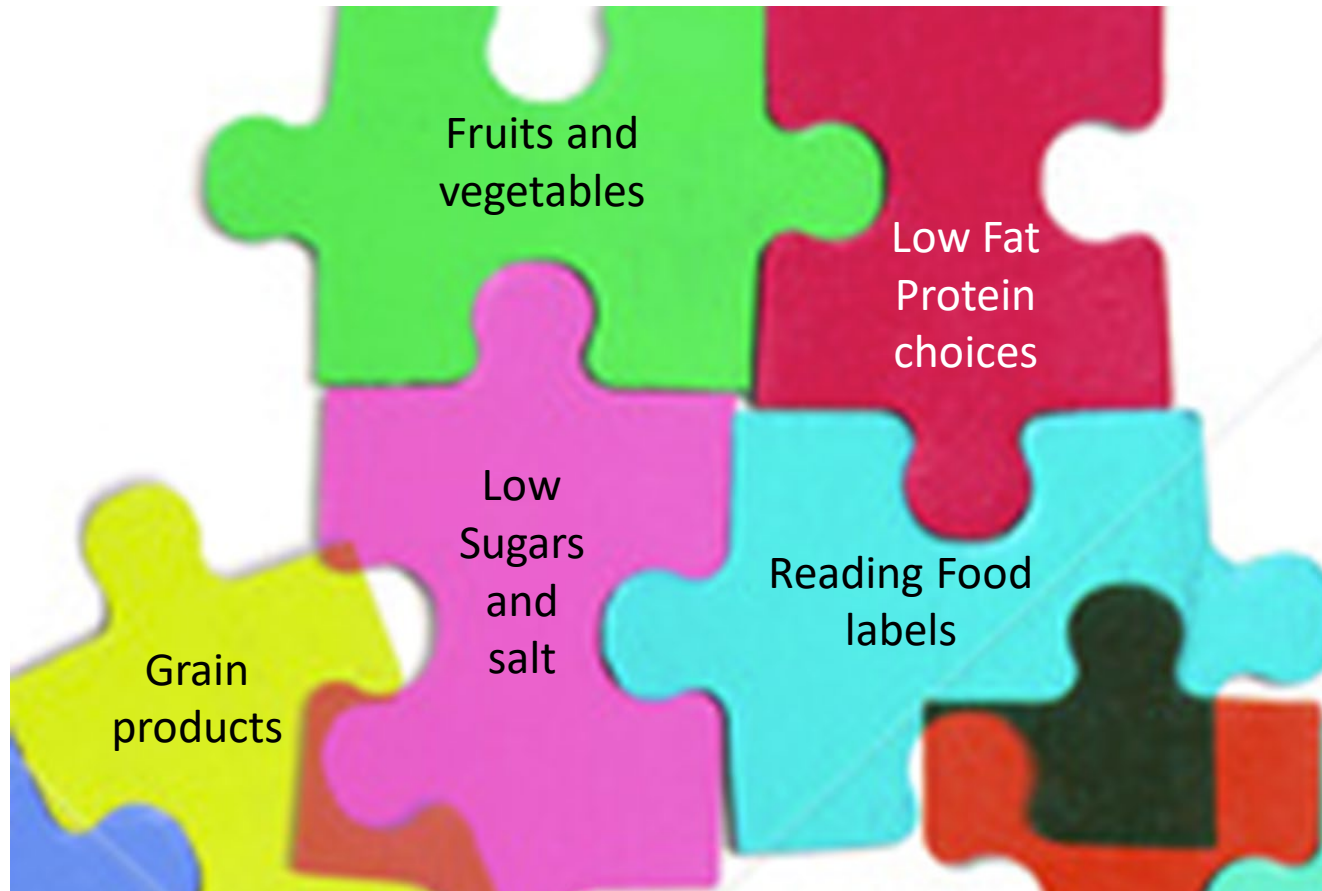
**Saturated fat intake/low polyunsaturated fat?**

Adapted from Nobili et al W J Gastroenterology 2009

# Are we putting the pieces together like this?

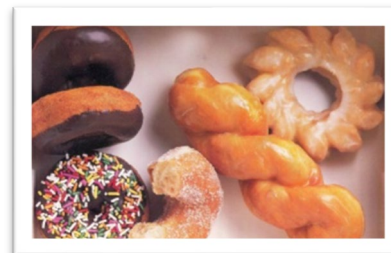


# Or are we putting the pieces together like this?



# So what are the factors that are thought to influence NAFLD?

- High intakes of fried foods, fast food meals.
- Large Portion Size (Super Size Me?).
- High intakes of simple sugars in carbonated beverages.



# High Fructose Corn Syrup....be careful



Found naturally  
in fruit, plant foods  
and honey



Used as  
sweetener in food  
industry

## Fructose in Naturally occurring vs processed foods.

**In excess:** turns into fat in the liver

Mean consumption in children and adolescents: 50-70 g/d

Adults > 70 g/d.

3rd National Health and Nutrition Examination Survey estimated



# So what is important to Liver Health:



Healthy Eating and Physical Activity  
Throughout the Liver Cycle

# Fruits and vegetables

- Rich in vitamins, minerals and
- antioxidants that are healthy for your liver.
- Good source of fibre.
- They are low in fat and calories.
- Have to be consumed in larger portions\*
- CHOOSE MORE OFTEN GREENLY VEGETABLES AND FRESH FRUITS.
- Limit juice to 1 serving (4 oz) per day.



\*The serving/portion size of fruits and vegetables consumed is important



# Grain products and liver health

- Carbohydrates
- Rich in fibre, vitamins and minerals
- Protein
- Choose whole grain



# Meat and alternatives

Provides

- Protein
- Fat: Choose lean meats to **protect your liver**
- Vitamins and Minerals
- Consume more often nuts and legumes



# Dairy products

- Rich in calcium and vitamin D  
**important for optimal bone health.**
- Good source of protein
- Content of fat depend of preparation
- Contain carbohydrates
- Choose skim milk products with no added sugar to **maintain a healthy liver**



# Oils and Fats



- Supply calories and help our bodies absorb fat-soluble vitamins A, D, E and K.
- The type of fat consumed is as **important for your liver** as the total amount consumed.
- Omega-3 FA vs Omega-6 FA



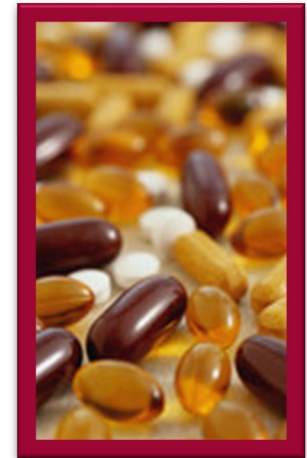


# Vitamins and Minerals in Chronic Liver Disease



# Fat-Soluble Vitamins

- Vitamins A, D, E and K are fat-soluble
- Body can use them only when bound to fat
- If there is not enough bile in the intestine for fat digestion, one may suffer from vitamin deficiency
- Supplements by mouth may be needed
- Infants, children and adults with prolonged jaundice often have problems absorbing certain vitamins due to poor bile flow will need to take extra vitamin supplements; particularly those containing these vitamins.



# Vitamin A

Sources of vitamin A and beta-carotene:



Vitamin A comes from animal sources such as eggs, meat and dairy products

Beta-carotene, a precursor of vitamin A, comes from green, leafy vegetables and intensely colored fruits and vegetables



ADAM.



# How much vitamin A do we need

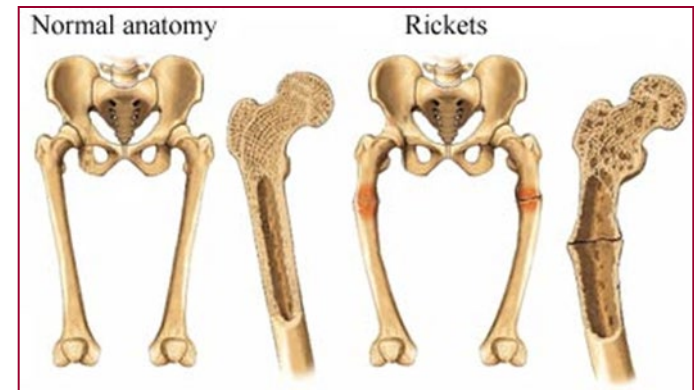
- RDA for Healthy Populations: Infants-8 yrs: 300-500 RE/D; Children/Adults >9 yrs: 600-900 RAE;
- Infants, Children and Adults with Liver Disease and jaundice: may need as high as 500-2000 RAE per day.
- How do I get this? Red-yellow vegetables are the best source; but also may need to take a vitamin supplement that contains 1000-3000 RAE; avoid any supplement with vitamin A content about 10,000 RAE /tablet.
- Consult your health professional regarding the need for routine supplementation.



# Classic Features of Vitamin D deficiency

## Child

- Early childhood: Classic: rickets, increased bone fragility, bone fracture risk
- Other issues: significant growth motor impairment and growth delay

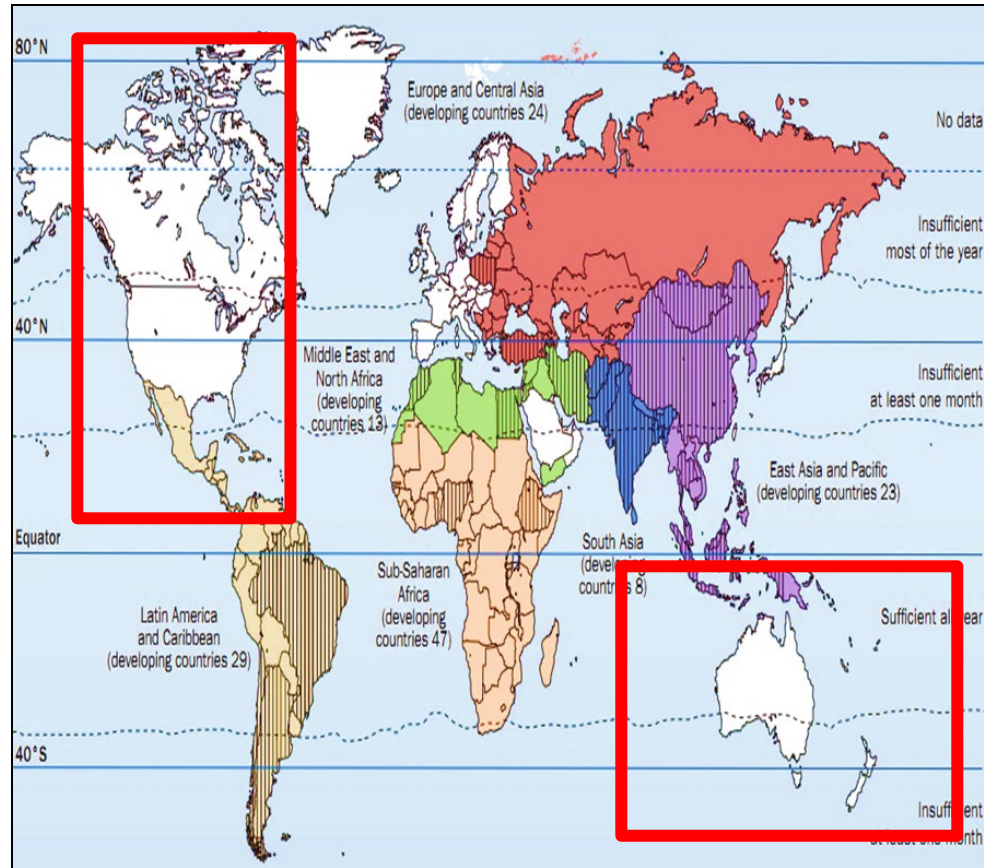


## Adults

- Osteomalacia with increased bone fragility
- Reduced BMD: Osteopenia/Osteoporosis associated with reduced bone mineral density
- Muscle pain and weakness, twitching

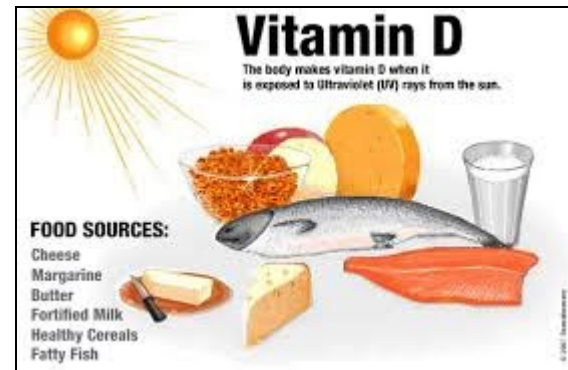


# Sunlight exposure and vitamin D synthesis in the skin



# Vitamin D in Liver Disease

- Few sources of dietary vitamin D :liver, fish, fortified milk/yogurts (some), margarine
- Sunlight exposure can be very important way to meet vitamin D needs. However, in northern climates this can be challenging.
- Most individuals rely on vitamin supplements to meet RDA due to low levels of intake; particularly in individuals with chronic disease such as Biliary Atresia due to issues of reduced absorption and altered metabolism.





# How much vitamin D do we need when you have liver disease?

- Recommended Dietary Allowance (RDA):
  - 600 IU/day (15 µg/d) (18-70yr), 800 IU/day (>70yr)
  - Toxicity rare; chronic intakes :50,000-100,000/d (over many months); toxicity related more to D2
  - May tolerate doses of >10,000 IU/d of D3 > 20 weeks without signs of toxicity: hypercalcemia
  - Controversy in literature with requirements: especially in liver disease; Most practitioners agree that 800-2000 IU/D are needed every day in chronic liver disease.




# Vitamin E

Tocopherol



Vitamin E is found in corn, nuts, olives, green, leafy vegetables, vegetable oils and wheat germ, but food alone cannot provide a beneficial amount of vitamin E, and supplements may be helpful

 ADAM.

# Vitamin K

Food sources of vitamin K include cabbage, cauliflower, spinach and other green, leafy vegetables, as well as cereals



ADAM.

# How much vitamin K do we need in liver disease

- RDA: 90-120 ug/d in adults; lower in children (30-60 ug/d)
- Most children and adults with chronic liver disease need 1-10 mg/d vitamin K.
- What does vitamin K do; Vitamin K is important for blood clotting; bone health, neurological function.
- Best sources of vitamin K: green leafy vegetables.



# Sodium

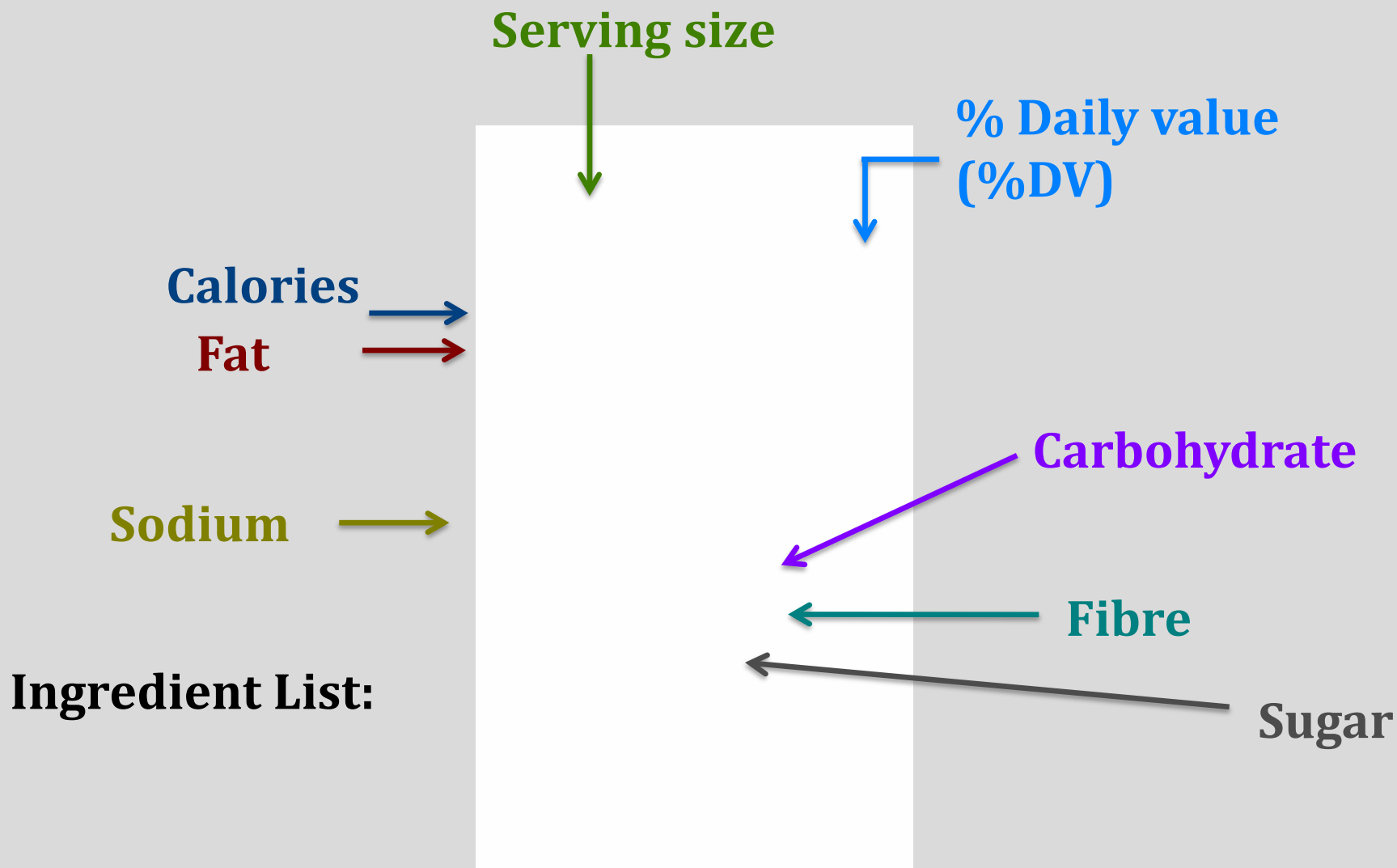
A tablespoon = 2000mg of sodium



- Function: maintain the fluid balance, blood pressure, transmit nerve impulses.
- Most of the salt we consumed is added in **processed food** or during food preparation.
- Pickled foods, **canned** vegetables and soups, snack foods, cured meats, **packaged** mixes and frozen dinners have higher amounts of sodium than **fresh foods**.

[WWW.EATRIGHT.ORG](http://WWW.EATRIGHT.ORG)





# What types of food choices are healthy for your liver and how much should you eat?



# Canada's Food Guide: Servings & Portion Size

- Serving: a reference amount of food determined by Health Canada or a food manufacturer<sup>1</sup>
- Portion: the amount of food you eat<sup>1</sup>



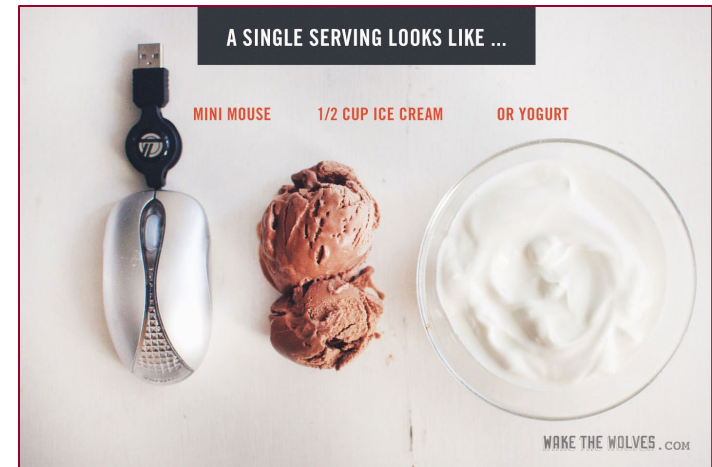
	Children			Teens		Adults			
	2-3	4-8	9-13	14-18 Years		19-50 Years		51+ Years	
	Girls and Boys			Female	Male	Female	Male	Female	Male
Vegetables and Fruit	4	5	6	7	8	7-8	8-10	7	7
Grain Products	3	4	6	6	7	6-7	8	6	7
Milk and Alternatives	2	2	3-4	3-4	3-4	2	2	3	3
Meat and Alternatives	1	1	1-2	2	3	2	3	2	3

Source: Recommended number of food guide servings per day. (2007), Health Canada. Reproduced with the permission of the Minister of Public Works and Government Services Canada, 2009.





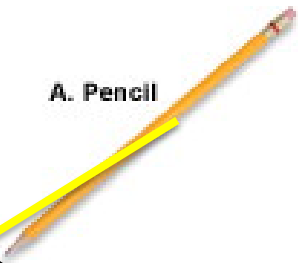







1: <http://www.eatrightontario.ca/en/Articles/Nutrition-Labeling/Understanding-Portion-Sizes#.VQ4ytRreujd>

# Photos of Servings/Portions



# Match the Food to the Correct Item

Which food on the left matches the portion size on the right?

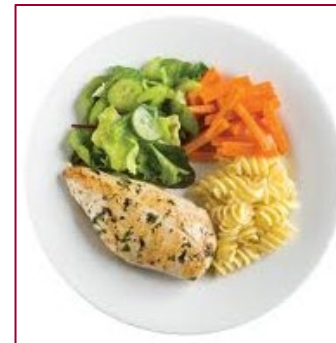
 <input type="checkbox"/> 3 oz. Lean meat	 <input type="checkbox"/> Small baked potato	 A. Pencil	 B. Baseball
 <input type="checkbox"/> Medium banana			 C. Golf ball
 <input type="checkbox"/> 1/4 cup Nuts	 <input type="checkbox"/> 1 cup vegetables (cooked or raw)	 D. Smart phone	 E. Computer mouse

**Answer**

# My Plate

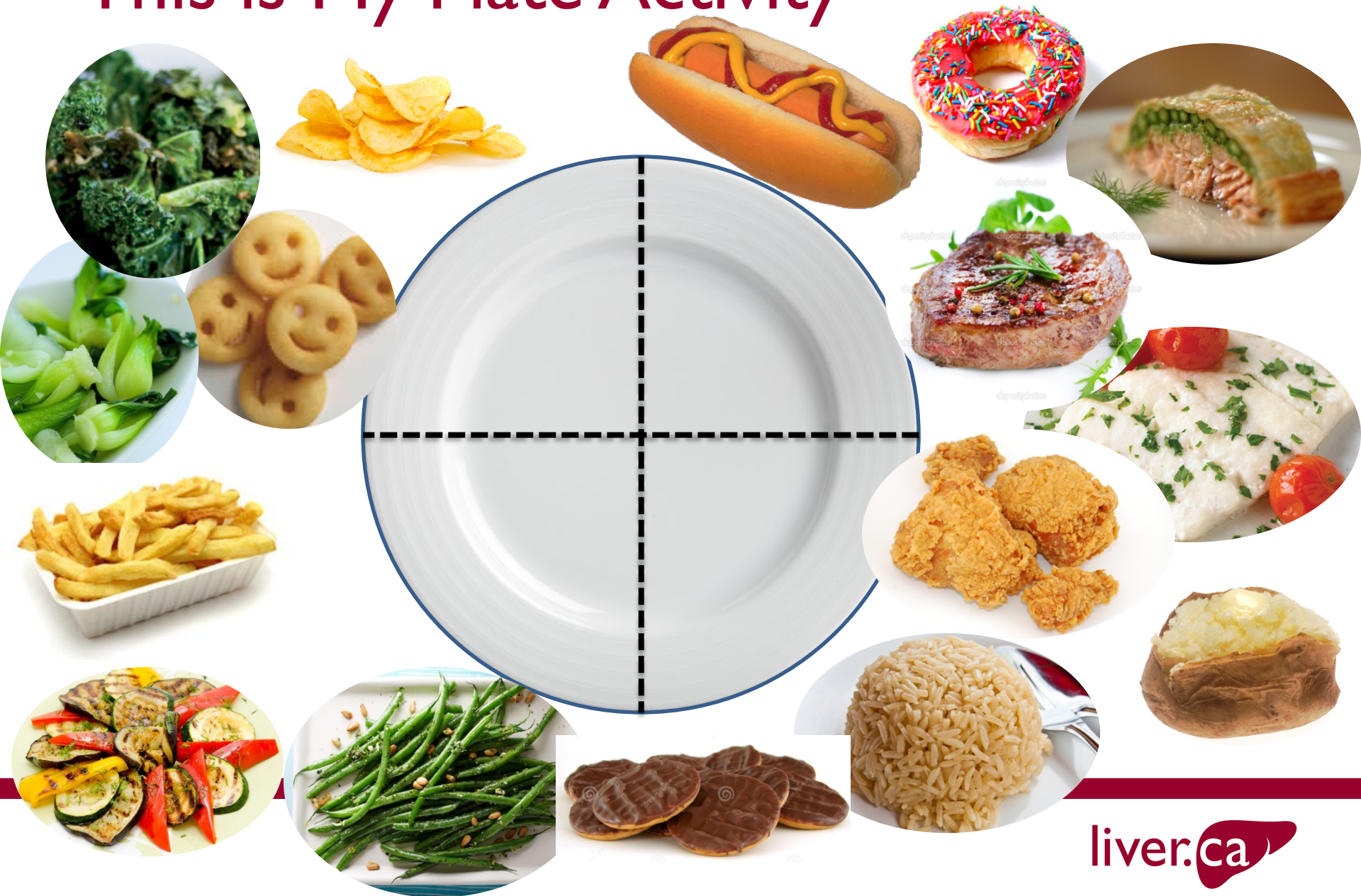


- $\frac{1}{2}$  Vegetables (or  $\frac{1}{4}$  Veggies +  $\frac{1}{4}$  Fruit)
- $\frac{1}{4}$  Grain
- $\frac{1}{4}$  Meat/Protein
- 1 cup Milk or an alternative





# This is My Plate Activity

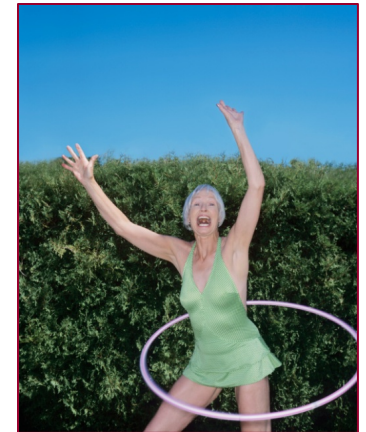


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# Canadian Physical Activity & Sedentary Behaviour Guidelines

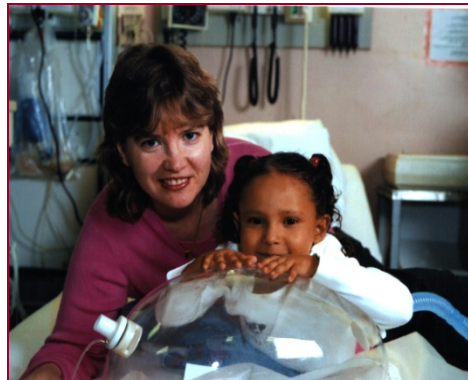
- Early Years: 180 min/day
- Children & Youth: 60 min/day
- Adults (18-64): 150min/week
- Older Adults (65+): 150 min/week
- Should include moderate to vigorous intensity activity







# Acknowledgements



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# Is ignorance bliss or is knowledge empowering?

