FOOD & NUTRITION EXAM REVIEW

CH 1: Food Choices & Human Health

Macronutrients vs micronutrients

- MACRO
  - Supply your body with energy, energy is measured by calories
    - Carbohydrates
    - Fat/lipids
    - Proteins
    - *Alcohol is not considered a nutrient
- MICRO
  - Necessary for the release of energy
    - They do not have calories and don't supply your body with energy
    - Vitamins
    - Minerals

Energy yielding nutrients

- Carbohydrates → 4 cal/g
- Fats → 9 cal/g
- Protein → 4 cal/g
- Alcohol → 7 cal/g

Organic vs inorganic

- Organic nutrients contain CARBON, derived from living things
  - Carbs, fat, protein, vitamins

Nutrient dense vs calorie dense foods

- NUTRIENT
  - High in nutrients, low in calories
  - Our diet should be composed of mostly nutrient dense foods
- CALORIE
  - High in calories, low in nutrients
  - Okay in moderate quantities

CH 2: Nutrition Tools

Food labeling

- What must be present…
    - Common name of product
    - Name/address of manufacturer
    - Ingredients list
    - Nutrition facts panel
- What doesn't need a label…
    - Fresh fruit/vegetables
    - Raw meat
    - Food made at store
    - Food that contains few nutrients
    - Alcohol
- Ingredients list…
    - List all ingredients by weight, from most to least

CH 3: The Remarkable Human Body

Problems with digestion

- Hiccups – spasms of the vocal cords and diaphragm, caused by indigestion or irritation to the diaphragm, breathing into a paper bag or dissolving a teaspoon of sugar may help
- Heartburn – caused by backflow of stomach acid into the esophagus
- Ulcer – erosion to the topmost and sometimes underlying layers of the cell that form the lining, commonly form in the esophagus, stomach or upper small intestine
- Hernia – a protrusion of an organ through the wall of the body chamber that normally contains the organ
- GERD – chronic splashing of stomach acids and enzymes into the esophagus, throat, mouth or airway that causes inflammation or injury, may cause esophageal cancer, treatmay may require surgery or medication
- Constipation – infrequent, difficult bowl movements caused by diet, inactivity, dehydration or medication
- Diarrhea – frequent, watery bowl movements caused by diet, stress or irritation, prolonged diarrhea robs the body of fluid and minerals causing dehydration
- Irritable bowel syndrome – disturbance of bowel function, diarrhea or alternating diarrhea and constipation, associated with diet, lack of activity or stress
- Foods and intestinal gas – milk, beans, vegetables and air swallowed during eating or drinking may cause little to excessive intestinal gas

Hormones that regulate hunger and fullness

- Gastrin is released into the blood by the stomach and small intestine in response to food intake and stimulates the release of stomach acid
- Cholecystokinin (CCK) is released into the blood by the small intestine and stimulates the gallbladder to contract and the pancreas to release pancreatic fluid
- Secritin is released by the small intestine and also stimulates the pancreas to release pancreatic fluid, aiding food in digestion
- When the pancreas detects a high concentration of glucose, it releases insult, stimulating muscles and other cells to remove glucose from the blood and store it
- The pancreas secretes glucagon when the blood glucose level falls, the liver responds by releasing some of the stored glycogen

CH 4: The Carbohydrates – Sugar, Starch, Glycogen, and Fibre

Types of fuel for the CNS

- Glucose from carbohydrate is a critical energy source, starchy foods, or complex carbohydrates, especially the fibre rich ones, are the preferred source of glucose for the diet
- Protein rich foods are usually expensive, and the provide no advantage over carbohydrates when used to make fuel for the body
- Fats normally are not used as fuel by the brain and CNS

Role of dietary fibre

- Indigestible parts of plant foods
- Whole grains, vegetables, legumes, and fruit
- Benefits: promotion of normal blood cholesterol concentrations, modulation of blood glucose concentrations, maintenance of healthy bowel function and help maintain a healthy body weight

Refined grains: which nutrient must be re-added by law in Canada

- Canada allowed optional enrichment of white wheat flour with B vitamins; in the mid 1970s, it became mandatory to add riboflavin, thiamin, niacin and iron to bleached wheat flour; and in the late 1990s it also became mandatory to add folic acid and optional to add other nutrients

Type 2 diabetes

- Characterized by relative insulin deficiency
- Target tissues become resistant to the actions of insulin, not effective in moving glucose from the bloodstream and into the cells
    - Blood glucose rises, as does blood insulin
    - Obesity brings on an insulin resistance
- Chronic progressive disease, with the end stage being type 2 diabetes

- Tends to run in families, some ethnicities are more susceptible
- Thought to be largely related to body weight
- High risk of developing cardiovascular disease
- Prevention: maintain a healthy body weight, choose a diet high in vegetables, fish, fruit, poultry and whole grains, exercise regularly, restrict alcohol and abstain from smoking

Artificial sweeteners, sugar alcohols

- Sugar Alcohols – envoke a low glycemic response, the body absorbs the sugar alcohols slowly; consequently, they are slower to enter the blood stream than other sugars. Regulations require if the product has more than 50 g of sugar alcohols in a day, the label must say "excess consumption may have a laxative effect". However, they do not contribute to dental cavities. Sugar alcohols do provide energy, but are not calorie free
- Artificial Sweeteners – make food tatse sweet without promoting dental decay and are calorie free. Current evidence states that artificial sweeteners pose no health risks, however, moderation is the key

CH: 5 – The Lipids

Essential fatty acids and dietary sources

- Linoleic acid is the parent to the omega 6 fatty acid family, leafy vegetables, seeds, nuts, grains, vegetable oils, poultry fat
- Linolenic acid is the parent to the omega 3 fatty acid family , other oils, nuts and seeds, vegetables
    - EPA and DHA – human milk, fatty coldwater fish, omega 3 eggs

Dietary sources of saturated fat/trans fat/cholesterol/unsaturated fat

- Saturated → beacon, butter, cheese, lard, milk, oils, sour cream
- Trans Fat → commercial baked goods, fried foods, margarine, nondairy creamers
- Unsaturated → avocado, nuts, olives, peanut butter, seeds
- Cholesterol → cholesterol is found in animal products, meats, poultry, fish, eggs and milk products
- * AVOID SATURATED AND TRANS FAT, monounsaturated, and omega 3 and omega 6 polyunsaturated are good!

Differences between a fat, oil, phospholipid and sterol

- Lipids - a family of organic compounds soluble in organic solvents but not in water
- Fat → lipids that are solid at room temperature
- Oil → lipids that are liquid at room temperature
- Sterols → sterols are large, complicated molecules, consisting of interconnected rings of carbon atoms with side chains of carbon, hydrogen, and oxygen – cholesterol is a sterol

- Phospholipid → a lipid containing a phosphate group in its molecule, ex: lecithin (made by the body, not essential)

Dietary fat and blood cholesterol levels

- Both LDL and HDL carry lipids in the blood, but LDL is larger, lighter and richer in cholesterol while HDL are smaller, denser and packaged with more protein
- LDL deliver triglyerides and cholesterol from the liver to the tissues, HDL scavage excess cholesterol and phospholipids from the tissues for disposal
- A high LDL cholesterol concentration is a predictor of the likelihood of suffering a fatal heart attack or stroke, the higher the LDL, the earlier the episode may occur; HDL cholesterol signifies a lower disease risk
    - HDL is healthy cholesterol, LDL is bad cholesterol
- Among major dietary factors that raise blood cholesterol, saturated fat and trans fat intakes are the most influential. Dietary cholesterol raises blood cholesterol but to a lesser degree
- The most effective way to reduce a foods potential for elevating blood cholesterol is to eliminate as much of the saturated fat and trans fat possible (ex. don't put sour cream and butter on your baked potato)

Role of fat in the body

- Triglycerides eaten in food are transported to body tissues
    - Muscles, breasts, adipose tissue. Fat is stored here for later use
- When a persons body starts to run out of available fuel from food, it begins to retrieve this stored fat for energy use
    - Whenever fat is broken down in the body, carbohydrates must be available as well
- Other functions include:
    - Muscle fuel
    - Emergency reserves
    - Padding
    - Insulation
    - Cell membranes
    - Raw materials – hormones, bile, vitamin D

Is fat essential?

- Cholesterol, saturated fats, trans fats and monounsaturated fats are NOT essential (our body can make them)
- The only 2 types of PUFA that are essential are omega 6 (linoleic) and omega 3 (linolenic)

CH 6: The Proteins and Amino Acids

Requirements / conditions for protein synthesis & breakdown

- For each protein there exists a standard amino acid sequence, and that sequence is specified by heredity
- Steps involved in protein synthesis:
    - The DNA serves as a template to make strands of mRNA. Each mRNA strand copies exactly the instructions for making some protein the cell needs
    - The mRNA exits the nucleus through the nuclear membrane. DNA remains inside the nucleus
    - The mRNA attaches itself to the protein making machinery of th cell, the ribosomes. Meanwhile, tRNA collects amino acids from the cell fluid and brings them to the messenger
    - Thousands of tRNAs, each carrying an amino acid, cluster around the ribosomes. When mRNA calls for a particular amino acid, the tRNA carrying it snaps into position. Then the next tRNA with its load moves into place, followed by the next
    - As the amino acids are lined up in the right sequence, and the ribosome moves along mRNA, an enzyme bonds one amino acid after another to the growing protein strand
    - Finally, the completed protein is released. The mRNA is degraded, and the tRNAs are freed to return for more amino acids

Dietary sources of high quality amino acids

- Amino acids from animal proteins are most easily digested and absorbed (90%)
- Legumes (80-90%)
- Grains and other plant foods vary (70-90%)
- Cooking with moist heat improves protein digestibility, whereas dry heat methods can impair it

Nutrients lacking from a vegetarian diet

- Poorly planned vegetarian diets typically lack iron, zinc, calcium, vitamin B12 and vitamin D
- Vegetarians who use animal derived foods receive high quality protein and are likely to meet their protein needs
- A wise vegetarian learns to use a variety of whole, unrefined foods often and commercially prepared foods less frequently
- Vegetarians may also use soybeans to boost protein intake

Various roles of protein in the body

- Growth and maintenance
    - Amino acids must be continuously available to maintain tissue proteins as they are replaced or to build new proteins
    - Helps replace worn out cells ad internal cell structures

    - The entire process of breakdown, recovery, and synthesis is called protein turnover
- Building enzymes, hormones and other compounds
    - Hormones → thyroid, helps maintain metabolism. Insulin, glucagon
    - Enzymes are among the most important of the proteins formed in living cells, each one a catalyst that facilitates a specific chemical reaction
- Building antibodies
    - Antibodies recognize every protein that belongs in their own body and leaves it alone, but they attack foreign proteins
- Maintaining fluid & electrolyte balance
    - Regulates the quantity of fluids in the compartments of the body
    - Too much can cause them to rupture, too little makes them unable to function
    - Transporting proteins in the membranes of cells maintain composition by continuously transferring substances into and out of cells
- Maintaining acid base balance
    - Blood proteins act as buffers to maintain the bloods normal pH
    - If blood pH changes too much acidosis (acid) or alkalosis (base) can cause coma or death
- Clotting of blood
    - Special blood proteins respond to an injury by clotting the blood
- Providing energy & glucose
    - For people eating a normal mixed diet, protein provides about 15% of the daily need for energy, protein use may speed up if needed
    - When amino acids are degraded for energy, their amine groups are stripped and they are excreted as urea
    - Many amino acids can be converted to glucose
- *carbohydrates offer energy, fat offers concentrated energy and protein can offer energy plus nitrogen
- There is no specialized protein energy storage compound (ex: fat is stored as a triglyceride)
- The body readily converts amino acids to glucose, the body possesses enzymes to turn them to fat and can produce fatty acids for storage as triglycerides in the fat tissue (if too much protein

PEM – protein energy malnutrition

- Most widespread malnutrition in the world
- Prevalent in africa, central America, south America, the middle east and asia
- Effects both adults and children – poor growth in children and weight loss/muscle wasting in adults
- Marasmus
    - Effects children from 6-18 months
    - Brain development stunted/learning impaired
    - Poor wound healing
    - GI tract – decreased digestive enzymes and digestive lining deteriorates (decreased absorption)

    - Fluid balance is most critical (electrolytes)
    - Can be corrected with nutrition therapy is caught early
- Kwashiorkor
    - Proteins of hormones that previously maintained fluid balance are now diminished, so fluid leaks out of the blood and accumulates in the belly and the legs, causing edema
    - Related to infection and inadequate protein intake
- A combination of both marasmus and kwashiorkor is possible
- Home
    - Lower socioeconomic status (rural areas), elderly, anorexia, hospitalized patients, disease

CH 7: The Vitamins

Main function of each vitamin in the body, top food sources

- Vitamin A
    - Main function
        - Gene expression
        - Vision
        - Cell differentiation
        - Immunity
        - Growth
    - Food source
        - Active vitamin A is provided in foods of animal orgin
        - Riches sources: liver and fish oil
        - Other good sources: milk/milk products
        - Carotenoids and beta carotene are precursors for Vitamin A
        - Vitamin A Toxicity – shark liver case
- Vitamin D
    - Main function
        - Maintains blood calcium levels
    - Food source
        - Milk
        - Fish
        - Mushrooms
        - Eggs
        - Margarine
        - Deficiency – rickits, osteomalacia
        - Toxicity – associated with hyperglycemia, can be toxic to brain, bones, nerves, heart and arteries
- Vitamin E
    - Main function

        - Antioxidant defending the body against oxidative damage
        - Protects cell membranes
    - Food source
        - Wheat germ
        - Safflower oil
        - Mayonnaise
        - Canola oil
        - Sunflower seeds
        - Vitamin E is destroyed by heat
- Vitamin K
    - Main function
        - Synthesis of blood clotting proteins
        - Synthesis of normal form of bone proteins that bind minerals to bone
    - Food source
        - Cabbage
        - Spinach
        - Soybeans
        - Lettuce
        - Canola oil
        - Cauliflower
- Vitamin C
    - Main function
        - Maintaining connective tissue
        - antioxidant
    - Food source
        - Fruits and vegetables, raw or quickly cooked retain the most vitamin C
        - Deficiency: scurvy
- B Vitamins
    - Main function
        - B vitamins do not directly provide energy, but only help the body use fuel
        - Thiamin, riboflavin, niacin, pantothenic acid, biotin → participate in the release of energy from carbohydrates, fats and proteins
        - Vitamin B6 → helps body use amino acids to build protein
        - Folate and vitamin B12 → help cells divide
    - Food source
        - Riboflavin → milk, yogurt, meat/liver, leafy greens, whole grains/cereals
        - Thiamin → occurs in small amounts in many nutritious foods
        - Niacin → all protein containing food, enriched bread/cereals
        - Folate → fruits/vegetables/legumes, enriched grains
        - B12 → only present in animal foods
        - B6 → fish, meat, poultry, legumes, potatoes, soy products

Fat soluble vs water soluble

- FAT SOLUBLE
    - A, D, E and K
    - Found in the fats and oils of food and require bile for absorption
    - Stored in the liver and fatty tissues until the body needs them
    - Can survive weeks on only average amounts
    - Vitamin A and D can reach toxic levels easily
    - Deficiencies occur when the body is consistently low
    - Vitamin A and D may act as hormones, directing cells to convert one substance to another
    - Vitamin E flows throughout the body, preventing oxidative destruction of tissues
    - Vitamin K is necessary for blood to clot
- WATER SOLUABLE
    - Body absorbs these vitamins easily and excretes them easily
    - Foods never deliver toxic doses of water soluble vitamins (because you just pee it out)

CH 8: Water & Minerals

The main functions/roles of water in the body, symptoms of dehydration

- Solvent/chemical reactions
- Transport
- Lubrication and protection
- Aids in maintaining the body's temperature
- Mild Dehydration: thirst, rough skin, rapid pulse, fever, fainting
- Severe Dehydration: pale skin, confusion, thickening of blood, irregular pulse, seizures, coma, death
- Chronic low fluid intake may increase the likelihood of bladder, colon and other cancers, cardiac arrest, gallstones, kidney stones, urinary tract infection

Hard water & soft water

- Hard water is water with high calcium and magnesium concentrations
- Soft water is water with a high sodium concentration

Major minerals vs trace minerals

- MAJOR
    - Calcium
    - Chloride
    - Magnesium
    - Phosphorus
    - Potassium

    - Sodium
    - Sulphate
- TRACE
    - Iodine
    - Iron
    - Zinc
    - Selenium
    - Flouride
    - Chromium
    - Copper

General functions and food sources for each mineral

- Calcium
    - Major function
        - The principle mineral of bones and teeth
        - Also acts in normal muscle contraction and relaxation, nerve functioning, regulation of cell activities, blood clotting, blood pressure and immune defenses
    - Food sources
        - Milk and milk products, small fish, leafy greens, broccoli, legumes
        - Deficiency: stunted growth in children, adult bone loss (osteoporosis)
        - Toxicity: constipation, urinary tract stones, kidney dysfunction
- Phosphorus
    - Major function
        - Mineralization of bones and teeth
        - Important in cells genetic material, in cell membranes and phospholipids, in energy transfer and in buffering systems
    - Food sources
        - Food from animal sources, some legumes
        - Deficiency: appetite loss, bone pain, rickets in infants
        - Toxicity: calcification of nonskeletal tissues
- Magnesium
    - Major function
        - Bone mineralization, the building of protein, enzyme action, normal muscular function, transmission of nerve impulses, proper immune function, maintenance of teeth
    - Food sources
        - Nuts, legumes, whole grains, dark green vegetables, seafood, chocolate, cocoa
        - Deficiency: weakness, twitches, confusion, growth failure in children
        - Toxicity: diarrhea with fluid and electrolyte and pH imbalances
- Sodium
    - Major function

        - Sodium, chloride and potassium maintain normal fluid balance and acid-base balance in the body
        - Sodium is critical to nerve impulse transmission
    - Food sources
        - Salt, soy sauce, seasoning, processed foods, fast foods
        - Deficiency: muscle cramps, mental apathy, loss of appetite
        - Toxicity: hypertension
- Potassium
    - Major function
        - Facilitates reactions, the maintenance of fluid and electrolyte balance, the support of cell integrity, transmission of nerve impulses, contraction of muscles,
    - Food sources
        - All whole foods: meats, milk, fruit, vegetables, grains, legumes
        - Deficiency: dehydration, muscle weakness, paralysis, confusion and death
        - Toxicity: muscle weakness, vomiting, can stop heart
- Chloride
    - Major function
        - Part of the hydrochloric acid found in stomach, necessary for proper digestion
        - Helps maintain normal fluid and electrolyte balance
    - Food source
        - Salt, soy sauce, large amounts in processed food
        - Deficiency: growth failure in children, muscle cramps, metal apathy
        - Toxicity: normally harmless, may cause vomiting
- Sulphate
    - Major function
        - Contributor of sulphur in many important compounds
        - Stabilizes protein shape by forming sulphur-sulphur bridges
    - Food source
        - All protein containing foods
        - Deficiency & toxicity: none
- Iodine
    - Major function
        - Component of thyroid hormone, helps regulate growth and metabolic rate
    - Food source
        - Iodized salt, seafood, bread, plants grown and animals who eat those plants
        - Deficiency & toxicity: goitre
- Iron
    - Major function
        - Part of hemoglobin (carries oxygen to blood), part of myoglobin in muscles (oxygen available for muscle contraction), necessary for the use of energy
    - Food source

        - Red meats, eggs, legumes, green leafy vegetables, dried fruit
        - Deficiency & toxicity: anemia
- Zinc
    - Major function
        - Associated with hormones, making genetic materials and proteins, immune cell activation, transport of vitamin A, taste perception, wound healing, sperm production, normal fetal development
    - Food source
        - Protein containing foods, yogurt
        - Deficiency & toxicity: growth failure in children, dermatitis, sexual retardation, loss of taste, poor wound healing
- Selenium
    - Major function
        - Assists a group of enzymes that defend against oxidation
    - Food source
        - Seafood, organ meats, other meats, whole grains, vegetables depending on soil content
        - Deficiency & toxicity: predisposition to a form of heart disease characterized by fibrous cardiac tissue (uncommon)
- Flouride
    - Major function
        - Helps form bones and teeth; confers decay resistance on teeth
    - Food source
        - Drinking water containing fluoride, tea, seafood
        - Deficiencies & toxicity: tooth decay
- Chromium
    - Major function
        - Associated with insulin; needed for energy release from glucose
    - Food source
        - Meat, unrefined grains, vegetable oils
        - Deficiencies & toxicities: abnormal glucose metabolism
- Copper
    - Major function
        - Helps form hemoglobin; part of several enzymes
    - Food source
        - Organ meats, seafood, nuts, seeds, whole grains, water
        - Deficiencies & toxicity: anemia

Bones

- The foundation of bone is composed of collagen

- During formation, calcium phosphate salts (hydroxyapatite) crystallize on to the collagen foundation
- As bones continue to strengthen, fluoride may replace the "hydroxy" portion of the salts to form "fluorapatite"
- Flourapatite is resistant to being dissolved back into the body fluids

Osteoporosis

- Too little calcium packed into the skeleton during childhood and young adulthood strongly predicts susceptibility to osteoporosis in adulthood
- Factors associated with osteoporosis risk:
    - Poor nutritional intake
    - Estrogen deficiency
    - Lack of physical activity
    - Being underweight

CH 9: Energy Balance & Healthy Body Weight

Canadian trends about obesity and physical activity

- Overweight and obesity related mortality rates have increased in every province, with higher levels in Eastern Canada
- Results of the Canadian Community Health Survey showed that 15% of the population were obese in 2000-2001, the rate has tripled in the last few decades
- Body weight among Canadian adults (BMI)
    - 30% obese
    - 25-29% overweight
    - 18-24% acceptable
    - 18% underweight

BMI classifications and associated health risks

- Underweight → <18.5, health risk associated with deficient body fat:
    - Increased risk of mortality
    - Increased risk of complications during hospitalization
    - Increased risk for individuals fighting wasting diseases
    - Increased risk of complications after surgery
- Normal → 18.5- 25.9
- Overweight → 25-29.9
- Obese→ 30+, health risks associated with a high amount of body fat:
    - Hypertension
    - Heart disease
    - Some types of cancer
    - Diabetes

Central obesity and metabolic syndrome

- Central obesity
    - Fat that collects deep in the abdominal area called visceral fat may be especially dangerous with regard to risks of diabetes, stroke, hypertension and coronary artery disease
    - Central fat released readily into the blood stream – significant contribution to the blood's daily burden of LDL
- Metabolic syndrome
    - A combination of characteristic factors – high fasting blood glucose or insulin resistance, central obesity, hypertension, low blood HDL cholesterol and elevated blood triglycerides – that greatly increase a person's risk of developing CVD. Also called insulin resistance syndrome or syndrome X

BMI

- A way of looking at weight, while taking height into account
- To calculate: weight (kg) / height (m) x height (m)
- Two major drawbacks:
    - Failure to indicate how much of the weight is fat
    - Failure to indicate where the fat is located
- BMI is not suited for:
    - Athletes
    - Pregnant women
    - Adults over 65

Eating disorders

- An eating disorder is NOT a choice
    - Studies show the brain in people with eating disordrs operates differently than in people without eating disorders
    - Believed to be a complex combination of biological, psychological and social factors
- Eating disorders ARE a treatable illness
- Eating disorders are not exclusive to women
- ANOREXIA
    - Weight <85% (weight loss and refusal to maintain body weight at normal weight for age and height)
    - Intense fear of gaining weight/becoming fat
    - Body image disturbance
    - Two types:
        - Restricting
        - Binging / purging

- BULIMIA
    - Recurrent episodes of binge eating
    - Recurrent, inappropriate compensatory behaviors (vomiting, laxatives)
    - Increased importance on weight/shape
    - Often close to or at normal weight
    - Cannot coincide with anorexia
    - Two types:
        - Purging type
        - Non purging type
    - Much more prevalent then anorexia
    - More men suffer from bulimia
- Treatment:
    - Psychiatrist
    - Psychologist
    - Social worker
    - Nurses
    - Dietitian
    - Physician
- Out of all the psychiatric illnesses, eating disorders require the most medical management and care

Theories of achieving energy balance

- 25-50% physical activity
- 5-10% thermic food
- 50-65% BMR
- Weight loss
    - People can lose weight through caloric restriction/increased energy expenditure
    - "State of the art" diet programs show an average weight loss of 7-10% of body weight (majority of people are unable to lose more)
- Weight maintenance
    - Weight loss typically slows or plateaus after 6 months
    - Majority regain a third of lost weight within one year
    - Often permanent weight loss is a battle against biology

Approximate percentages for average BMR, TEF and PA

- PA → Physical Activity
    - Sedentary → 1.0 M, 1.0 W
    - Low activity → 1.11 M, 1.12 W
    - Active → 1.25 M, 1.27 W
    - Very Active → 1.48 M, 1.45 W

- BMR – Basal metabolic rate
    - Minimum amount of calories required to sustain the body's functions and processes, when the body is at rest
    - It is responsible for consumption of about 70% of total calories used by the body
- TEF – thermic effect of food
    - The body's speeded up metabolism in response to having eaten a meal
    - Uses up to 5-10% of a meals energy value in stepped up metabolism in the five or so hours after a meal

Definitions

- Hunger – the physiological need to eat, experienced as a drive for obtaining food; an unpleasant sensation that demands relief
- Appetite – the psychological desire to eat; a learned motivation and a positive sensation that accompanies the sight, smell, or thought of appealing foods
- Satiation – the perception of fullness that builds throughout a meal, eventually reaching the degree of fullness and satisfaction that halts eating. Satiation generally determines how much food is consumed in one sitting
- Satiety – the perception of fullness that lingers in the hours after a meal and inhibits eating until the next mealtime, generally determines the time between meals

Weight and appetite controlling hormones

- Grehlin
    - High levels are associated with a fasting state and are thought to promote food intake
    - Secreted by the stomach, "hunger hormone"
- Leptin
    - Primarily produced by adipose tissue
    - Travels to the brain via bloodstream and is directly linked with both appetite control and body fatness
    - Some is also produced in the stomach, where it may contribute to satiety
    - Leptin suppresses appetite and food intake between meals
    - Operates in a feedback mechanism – a gain in body fatness stimulates leptin production, reducing food consumption. Fat loss brings the opposite effect, suppression of leptin and increased appetite
    - In turn, the fat tissue that produces leptin is ultimately controlled by it

Theories of obesity and weight gain

- Inside the body causes
    - Selected metabolic theories of obesity
        - Set point theory – the body tends to maintain a certain weight by means of its own internal control

        - Thermogenesis – the generation and release of heat associated with the breakdown of body fuels
    - Genetics and obesity
        - Relatively rare types of obesity arise primarily from genetic causes
        - For someone with one obese parent, the chance of becoming obese is 40-70%
        - Although an individual's genetic inheritance may make obesity likely, the disease of obesity cannot develop unless the environment (factors outside the body) provide the means of doing so
- Outside the body causes
    - External cues to overeating
        - Many people overconsume when presented with a wide variety of unhealthy foods
        - Overeating also occurs in response to complex human sensations such as lonliness, craving, and depression
        - Time "im waiting for lunch"
        - Stress – comfort foods
    - Food pricing, availability, advertising
        - High calorie fast foods are inexpensive , available, heavily advertised and taste good
    - Physical inactivity
        - Today only 1% of power comes from human muscle power

Strategies for long term, healthy weight loss

- Setting goals
- Keeping records
- Plan your own diet
- Choose realistic calorie intakes
- Balancing carbs, fats and protein
- Portion sizes
- Energy density
- Consider milk and milk products
- Demonstration diet
- Meal spacing
- Physical activity
    - Increasing metabolism, reducing appetite
    - Choosing activities
    - Spot reducing

BMR – Basal Metabolic Rate

- Age – higher in youth, however continues activity may prevent this decline

- Height – tall people have higher BMR
- Growth – children and pregnant women have higher BMR
- Body composition – more lean tissue, higher BMR, men have higher BMR
- Fever – high BMR
- Stress – raise BMR
- Environmental temperature – adjusting to heat or cold raises BMR
- Fasting/starvation – lower the BMR
- Malnutrition – lowers BMR
- Thyroxine – key BMR regulator, more produced, higher BMR

CH 10: Nutrients, Physical Activity, and the Body's Responses

Canadian trends about physical activity

- Approximately 50% of Canadians are inactive
- Physical activity levels among Canadians have significantly declined (between 1981-2009)

Benefits of physical activity

- healthy growing and development
- prevent chronic diseases like cancer, type 2 diabetes and heart disease
- make us stronger
- give us energy
- decrease stress
- prolong independence as we get older

Canadian physical activity guidelines

- Age 18-64
    - to achieve health benefits, adults aged 18-64 years should accumulate at least 150 minutes of moderate to vigorous intensity aerobic physical activity per week, in bouts of 10 minutes or more
    - it is also beneficial to add muscle and bone strengthening activities using major muscle groups, at least 2 days per week
    - more physical activity provides greater health benefits
- Age 5-11
    - For health benefits, children aged 5-11 years should accumulate at least 60 minutes of moderate to vigorous intensity physical activity a day this should include:
        - Vigorous intensity activity at least 3 days a week
        - Activities that strengthen muscle and bone at least 3 days per week
        - More daily physical activity provides greater health benefits

- Age 12-17
    - For health benefits youth aged 12-17 should accumulate at least 60 minutes of moderate to vigerous intensity physical activity daily, this should include:
        - Vigorous intensity activities at least 3 days per week
        - Activities that strengthen muscle and bone at least 3 days per week
        - More daily physical activity provides greater health benefits
- Age 65+
    - To achieve health benefits and improve functional abilities, adults aged 65+ should accumulate at least 150 minutes of moderate to vigorous intensity aerobic physical activity per week, in bouts of 10 minutes or more
    - It is also beneficial to add muscle and bone strengthening activites using major muscle groups, at least 2 days a week
    - Those with poor mobility should perform physical activities to enhance balance and prevent falls
    - More physical activity provides greater health benefits

Macronutrients and physical activity

- Athletes do not need a diet substantially different from Canada's Food Guide
    - Relatively high carbohydrate diet is best
    - Carbohydrate → 60-70% total calories
    - Fat → 20-30%
    - Protein → 10-20%
- Protein
    - Dietary protein – helps synthesize/repair muscle protein
    - Increasing protein intake still puts the athlete at risk of high cholesterol
- Carbs
    - Carb loading
        - Useful for activities that exhaust glycogen stores (>90 min)
        - Encourage their muscles to store extra glycogen prior to a competition
        - Can nearly double glycogen concentrations
        - Should eat a high carbohydrate diet 3 days prior to the event

Micronutrients and physical activity

- Vitamin E
    - Prolonged high intensity activity enhances the production of damaging free radicals in the body, vitamin E is a potent fat soluble antioxidant that vigorously defends cell membranes against oxidative damage to muscles
    - Vitamin E supplements are proven to protect against oxidative stress, but have not been proved to enhance performance

- Iron
    - Iron losses in sweat may contribute to deficiency, physical activity may cause small blood losses through the digestive tract, muscle also has a high demand for iron to make the iron containing molecules of aerobic metabolism → therefore most athletes have iron deficiency (especially women b/c of their period)
    - External hemolysis (squished blood cells releasing iron) rarely contributes to anemia in athletes
    - Iron deficiency effects performance because iron helps deliver the muscles oxygen, therefore reducing aerobic work capacity (person tires easily)
    - "sports anemia" (low hemoglobin) is not a true iron deficiency condition, usually viewed as a temporary response to endurance training and it goes away on its own without prescription iron pills
- Sodium
    - Replenishing electrolytes becomes crucial, if sodium is not replaced hyponatremia may result (symptoms are similar to dehydration), can also occur from drinking too much water and diluting the sodium
    - Athletes who sweat profusely may lose more sodium than others
    - Sport drinks to not supply as much sodium as most people think, to replenish sodium loses, athletes should drink sports drinks and eat pretzels

Fluids

- Endurance athletes can lose 2 or more litres of fluid every hour of activity, but the digestive tract may not be able to absorb enough water to keep up with the losses
- Hydrating is important before, after and during the activity
- 2 hours before activity → 2 to 3 cups
- 5 min before activity → 1 to 2 cups
- Every 15 min during activity → 1 to 1 ½ cups
- After activity → 2 cups for each pound of body weight lost

CH 11: Diet & Health

Infectious vs chronic diseases

- Infectious – diseases that are caused by bacteria, viruses, parasites, and other microbes that can be transmitted from one person or another though air, water or food; by contact; or through vector organisms such as mosquitos or fleas
    - Ex: tuberculosis, smallpox, influenza, polio, h1n1, sars
- Chronic – irreversible diseases characterized by degeneration of the body organs due in part to such personal lifestyle elements as poor food choices, smoking, alcohol use and lack of physical activity
    - Ex: heart disease, diabetes, cancer, osteoporosis

Nutrients and immune function

- Deficient intakes of many vitamins and minerals are associated with impaired disease resistance, as are some excessive intakes
- Immune tissues are among the first to be impaired in the course of a nutrient deficiency or toxicity
- Some deficiencies are more immediately harmful to immunity than others; this depends on whether one nutrient can preform some of the metabolic tasks of the missing nutrient, how severe the deficiency is, whether there is already an infection and the persons age
- Malnutrition and infection worsen each other
    - Disease → impaired food assimilation → impaired nutrition status → weakened immunity → worsened disease → further malnutrition and disease
- Deficiencies (↓) and toxicities (↑) known to impair immunity:
    - Protein ↓
    - Energy ↓
    - Vitamin A ↓
    - Vitamin E ↓
    - Vitamin D ↓
    - B vitamins ↓
    - Folate ↓
    - Vitamin C ↓
    - Iron ↑↓
    - Zinc ↑↓
    - Copper ↓
    - Magnesium ↓
    - Selenium ↓

Modifiable risk factors connected with chronic disease

- Distinct from infection disease, chronic diseases have suspected contributors, known as risk factors:
    - Environmental
    - Behaviors
    - Genetic
    - Social
    - Age
- Family history can raise a warning flag as well (alcoholism, diabetes, cancer, CVD, hypertension, liver disease, osteoporosis)
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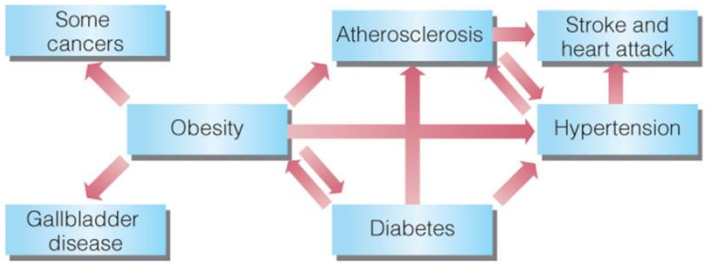
- 

This flowchart shows that many of these conditions are themselves risk factors for other degenerative diseases. For example, a person with diabetes is likely to develop atherosclerosis and hypertension. These two conditions, in turn, worsen each other. Notice how all of these

Healthy vs unhealthy fats and CVD

- Diseases/injuries of the cardiovascular system include the heart, blood vessels of the heart, system of blood vessels throughout the body and within the brain
- DRI recommends 20-35% of calories from fat
    - Limited saturated and trans fats, limited dietary cholesterol
    - If decreasing the fat in the diet, avoid substitution with simple sugars, may result in increased TG (triglycerides) and lower HDL
    - Choose fish oils, rich in omega 3 fatty acids, lower TG, prevents blood clots
- Monounsaturated fat, polyunsaturated fat, omega 3 and 6 → GOOD
- Saturated fat and trans fat → BAD
- To reduce CVD risk:
    - Increase soluable fiber
    - Choose a diet rich in nutrient density and phytochemicals (legumes, fruit, veggies)
    - No binge drinking
    - Exercise
    - Relax

- Medication

Nutrition and hypertension

- Hypertension is strongly related to central obesity, artherosclerosis and insulin resistance
- Weight control and PA (weight loss and moderate PA)
- Moderate alcohol consumption
- Increase intake of F & V, fish, low fat dairy products
- Decrease sodium intakes
- Ca, K, Mg, Vit C – increasing Ca reduces BP; diets low in K rich F&V are associated with high blood pressure, Mg deficiency causes artery walls & capillaries to constrict and may raise BP, adequate vitamin C helps normalize blood pressure

Heart attack and stroke

- Heart attack – an event in which the vessel that feeds the heart muscle becomes closed off by an embolism, thrombus, or other cause, resulting in sudden tissue death
- Stroke – the sudden shutting off of a blood flow to the brain by a thrombus, an embolism or the bursting of a blood vessel

Nutrients and cancer

- Lung, prostate, breast and colorectal cancer are the 4 most common cancer types in Canada
- A disease in which cells multiply out of control and disrupt normal functioning of one or more organs
- Cancer prevention:
    - Body fatness – be as lean as possible
        - When calorie intake is reduced, cancer rates fall
    - Physical activity – make PA a part of every day life
    - Foods and drinks that promote weight gain – limit consumption of energy dense foods and avoid sugary drinks
    - Plant foods – eat foods of mostly plant origin
    - Animal foods – limit intake of red meat and avoid processed meat
    - Alcoholic drinks – limit, no more than 2 a day for men and 1 for women
    - Preservation, processing, preparation – limit consumption of sat
    - Dietary supplements – aim to meet nutritional needs through diet alone
    - Breastfeeding – up to 6 months
    - Cancer survivors – recommendations for cancer prevention

CH 12: Food Safety & Technology

Food borne infection

- Illness transmitted to humans through food/water and caused by infectious agents
- E. Coli
    - Causes: undercooked ground beef, unpasteurized milk/juice, raw produce, contamined water, person to person
    - Symptoms: 1-8 days, severe bloody diarrhea, abdominal pain, vomiting, acute kidney failure, death. Survivors may face kidney problems, hypertension, blindness, paralysis and colon problems
    - Prevention: cook beef thoroughly, avoid unpasteurized products, use sanitary handling methods, use treated/boiled/bottled water, avoid raw sprouts
- Hepatitis A
    - Causes: undercooked or raw shellfish, raw or lightly cooked produce, contaminated water, baked goods or ready to go foods contaminated by handlers
    - Symptoms: 15-50 days, inflammation of the liver, fatigue, dark urine, headache, vomiting, jaundice, muscle pain
    - Prevention: cook foods thoroughly, test food handlers
- Listeria
    - Causes: raw meat and seafood, lunche on meats, hot dogs, unpasteurized milk, soft cheese
    - Symptoms: 7-70 days, mimics flu, blood poisoning, meningitis, miscarriage of preganancy, sever illness or death of new borns, blood or brain infection
    - Prevention: use sanitary food handling methods, cook thoroughly, use pasteurized milk
- Selmonella
    - Causes: raw or undercooked eggs, meats, poultry, shrimp, pasta, raw produce, contaminated water
    - Symptoms: 1-3 days, nausea, fever, chills, vomiting, cramps, diarrhea, headache, could be fatal
    - Prevention: use sanitary food handling methods, pasturized milk, cook foods thoroughly and refrigerate properly
- Travellers Diarrhea
    - Causes: contaminated water, undercooked ground beef, raw foods, importated soft cheese
    - Symptoms: 2 days to several weeks, cramping, vomiting, fever and chills
    - Prevention: cook thoroughly, use safe treated water, wash and peel raw fruit and vegetables
- Botulism
    - Causes: anaerobic environment
    - Symptoms: 12 to 72 hours, nervous system symptoms, paralysis of respiratory system, leaves prolonged symptoms in survivors

    - Prevention: use proper canning methods, avoid leaky seals or bent, bulging or broken cans

Ways to minimize risks of food poisoning

- HACCP
    - A systematic plan to identify and correct potential microbial hazards in the manufacturing, distribution, and commercial use of food products
- CHILL
    - Keep cold food cold to slow down bacterial growth
    - Never defrost at room temp, thaw in fridge, microwave or in cold water
    - Buy perishable foods last when shopping, and put them in the fridge or freezer as soon as you get home
    - Refrigerate or freeze leftovers within two hours
- COOK
    - Cook food completely and use a clean thermometer
    - Do not use leftover marinade from raw food to cooked food
    - Keep hot foods at or above 60 degrees
    - Bacteria can grow quickly, DANGER ZONE between 4 – 60 degrees
- SEPARATE
    - Separate raw meats from other foods in your grocery cart and while storing, preparing and serving food
    - Store raw meats in sealed containers on the bottom of the fridge
    - Use separate cutting boards for produce and meats
- CLEAN
    - Wash hands for 20 seconds before handling
    - Sanitize everything being used before preparing food
    - Use paper towels or change dishcloths daily to avoid spreading bacteria

Vulnerable populations

- Health Canada warns of high levels of mercury in fish. They advise all pregnant women, women who may become pregnant, nursing mothers and young children to avoid eating fish known to have high levels of mercury
- Infants and children may be more susceptible than adults to adverse effects from pesticides
- Honey has been implicated in several cases of sudden infant death

Food processing

- Food processing prevents microbial growth, oxidative damage, enzymatic destruction of food molecules

- MAP – modified atmospheric packaging, a preservation technique in which perishable food is packaged in a gas impermeable container from which air has been removed or to which another gas mixture has been added, preserve softness and freshness
- Canning – a method of preserving food by killing all microorganisms present in the food and then sealing out the air, the food/container/lid are heated until sterile; as it cools, the lid makes an airtight seal preventing contamination, however canned foods have fewer nutrients due to HTST principle (rise in temp decreases nutrient)
- UHT – ultra high temperature, a process of sterilizing food by exposing it for a short time to temperatures above those normally used in processing
- Irradiation – the application of ionizing radiation to foods to reduce insect infestation or microbial contamination or to slow the ripening or sprouting processes, also called cold pasteurization
- Salt/sugar – work by withdrawing water from food, microbes can not grow without water
- Nitrates – added to meats; preserves colour, enhance flavor, inhibit bacterial growth

Genetic engineering and organic foods

- Organic foods – prohibitation of most synthetic pesticides, herbicides, fertilizers, drugs and preservatives, as well as genetic engineering and irradiation
- GE foods – foods that have been altered by way of rDNA technology
- GE – direct intentional manipulation of the genetic material of living things in order to obtain some desirable trait not present in the original organism
- Genetic Modification – intentional changes to the genetic material of living things brought about through a range of methods, including rDNA, natural cross breeding and agricultural selective breeding

CH 13: Mother & Infant Nutrition

Nutrients of interest in pregnancy

- Energy, carbohydrates, fat and proteins
    - Requires an additional 340 calories during second trimester and 450 in third
    - Should choose nutrient dense foods such as whole grain breads, legumes, dark green vegetables, citrus fruits, low fat milk/products, lean meats
    - Ample carbohydrates are necessary to fuel the fetal brain and spare the protein needed for fetal growth
    - Fibre helps alleviate constipation
- Folate and Vitamin B12
    - Needed for cell reproduction
    - Folate helps prevent neural tube (brain and spinal cord) defects
    - B12 assists folate in the manufacture of new cells
- Calcium, Magnesium, Iron, Zinc
    - Necessary for normal development of bones and teeth

    - Intestinal absorption of calcium doubles early in pregnancy, storing in the mothers bones until fetal bones begin to calcify
    - Iron is transferred to the fetus in significant amounts
    - Zinc is required for protein synthesis and cell development
    - Zinc deficiency predicts low birthrate
    - Iron interferes with the absorption and use of zinc
- Fish
    - 150 grams of cooked fish a week (salmon, trout, and canned light tuna)
- Prenatal supplements
    - Provide folate, iron and calcium

Recommended weight gain in pregnancy

- Underweight → 28-40 pounds
- Normal → 25-35 pounds
- Overweight → 15-25 pounds
- Obese → 11-20 pounds
- An active women in a normal pregnancy can and should continue to exercise throughout the pregnancy, adjusting the intensity and duration as it progresses (low impact activities)

Harmful substances

- Cigarette smoking
    - Restricts blood supply to the fetus, limiting the delivery of oxygen and nutrients and the removal of waste
    - Slows growth and may cause intellectual or behavioral problems later – more someone smokes, smaller the baby will be – smoking has the greatest impact on low birthrate
    - Environmental Tabaco use also increases the likelihood of low birth rate and SIDS
    - Lactating women who smoke produce less milk
- Medicinal drugs and herbal supplements
    - Should not take over the counter drugs or anything not prescribed by a physician
    - Important not to use asprin or ibuprofen during last 3 months of pregnancy (unless told by a doctor) as it could cause excessive bleeding during pregnancy
    - Herbal supplements used to alleviate symptoms of pregnancy may or may not be safe
- Drugs of abuse
    - Marijuana and cocaine could cause serious health consequences including nervous system disorders
    - Cocaine easily crosses the placenta and impairs the fetus
    - Babies face low birth rate, heartbeat abnormalities, withdrawl symptoms and even death
- Environmental contaminants
    - Exposure to lead and mercury during development show signs of impaired cognitive development

- Foodborne illness
    - Listeriosis – a serious foodborne infection that can cause severe brain infection or death in the newborn, caused by bacteria found in soil or water – pregnant women are 20 times more likely to contract it
- Vitamin-mineral megadoses
    - Massive doses of vitamin A cause birth defects, as well as chronic low use
- Dieting
    - Low carb diets or fasts deprive the brain od needed glucose and may impair development
    - Energy restriction is dangerous, regardless of how far along the women is
- Sugar substitutes
    - Cautioned against excessive amounts of aspartame and other artificial sweeteners
- Caffeine
    - Caffeine crosses the placenta, and the fetus has only a limited ability to metabolize it
    - Should limit to one cup of coffee or 2 cola a day
    - Should be moderate while breastfeeding
- Alcohol
    - Can hault delivery of oxygen to the umbilical cord
    - Slows cell division
    - Interferes with placental transport and can cause malnutrition in the mother
    - Can damage ovum or sperm, leading to abnormalities in the child
    - FAS – brain damage, growth retardation, mental retardation and facial abnormalities

Infant feeding guidelines and best options

- Breast milk
    - Health Canada advocates exclusive breast feeding for at least 6 months, it provides all the nutrients a healthy infant needs for the first 6 months of life
    - Conveys immune factors, protecting the infant from infection and inform its body about the outside environment
    - Lactose (carb) in breast milk enhances calcium absorption
    - The lipids provide the main source of energy
    - Contains omega 3 and 6, arachiodonic acid and DHA
    - Protein is alpha lactalbumin and lactoferrin, they help absorb iron into the infants bloodstream
    - Lacks vitamin D, should be given supplements
    - Needs more iron after 6 months
    - Experience less vomiting and diarrhea than formula fed babies, they also have lower cholesterol
    - Mother passes on her immunity via white blood cells in the first 2-3 days of lactation (colostrum)
    - Potential benefits: low childhood obesity, better brain function

- Formula feeding
    - Premature babies and babies allergic to breast milk require special formula
    - Advantage is parents can see how much the infant is drinking
    - Cows milk is an inappropriate replacement
    - Iron fortified formulas are recommended for all formula fed infants
- First food
    - When to introduce solid food:
        - Can sit with support and control its head movements
        - Six months old ~
    - Iron fortified cereals, legumes and meat/alternatives are needed to prevent iron deficiency
    - Vitamin C should be included in enhance absorption, fruits and veggies
    - Juice should not be served before 6 months of age
    - New food should be introduced one at a time so allergies and other sensitivities are detected
    - Omit any kind of sweets and canned vegetables

Safety tips

- To prevent choaking, do not give infants or young children:
    - Carrots
    - Cherries
    - Gum
    - Marshmellows
    - Hot dog slices
    - Hard candies
    - Nuts
    - Peanut butter
    - Popcorn
    - Raw celery
    - Whole beans/grapes
- Keep out of reach:
    - Balloons, coins, pen tops, small balls

CH 14: Child, Teen & Older Adults

Childhood feeding guidelines and when to introduce certain foods

- A one year old child needs 800 calories a day, by 6 years they need 800 more, by age 10 2000 calories a day is needed
- Children 2-6 years need at least the specified number of food guide servings, but can vary according to age and keep calorie intakes moderate

- Older children and adolescents need additional food guide servings, deriving most of their daily energy from carbs and most calories from grain products, calcium/ zinc and other nutrients usually fall below recommendations
- Active, normal weight children may enjoy occasional treats of high calorie but nutritious food, these food encourage that pleasure in eating is important, but too many treats can lead to obesity

Allergy vs intolerance

- Sometimes grow out of food allergies
- A food allergy is an immune response to a foreign substance, such as a component of food
- Allergies always involve antibodies and sometimes involve symptoms
- Food intolerance is unpleasant symptoms that occur after consumption of certain foods (lactose intolerance)
- Food aversion is an intense dislike of a food that may be a biological response to a food that once caused trouble

Childhood obesity

- Tv viewing, video and computer games require no energy, and decreases the time that could be spent in energetic play time
- Correlates with more snacking, buying and eating calorie dense foods
- Children who watch more than 4 hr of tv a day are most likely to be obese
- Integrated approach involving diet, PA, psychological support and behavioral changes can help an overweight child – parents are the most influential force
- Goals: slow overweight/obese childs rate of growth, weight loss is generally not recommended

Nutrients of interest in teens & older adults

- A boy needs more iron to develop extra lean body mass, a girl needs extra not only to gain lean body mass but it is also important for her period (girls need stays high until older age, guys drop as they become men) – always increases during the growth spurt, regardless of age
- Paired with lack of physical activity, low calcium intake can compromise the development of peak bone mass, increasing chance of osteoporosis and other bone disease later on
- Growth patterns vary widely
    - Girls – 10 or 11, peak at 12
    - Boys – 12 or 13, peak at 14
- Nutritional issues:
    - Irregular eating patterns – due to activities
    - Skip breakfast – being rushed
    - Food gatekeeper – easy to grab foods provided by parents
    - ¼ of teens total energy comes from snacks

Nutrients for older adults

- life expectancy in Canada:
    - women – 82
    - men – 77
- energy needs decrease with aging
    - reduced PA
    - loss of lean tissue; active number of cells in each organ decrease
- after 50, the intake recommendations for energy assume a 5% reduction in energy output per decade
- For healthy elderly people, protein needs are the same as for younger adults
- Some elderly may have barriers in receiving adequate protein intake (loss of teeth, poor appetite, decreased ability to prepare food)
- Carb/fibre intake is similar for adults
- Fibre is important to prevent constipation
- Important for older adults to continue to consume enough essential fatty acids and limit saturated and trans fat
- Omega 3 has an anti-inflammatory effect
- Dehydration – thirst becomes less sensitive, kidneys are less effective at conserving water

CH 15: Hunger & the Global Environment

Hunger

- Lack or shortage of basic foods needed to provide the energy and nutrients that support health, bigger issue in developing countries
- Consequences of hunger in children include infant mortality, stunted growth, anemia, poor learning, extreme weakness, protein energy malnutrition, susceptible to disease, loss of ability to stand or walk, premature death
- Food insecurity – limited or uncertain access to food of sufficient quality or quantity to sustain a healthy, active life
- Food security – reliable access to enough nutritious food at all times to sustain a healthy, active life
- Poverty – enough food exists in an area but people can not obtain it because they lack money, are being denied for political reasons, live in war, or suffer from other problems such as lack of transportation
- Famine – widespread and extreme scarcity of food in an area that causes starvation and death in a large portion of the population

Canadian programs promoting food security

- Canadian Living Foundation's Breakfast for Learning program is Canadas only national, nonprofit organization dedicated to supporting child nutrition

- Childrens Emergency Foundation provides help to children living in poverty through a network of community breakfast clubs
- "ShareGoods" partnership with FCPC and Food Banks Canada donated over 5 million bags of groceries to families in need

World food supply

- The worlds population will soon outgrow the worlds food production
- Research shows farmers will have to produce 40% more grain by 2020 to meet a rising demand
- Dwindling water supplies may prevent further growth in the food output in agricultural areas
- Soil Erosion
    - Without the forest covering to hold the soil in place, it washes off the rocks beneath, drastically reducing the lands productivity
    - Without topsoil, little plant life is possible
    - Continuous irrigation leaves deposits of salt in the soil, rising salt concentrations lowers yields on close to a quarter of the worlds irrigated crop land
- Grass Lands and Fisheries
    - Grasslands are already being used or overused everywhere
    - Big fish have declined by 90% in the last 50 years
    - About 47-50% of major marine fish stocks are currently fully exploited
    - In early 1900s, 14000 Canadian lakes were declared biologically dead due to acid rain
    - To help:
        - "no fish zones"
        - "fish farms" and altering wild species through recombinant DNA may also help human demand
        - Seasonal quota limitations
- Climate, Air & Fresh Water
    - Air pollution and resulting climate change also reduce food output
    - A rise of a degree or so in average global temperature may reduce soil moisture, impair pollination of major food crops, slow growth, weaken crops resistance to disease, and disrupt many other factors effecting crop yields
    - Supplies of fresh water are now limiting the numbers of people who can survive in some areas
    - Every day people dump 1 million tonnes of waste into the worlds water supply, as such, vast quantities of the earths freshest water will be unusable by 2050
    - If patterns continue, by 2025 2/3 people will live in water stressed conditions
- Overpopulation
    - The human population will exceed the earths estimated carrying capacity by 2033
    - Overpopulation may be the most serious threat mankind faces today
    - Without population stabilization, the world can neither support the lives of people already born nor halt environmental deterioration around the globe
    - 98% of people born each year are born in the most poverty stricken areas of the world

    - High correlation of low income and high birthrate
- Sustainable Eating Tips:
    - Choose locally produced food
    - Choosing organic foods
    - Eat less meat
    - Choose sustainable seafoods
    - Reduce food waste

World hunger

- 1/5 of the worlds population have no land and no possessions at all
- Food Shortage and Armed Conflict
    - Most visible form of hunger is famine
    - Violence of armed conflict has been a dominant cause of all famines reported worldwide
- Chronic Hunger
    - Over 800 million people, mostly women and children, are chronically malnourished from lack of food
    - Most children who die of malnutrition do not starve to death, they die because their health has been compromised by dehydration from infections that cause diarrhea
        - ORT – oral rehydration fluid, oral fluid replacement for children with severe diarrhea caused by infectious diseases, enables parents to mix the solution with substances they have at home
    - Almost 80 million young children suffer from symptoms of vitamin A deficiency – blindness, growth retardation, and poor resistance to infections