Food Notes: Week 10

Main points:

- Both excessive and deficient body fat result from an energy budget imbalance.
- Body weight is stable when energy consumed is equal to energy expended.
- When energy consumed is greater than expended, weight increases.
- When energy consumed is less than expended, weight decreases.
- One kilogram of body fat contains approximately 30,000 kJ of energy.
- Energy expenditure is fuelled by the macronutrients: carbohydrates, proteins and lipids
- Energy not used will be stored as fat in fat cells.
- Accumulation of excess fat is a health risk leading to atherosclerosis, obesity, heart disease etc.
- Excess fat located around the abdominal organs leading to central adiposity is the most serious risk.
- All 3 macronutrients can be converted to storage fat- alcohol as well
- Because proteins are usually directed to structural use and carbohydrates are the first used energy source, it is usually dietary fat that turns into body fat first.
- Also fat has more energy per gram (37kJ/g compared to 17kJ/g) than protein or carbohydrate, so can contribute much more energy to body excess.
- Also metabolic steps in converting dietary fat to body fat are easier and quicker than converting protein or carbohydrate to fat.
- Thus reducing dietary fat intake usually has the best effect in reducing body fat.
- However, some fat in diet necessary, particularly MUFA and PUFA for structural needs- membranes.
- Many modern diets promote low carbohydrate intakes, and this can also help reduce weight by allowing body fat to be metabolised for energy. Turn the body metabolism into fat burning mode.
- All the macromolecules can make fat
- Excess KJ is what causes fat. More than expenditure.
- Every 37 Kj of excess energy per day will make fat – one gram of fat.
- Our modern diet most of our energy is coming from fat, as protein is mostly used for the body, carbs are mostly used to fuel the body as it's the first fuel source we use then we switch to fatty acids and amino acids. Depending on what we over eat that is what causes fat.
- A person who drinks lots of alcohol will get lots of fat around his organs on the inside.
- Excess fat leads to atherosclerosis, diabetes, some people react to the body fat worse than others and that is partly depending on where the body fat is.
- Excess fat around abdominal organs is a serious risk.
- Mostly lipids and crabs make energy.
- Overeating fat will give excess energy over the other two.
- Metabolic steps from converting dietary fat to body fat are quicker than the other macromolecules.
- Some fat in body and diet is necessary as cells need lipid membranes.

Food Composition:

- Bomb calorimeter is used to determine the energy content of foods.
- This instrument burns a food into CO2 and H2O and measures the energy released as heat (kJ)
- Human cells do something similar in a slower controlled fashion and much of the heat is captured quickly and stored chemically (ATP)
- Human cells are not as efficient as a bomb calorimeter hence the energy in kJ released in the body is less than that measured in a bomb calorimeter
- This has been mathematically adjusted for in the designation of energy content of carbohydrates, proteins and lipids when catabolised in human cells
- Heat energy is stored in ATP some leaks out as heat but most is captured.

Food Energy Measurement: When food is burnt in a bomb calorimeter, the measure of heat energy released provides a direct measure of the foods chemical energy content. When the food molecules burn they also produce waste products (CO_2 and H_2O), which are formed from the atoms in the food molecules and oxygen gas. This is an indirect measure of energy release. Direct calorimetry is measuring the temperature rise. Or we can measure the gases and if we measure the amount of CO and H20 coming out we can measure the energy.