Week 13 Lecture 1

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1 Administrative drivel

- Scantrons have been processed, exam scores to be posted in the next few days
- term papers won't be looked at till next week

2 Nutrition

- Malnutrition: a bigger problem for children
- Micronutrients
  - Needed inn small amounts
    - Not broken down, but used intact
    - used individually, or used to modify macronutrient-based molecules
    - may be part of a larger molecule, but the actual nutrient is not broken down
    - used along with other molecules to do things
  - Vitamins
    - Organic molecules – they have a carbon backbone (carbon based)
    - Often used in enzyme pathways, especially for metabolizing or synthesizing other organic molecules
      - using them in the enzyme pathways makes the enzyme better at their job
    - only the organic molecules that we cannot generate on our own
      - cows can produce almost all of the vitamins they need!
      - this is done by gut bacteria
    - e.g. vitamin c
      - involved in the productionn of colagen
      - so, if you're vitamin c dificicient, you'll fall apart – scurvey
      - captain cook discovered that sour crout prevented the developement of scurvey, not knowing about vitamin C
  - minerals
    - Inorganic molecules – non-carbon based
    - often used as ions or crystals
      - e.g. salt is split into 2 ions
  - these cannot be constructed by the body, and need to be injested
- List of vitamins:
  - Fat-soluble: A, D, E, K
    - very common

        * disolve in fat
            · doessn't dissolve well in water
            · obsorbs into lipids, fatty tissues
            · so, it's hard to get rid of excess, so it is stored as deposits in fatty tissues, which can become toxic
        * A important for light detection
        * D is important in growth; bones, muscles
        * E important in cell membranes, esp neuro cells
        * K important for reasons?
    - Water-soluble: B (1 (thiamine), 2 (riboflavin), 3 (niacin), 5, 6, 7 (biotin), 9 (folic acid), 12), C
        * folic acid is important during fetal developent, particularly in the spine; not great for males to consume
        * disolves in water, so excess is dumped from the kidneys into the urine, so it's virtually impossible to have too much
    - modern food is fortified with vitamins

- micro – water soluble vitamins
    - small quantity needed
    - very difficult to overdose
    - excess is excreted in urine

- Vitamin C
    - Aids in the synthesis of collagen – important for wound healing
    - scurvy: fatigue, bleeding from mucous membranes, spongy gums, tooth loss, open wounds
        * caused by vitamin C difficiency
        * ultimately leads to death
        * common in sailors of the past

- fat-soluble vitamins
    - needed in small quantity
    - overconsumption can lead to toxicity
    - not easy excreted in urine, so are stored in the liver
        * Hamper liver function when in excess

- Vitamin A
    - beta-carotene – the pigment that causes the color, and vitamin A is derived from it
        * found in meat, oorange fruits and veggies
        * Immune functioning
        * DNA $\rightarrow$ RNA (transcription)
        * Vission
    - Royal Airforce (british) 1939 – Airborne Interception Radar
        * advertised that airmen needed vitamin A in order to see at night
        * early WWII

- List of minerals;
    - Calcium (Ca)

    * important in bones and muscle function
  - Phosphorus (P)
  - Potasium (K)
  - Solfur (S)
  - Sodium (NA)
  - Chlorine (Cl)
  - Magnesium (Mg)
  - Iron (Fe)
    * important in blood: hemoglobin
  - Iodine (I)
  - Manganese (Mn)
  - Copper (Cu)
  - Cobalt (Co)
  - Zinc (Zn)
  - Fluorine (Fl)
    * prevents cavities, since it's highly reactive
  - Selenium (Se)
  - Chromium (Cr)
- minerals:
  - Some needed in larger quantities (Na, Cl, ,Ca, P)
  - Others in trace amounts (S, Co, Mn, Se)
- Recommended diet
  - Macronutrients are easy to come by in most foods
    * most difficult to get is probably protiens – getting all of the amino acids
  - conusuming too much is the typical problem
  - micronutrients can be more challenging
  - Not too much
    * eat enough calories but not more than you use
  - High diversity
    * anything in excessive quantity can be bad for you
  - Lots of plants
    * relatively high in micronutrients
    * relatively low in macronutrients
    * macroos that are present are usually more complex == more energetically expensive to digest
- clicker Q: Why are vitamins and minerals called micro-nutrients? Your body needs these in small amounts
- end of nutritian

3 Digestive system

- clicker q: what hormone is released by the pancreas when blood sugar is high? Insulin
- Functions:
  - Break down food
  - absob nutrients
  - dispose of waste
- Tow major divisions:
  - **Gastrointestinal (GI) tract**:
    - connects mouth → stomack → intestines (small and large) → anus
  - **Accessory organs**
    - Salivary glands
      - food lubrication
    - pancreas
      - produces lots of hormones
    - liver
      - detoxifies food
    - gallbladder
      - breaks down lipids