

Ch. 10 Food and Diets [食物與膳食] (Notes)

HK people's diet (lunch or dinner at foodshop) → too much salt, fats (causes coronary heart disease), energy/sugar (snack eg. soft drink/chocolates), food additives (eg. artificial pigments); NOT enough vitamin, dietary fibre.

[香港人通常都在外面吃午或晚餐, 有太多鹽、脂肪(引至血管阻塞及心臟病)、能量/糖 (小食 eg. 汽水/巧克力)、食物添加劑 (eg. 人造色素); 而不夠維生素(尤其維生素 C)及 食用纖維]

Mode of nutrition (human): heterotrophic nutrition (consume organic food); the organism: heterotroph
[人類的營養方式: 異營養(要進食有機食物); 用這種方式的生物: 異養生物。]



這樣的飲食習慣, 遲早死!

Food types [食物種類]:

1. Carbohydrates[碳水化合物]: sources: starch (), sugar () [來源:澱粉(),糖()]

- In gut: starch/sugar is digested to glucose → absorb by blood (blood glucose) → release energy by respiration in cells.
[在腸道內, 澱粉/糖被消化成葡萄糖 → 吸收入血(成為血葡萄糖) → 在細胞內經呼吸作用而釋出能量。]

(In answering questions about digestion, we usually cannot directly state that we digest starch into glucose, but starch → maltose → glucose. But in this question, we only consider the general results of digestion, therefore we stated that starch has been digested into glucose. In fact, this already includes many processes.)

[在答消化的題目時, 通常不能直接說我們消化澱粉成為葡萄糖, 而是澱粉 → 麥芽糖 → 葡萄糖, 但這裡只是說那消化的整體結果, 因此才說澱粉被消化成葡萄糖, 這其實包括了數個步驟/過程]

- Excess[過剩]: stored as glycogen in liver & muscles, still excess, it is converted to fat and store under skin
[在肝臟和肌肉內貯成糖原; 再過剩, 就轉成脂肪貯存在皮下]

2. Fats[脂肪]: energy-rich; usually stored under skin (forming subcutaneous fat) or around internal organs (original function for absorbing shock, but excess of it causes diseases. [含高能量; 通常貯存在皮下(成為皮下脂肪)或環繞內臟器官 (本意用作吸收震盪力, 但太多又反而致病)])

- 功能[function]: component of **cell membrane**, some hormones [是細胞膜、部分激素的成分];
transport fat-soluble vitamins (eg. A, D, E, K) [運輸脂溶性維生素(eg. A, D, E, K)]

- 種類[types]: saturated fats[飽和脂肪](source:), unsaturated fats[不飽和脂肪]() (好)

3. Proteins[蛋白質]: functions[功能]: forming cells for growth and repair of **tissues** and enzymes (all), some hormones, protein in food also can supply energy (the structural protein in the cells can also release energy in starvation (so that our skeletal muscles will be loss).

[製造新細胞作為組織的生長及修補、 (全部)、部分激素; 食物的蛋白質也可以供給能量, 而我們身體細胞內的結構性蛋白質也可以在飢餓時被分解而釋出能量(這樣我們便會變成皮包骨)]

- When protein (actually amino acid because protein are being absorbed in form of amino acids) is in excess, amino acids will be deaminated into two parts: one of them becomes carbohydrates (for releasing energy or storage); another part changes into nitrogenous compound (eg. urea) that will be excreted by the kidney. [當蛋白質(氨基酸, 因蛋白質是以氨基酸形式被吸收的)過剩時, 氨基酸就會被脫氨作用[deamination]所分解, 成為兩部分, 一部分變成碳水化合物(用作釋放能量或貯存); 另一部分變成氮化物 eg. 尿素經由腎臟排出體外]

- source[來源]: ; **essential amino acids** (20types), (should obtained from food):
other non-essential amino acids (can be formed from other absorbed essential amino acids) [20 種必需氨基酸必需由食物處取得, 其他非必需氨基酸, 身體可由已攝取的氨基酸改變而來 (即身體能夠合成氨基酸)]

鬼叫我們投胎在非洲這些政府動盪的國家, 你們在香港生活, 真的很幸福!



我的組織(肌肉)已經被分解, 用作釋放能量[release energy by oxidation], 再無食物, 我很快會死!

energy ratio[能量比例]: Carbohydrates : fats : protein = 1 : 2 : 1

4. **Vitamins**[維生素]: control metabolic activities, lacking causes deficiency diseases [控制代謝活動, 缺乏引致營養缺乏病].
- can be classified into water soluble (vitamin B, C) and fat soluble (vitamin A, D, E, K) [分為水溶性和脂溶性兩種].

vitamins	deficiency disease [營養缺乏病]	function [功能]	source [來源]
A	night-blindness [夜盲症]	維持 cornea[角膜]; dim light vision [暗光下的視力]	
C	scurvy [壞血病]	form connective tissues [製造結締組織]	
D	rickets [佝僂症](年幼); osteoporosis[骨質疏鬆症](成年)	forming bones & teeth [影響鈣 的吸收, 而影響骨和牙齒]	

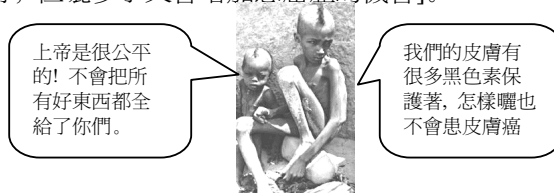
- test for vitamin C [檢定維生素 C]: use **DCPIP solution**: add vitamin C solution into DCPIP solution drop by drop, until it decolourize (blue change to colourless) [把維生素 C 逐滴滴落 DCPIP 溶液內, 它會脫色(由藍色變成無色)]

Note: should add vitamin C solution into DCPIP solution, NOT vice versa.

[注意: 是把維生素 C 溶液加入 DCPIP 溶液內, 不要倒轉]

- Our skin can produce vitamin D under UV ray of sunlight; but excess UV causes skin cancer

[皮膚在陽光的紫外光之下, 能夠製造維生素 D, 因此說曬太陽身體好; 但曬多了又會增加患癌症的機會].



Pr.10.3 Compare vitamin C content of different type of fruits [比較不同水果的維生素 C 含量]:

What variable(s) should be keep constant? [什麼變數]要被保持恆定? _____

assumption[假設]: _____; how to measure the amount? _____

Should the experiment be repeated? Why? [每套實驗是否要做多次, 為什麼] _____; _____;

errors[錯誤]: _____

5. **Minerals**[礦物質]: control metabolism [調控體內的代謝作用]

Minerals	deficiency disease [營養缺乏病]	function [功能]	source [來源食物]
calcium [鈣質]	rickets [佝僂症](年幼); osteoporosis[骨質疏鬆症](成年)	component of bones & teeth [骨和 牙齒的成分]; 肌肉和神經的作用 [muscle & nerve action]	
iron [鐵質]	anaemia [貧血]	form haemoglobin in red blood cells [形成紅血球內的血紅素]	

- Due to blood loss by menstruation each month, female requires more iron in their diet, to replace the lost haemoglobin in red blood cell. Otherwise they are more easily suffered from anaemia.

[女性每月都因月經而流血, 更加需要鐵質補充紅血球中的血紅素; 否則更易貧血]

- Calcium keeps the healthy bones and teeth, but it is not responsible for preventing tooth decay.

[鈣質可以使骨和牙齒變得更健康, 但卻不能防止蛀牙]

6. **Dietary fibre** (roughage)[食用纖維]: cellulose cell wall of plant cell. [是植物的纖維素細胞壁]

- Human (animal) cannot digest cellulose, it provides bulk to **stimulate peristalsis** of gut

[人體(動物)不能夠消化食用纖維, 因此它只提供大團的刺激腸道的蠕動]

- deficiency disease [缺乏症]: **constipation** [便秘]: faeces stay in rectum for too long time. It becomes hard due to water absorption from the faeces. [因糞便逗留在直腸內太久, 水分被吸去而變硬]

- (不要寫成: the function of dietary fibre is to prevent constipation [食用纖維的功能是防止便秘])

- source[來源]: obtained from fruits and vegetables [生果和蔬菜等取得]

7. **Water** [水分]: acts as solvent, transport medium, cooling agent (evaporation of sweat to keep cool), component of fluids (eg. digestive juices, tears) [作為溶劑、運輸介質、汗液蒸發而使身體冷卻、體液(例如: 消化作用、眼淚)的成分, eg. 消化液、眼淚,等].

Balanced diet [均衡膳食]: enough (but not excess) following substances [足夠(但不是過剩的)以下物質]:

- energy-rich food (eg. carbohydrate, fats) [高能量食物 ([碳水化合物、脂肪])]
- body-building substance (eg. protein) [建造身體的物質(蛋白質)]
- substance to maintain health (eg. vitamins, minerals & dietary fibre) [維持健康的物質(例如:維生素、礦物質、食用纖維)]

Factors affecting food/energy requirement [影響 食物/能量 需求的因素]:

- age: **young child**: higher energy requirement: because higher metabolism (require more carbohydrate to provide energy);
[年齡: 年青人要求: 因有較高代謝速率而要較多含高能量的食物(多些碳水化合物等)]
more protein: should build new cells/tissues for growth. [較多蛋白質: 建造新細胞/組織, 用作生長]
more calcium & vitamin D: building bones and teeth. [較多鈣質和維生素 D: 建造骨和牙齒]
more iron: produce more blood to meet the higher requirement during growth.
[較多鐵質: 製造更多血液供應生長所需]
- sex [性別]: male require more energy than that of female due to his higher metabolic rate
[男性比女性要較多能量, 因男性的代謝速率較快]。
- occupation & daily activities [職業及每日的活動量]
- special condition [特別情況]: pregnant woman, breast-feeding woman [懷孕婦人、授乳婦人]: require more energy for the growth of embryo/baby [需要額外的食物/能量, 以供應胚胎/嬰兒的生長所需]
(如果題目問懷孕婦人為什麼要喝較多牛奶, 就要答: “to provide more calcium, for the growth of bones of the embryo” [供應更多鈣質, 以利胎兒的骨骼生長]; 或 “to provide more protein, for the growth of the embryo”, 等。)

部分名詞:

1. starvation → glycogen in liver & muscle use up → fat stored under skin/internal organs use up → break down muscles.
[飢餓 → 使用肝臟和肌肉內的糖原 → 使用皮下/內臟旁的脂肪 → 分解肌肉組織]
2. anorexia nervosa [厭食症]
3. malnutrition [營養不良]: without balanced diet → lacking some type of nutrients
[沒有均衡膳食, 即有偏食, 因而缺乏某些營養]
4. obesity [肥胖症] → 容易有 easy have high blood pressure, coronary heart diseases, diabetes [高血壓、冠心病、糖尿病].
- to avoid obese: more exercises, eat less energy-rich food, not taking snack. You should take more fruits and vegetables (which contains less energy)
[要避免過胖, 可以多作運動, 吃小些含高能量的食物, 不吃零食, 而改吃較多水果和蔬菜(有較少能量)]

Concepts for Food & Diets

1. Mother's milk is an ideal food for baby: (1) it contains most nutrients (NOT all, lacking vitamin C, D and iron) required for the growth of the baby; (2) it is easy taken (NOT: easy digested); (3) contains antibody, to help body defence of the baby. [母乳是一種理想的嬰兒食物: (1) 含有大部分(不是全部)必需的營養(缺乏維生素 C、D 和鐵質); (2) 容易進食(不是容易消化); (3) 含有抗體, 以幫助嬰兒身體防衛。
2. (a) Vitamin C is easily destroyed by heating (therefore not to cook vegetables for too long). However we discovered that boiled orange juice contains more vitamin C than that of unboiled one. This is because the test we applied is only to test for the present of some characters of vitamin C and the amount of substance causing this character will be increased after destruction. [維生素 C 很容易被加熱所破壞(因此烹調蔬菜時, 不要把蔬菜煮得太久); 但我們發現煮沸了的橙內含有的維生素 C 比鮮橙還多: 這是由於我們用的方法實際上只是測試維生素 C 內的某些成分, 而它被破壞後這些

3. Our daily energy required is mainly supplied by carbohydrates. (The main diet in Chinese is rice). (Fats and protein can also supply energy). Protein can no longer being oxidized to supply energy after being converted to structural protein of tissue cells. (In starvation, these structural proteins (i.e. tissue cells) can also be oxidized to release energy, but this is very dangerous). [我們每天需要的能量, 大部分是由碳水化合物(中國人的主糧是米或麥)所提供, (脂肪和蛋白質也會提供能量)。蛋白質能夠供應能量(食物中的蛋白質), 但當轉化成正常的人體組織後, 就不再被氧化而釋放能量。(在挨餓時, 這些身體組織仍然能夠被氧化而放出能量, 但這是十分危險的)(不要以為: “只有碳水化合物和脂肪提供能量”)]
4. (a) NOT to say, “to avoid obesity, we should take in less fat but more carbohydrate”, since excess carbohydrate will be converted to fat to be stored under skin. This will cause obese.
[不要以為: “要避免變得太肥胖, 我們要進食較少脂肪, 但更多碳水化合物”; 因為體內過剩的碳水化合物也會被轉化成脂肪, 而被貯藏成為皮下脂肪組織, 這樣也會變肥]。
A person gains weight (becomes fat) as he takes in more energy from food than his body needs. (The reverse, for lose weight, is also true.) (**NOT because he takes in too much fatty food.**) [當人獲得的能量比他所需的更多, 他就會增加重量(變得肥胖); (相反, 在變輕時, 也是相同道理)。(不接受: 由於吃下太多脂肪)]
(b) 市面上太多所謂纖體方法, 有些還強調不用做運動, 而其實有些可能只是減去你體內的水分, 因而導致體重下降; 如果真是這樣, 就會對你的身體造成不良的影響。
5. Our body will not store sugar, since it is soluble and will lowers the water potential of the body fluid. This will alter the osmosis of the cells. Only starch (in plant) and glycogen (in animal) are suitable for storage due to their insolubility.
[身體不能貯藏糖, 由於它們是水溶性的; 這樣(糖溶於水)會降低細胞的水勢而改變細胞的滲透能力; 只有澱粉(在植物)及糖原(在動物), 由於它們是不溶的, 是最適合用作貯藏的]。
6. Vegetarian diet is not suitable for children and teenagers. They are actively growing and some essential amino acids may not be provided in sufficient amount. [一個素食者的膳食是不適合給小孩和青少年的, 因為他們正活躍地生長, 而某些必需的氨基酸不能夠全由植物中充分地供應他們生長所需]。
7. Diet in cool area contains lots of fats, because:
 - (a) fats can release much more energy (double) than that of carbohydrates and proteins. This can compensate for the great heat loss.
 - (b) excess fats is stored under skin for insulation/ to reduce heat loss.
居住在寒冷環境的人民, 其膳食中含有大量的脂肪, 由於
 - (a) 脂肪比碳水化合物及蛋白質能夠釋放更多能量(雙倍), 這樣可補償他們的巨大散熱量;
 - (b) 過剩的脂肪能夠被貯藏在皮膚下, 用作隔熱, 使身體散熱量減低。
8. Besides the skin to produce vitamin D under sunlight/UV ray, the bacteria in the large intestine can also produce vitamin K. Therefore not to say that human cannot produce vitamin. [除了我們的皮膚能夠製造維生素 D 之外, 大腸的細菌(大腸桿菌)也會為我們製造維生素 K。因此不要以為人體不能夠製造維生素]。
9. Patient with night-blindness cannot see things **clearly in dim light** (NOT at night/without light/dark condition). If there is really no light, nobody can “see” things. [患了夜盲症的人不能夠在暗光之下看清楚東西; (不是: 在夜間或沒有光時); 沒有光就任何人也看不見東西的了]。(而夜間也不一定是暗光的)
10. Balanced diet includes correct amount and type of food in correct ratio (i.e. not too much/little)(NOT accept: take in all type of food in a diet).
[均衡膳食是包含正確份量及各種食物成分的正确比例 (不要太多或太少)(不接受: 在一餐吃下各種食物)]
(即是說: 膳食中要包含所有必需的食物種類[type of food], 而每種要有適當的份量[suitable amount of food substances]; 亦要有適當的能量數量[amount of energy])。
11. Eat more sugar will probably cause tooth decay, NOT diabetes. [吃得太多糖會引致蛀牙, 卻不是 “形成糖尿病”]。