

CHALMERS

*Department of Chemical and Biological Engineering
Food Science*



Written assessment in Nutrition & Health (KLI041), 7.5 ECTS

Date: 18th December, 2015

Time: 08.30-12.30

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Aid: Dictionary
Calculator

GOOD LUCK!

Grading system (marks):	0-49	=fail
	50-64	=3
	65-79	=4
	80-100	=5

Several questions can be answered on the same paper

1. Name the four most common nutrient deficiencies in developing countries.

(2p)

2. Give examples of consequences of each of these deficiencies

(4p)

3. The major cause for food-borne illness is the consumption of microbiologically contaminated foods. What can consumers do to protect themselves from food-borne illness?

(3p)

4. Give examples (at least 3) of important functions of HCl in the stomach during digestion of food.

(3p)

5. Describe the three components of **energy expenditure** in a human body. Indicate how much each component represents of the total energy expenditure (approx. average value in an adult sedentary person **or** an active person)

(3 p)

6. Body composition can be assessed several ways. Describe advantages/disadvantages of the use of the following methods to measure/estimate body composition:

- a) Anthropometry
- b) Bioelectrical impedance
- c) DXA

(5 p)

7. Which of the alternatives below; *a,b,c* do you think has the highest bioavailability of β -carotene?

Why- motivate/explain your answer!

- a) Carrot purée with oil
- b) Raw carrots
- c) Grated carrots

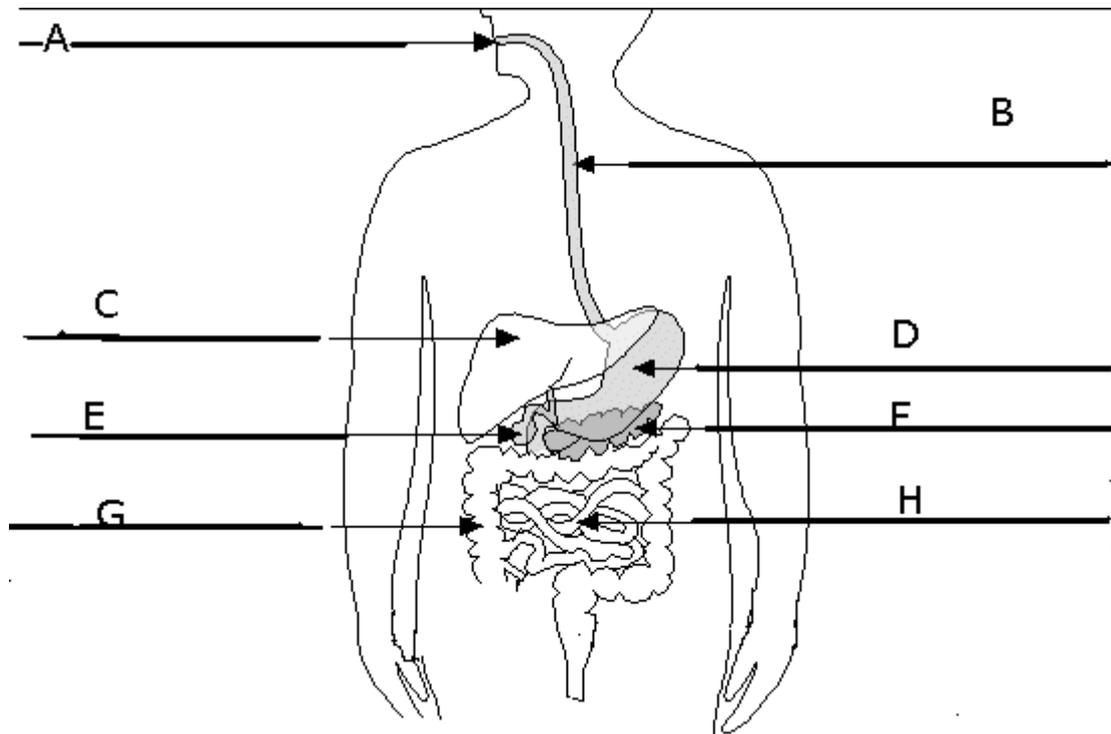
(2 p)

8. The digestive tract

a. List the different indicated (with arrows) **parts and organs** of the human digestive system in the figure below. Indicate the **secretions (and when appropriate also the enzymes)** from the different parts of the system and the organs.

b. What is the role of the **large intestine** in digestion and absorption

(10 p)



9. The bioavailability of iron is influenced by the nutritional status and different components of food.

Consider a "basal breakfast" consisting of white bread, margarine and combined with different food products for comparison of the iron absorption from the breakfast. How would the iron uptake be influenced of the following beverages and food products?

For each example, describe **which component/s** in the beverage or food that has an effect and **how** it affects the uptake.

1. Orange juice
2. Ham
3. Oat meal/whole grain porridge
4. Tea
5. Coffee

(5p)

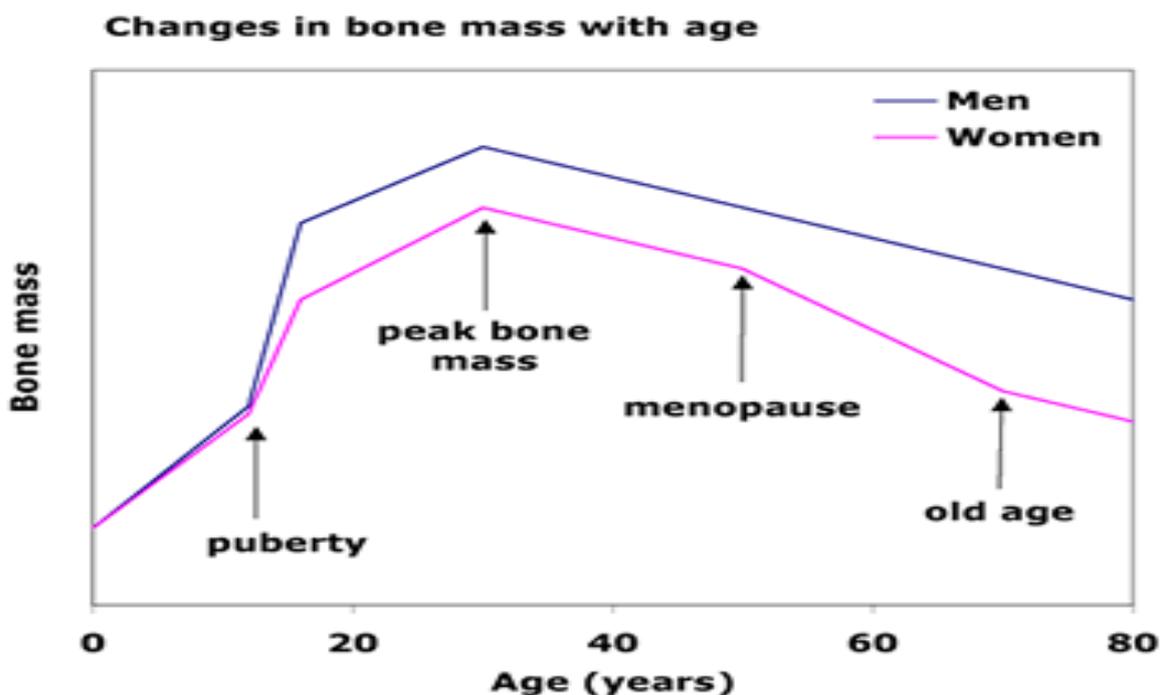
10. Osteoporosis causes > 8.9 million fractures/year, resulting in an osteoporotic fracture every 3 seconds. Worldwide, 1 in 3 women and 1 in 5 men > 50 years will get fractures in some parts of the body.

a) Name the parts of the body are mostly affected by fractures

(2p)

b) With the help of the diagram below, describe the **major factors** that are important for the development of a high peak bone mass (and high mineral density) during our whole life, indicate which of the different factor that is most important. Try to explain (also with the help from the figure), why it is more common with fractures in women than in men.

(8p)



11. Vitamin A

- a. Give examples of early and late symptoms and complications of **vitamin A deficiency**.
- b. Describe potential risks/adverse effects of **too high vitamin A** intakes

(4 p)

12. What is meant by the term methyl-folate trap and how is this linked with increased risk of heart diseases? Describe in words or/and a diagram.

(5 p)

13. Multiple choice questions: Select one (or more) alternatives among the suggested answers below!

(a) Fat-soluble vitamins are absorbed in the _____ and circulated in the _____

- a) Stomach; lymph
- b) Small intestine; lymph
- c) Large intestine; blood
- d) Small intestine; kidney

(b) The most biologically active form of vitamin A is

- a) Lycopene
- b) Retinol
- c) Beta-carotene
- d) Zeaxanthin

(c) Which of the following can result from vitamin D deficiency in infants and children?

- a) Osteoporosis
- b) Osteomalacia
- c) Rickets
- d) Anemia

(d) Vitamin B12 is absorbed in _____ and transported to the _____

- a) Small intestine; kidney
- b) Large intestine; liver
- c) Stomach, pancreas
- d) Small intestine; liver

(4p)

14. Lipid absorption and distribution

a) Describe how lipids are absorbed in the intestine, and then transported around the body, to the point where HDL returns to the liver. Preferably use one or several annotated diagrams. **(7 p)**

b) Write down, or annotate your answer to 18 a) with the points where dietary components could interfere with lipid absorption **(2 p)**

15. According to the weight of scientific evidence, can eating high amounts of essential fatty acids improve health in healthy people? If so, what? **(1 p)**

16. Describe in words and/or a diagram how proteins are digested and transported into blood. **(4 p)**

17. a) In developing countries, what proportion of protein comes from plant sources? **(1 p)**

b) Is this a potential problem, and if so, why? **(2 p)**

18. 1 g of protein provides 4 kcal of energy. Protein recommendations are that people get 10-20 % of their total energy intake from protein.

- a) For a woman requiring 1800 kcal/day, calculate how much protein she would need to eat if she ate 10 % or 20 % of her total energy requirement as protein
- b) Beef has 20.6 g of protein/100 g, lentils have 7.8 g/100 g. How much beef or lentils would the woman above need to eat to meet the amount of protein required at 10 and 20 %?
- c) Recommendations in the United States of America state that up to 35 % of total energy intake as protein is acceptable. Based on the calculations above, briefly discuss whether such high intakes are safe or sustainable. Don't forget to provide arguments to back up your answer! **(6 p)**

19. Describe the digestion of starch from the mouth through to absorption into the bloodstream. You may use words and/or diagrams. **(4 p)**

20. Name 3 key functions of insulin

(2 p)

21. There is controversy about the safety of high-fructose corn syrup. Some groups of people, including some scientists blame high-fructose corn syrup for increasing the incidence of obesity.

As a nutrition expert, you are asked to design a study or several studies to test if high fructose corn syrup is indeed more likely to cause obesity than equivalent sweeteners (e.g. sucrose).

Write down what you would do and how you would interpret the likely results. Keep in mind the high scientific standards for evidence required.

(6 p)

22. Why do we have health claim legislation for foods?

(1 p)

23. What are the guiding principles of health claims within the EU? (Name at least 4)

(2 p)

24. Food-based health claims in the EU are divided up into 3 main categories:

Article 13.1

Article 13.5

Article 14

Describe each of these different health claim categories

(2 p)