

CHALMERS

*Department of Chemical and Biological Engineering
Food Science*



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

Date: 25th October, 2016

Time: 14.00-18.00

Examiners: Marie Alminger and Alastair Ross

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 but remember to write your examination code on each paper

1. Noncommunicable diseases (NCDs)

a) What is the definition of NCDs? **(1p)**

b) NCDs are related to several determinants and risk factors, some are related to global/societal factors and some are modifiable. The different “classes” of determinants/risk factors and the diseases these may lead to are listed below.

Give at least **two examples for each** of these.

1) Underlying determinants (global/societal) **(1p)**

2) Common risk factors **(1p)**

3) Intermediate risk factors (measurable) **(1p)**

4) Diseases **(1p)**

2. a) Name the four most common nutrient deficiencies in developing countries. (2p)

b) Give examples of consequences of each of these deficiencies. **(4p)**

c) Describe some potential strategies (at different levels e.g. household, society, food supply chain etc.) to prevent and control nutrient deficiencies. **(3p)**

3. According to the United Nations Food & Agriculture Organisation Sustainable diets are diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. What do you consider would be good strategies/alternatives to contribute to a sustainable food future (e.g. what consumers can do on an individual basis). (3p)

4. Describe the three components (see below) of human daily energy expenditure

a) **BMR/RMR** - what it is and how much it represent (approx.) of total human daily energy expenditure in an adult person with sedentary lifestyle **(2p)**

b) **Thermic effect of food** – explain what it is and describe what it is primarily influenced by **(2p)**

c) **EE** – explain what it is and name the most important factors affecting it **(2p)**

5. Human body composition can be studied using different methods and techniques. Dual X-ray absorptiometry (DXA) can provide information about different tissues in the body.

- a) Specify tissues that can be estimated using DXA.
- b) Give examples of advantages and disadvantages with the DXA technique. **(5p)**

6. Obesity is strongly related to a number of diseases and complications.

Describe **cardiovascular, metabolic, respiratory, gastro-intestinal** and **mechanical** health risks/complications related to obesity.

(5p)

8. The digestive tract

Describe some important functions of:

- a) Saliva **(1p)**
- b) The muscles surrounding the stomach and the small intestine. **(1p)**
- c) Hydrochloric acid (HCL) in the stomach. **(2p)**
- d) The pancreas **(2p)**
- e) The gallbladder **(2p)**
- f) The large intestine/colon **(2p)**

9. The plasma concentration in the blood is controlled by the regulation of the absorption, storage and secretion of calcium in the body through different mechanisms.

a. Describe (in words or in a diagram) how the three calciotropic hormones are secreted in the body (at either high or low plasma calcium concentration) and which **organs and tissues** that are involved in the regulation.

b. How is calcium taken up in the small intestine (2 different ways)?

c. Give examples of factors that may decrease or increase the absorption of calcium.

(10p)

10. Vitamin B12

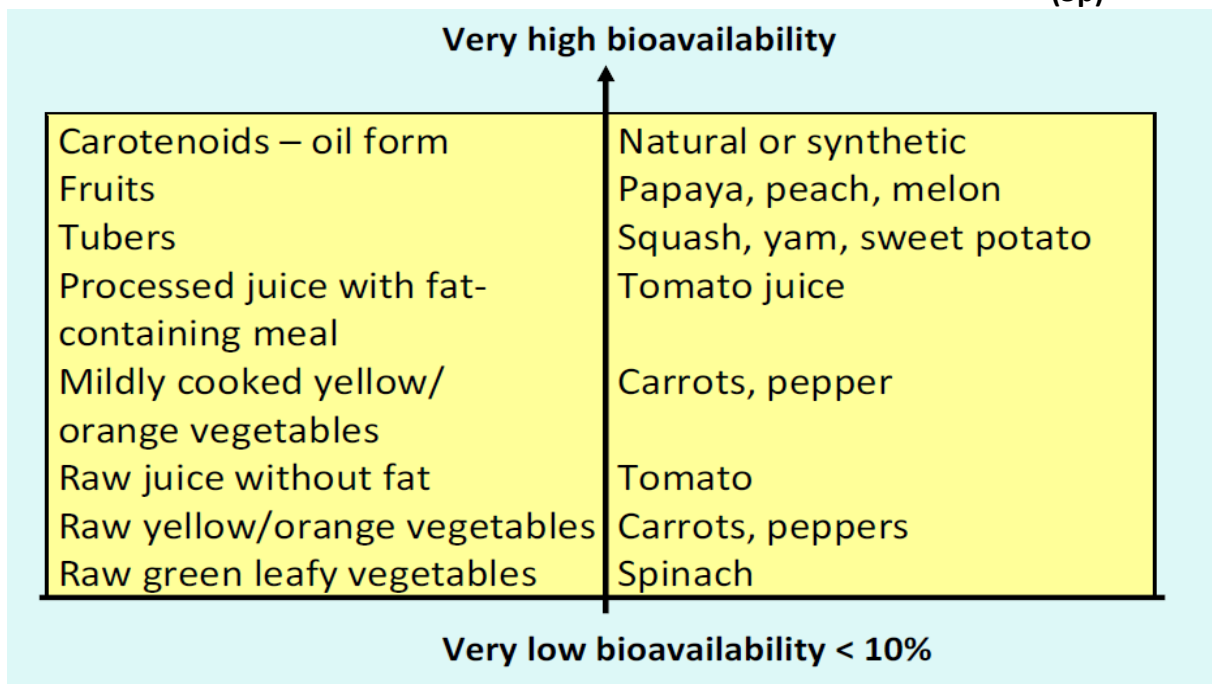
Describe in a figure or stepwise in text how vitamin B12 is digested and absorbed in the body.

(3p)

11. The figure below illustrates examples of how bioavailability of carotenoids can vary from very low to very high in different plant sources and products.

- a) Describe major factors affecting the bioavailability of carotenoids (at least 3), give clear arguments by using the examples below.
 b) How would you prepare a vegetable soup - to obtain a soup with high carotenoid bioavailability?

(5p)



12. 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.

(7p)

- b) Write down, or annotate your answer to a) with the points where dietary components could interfere with lipid absorption

(2p)

13. According to the weight of scientific evidence, can eating high amounts of essential fatty acids improve health in healthy people?

If so, what?

(1p)

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

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

15. 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!

(6p)

16. Name 3 key functions of insulin (2p)

17. How can carbohydrate intake influence protein and lipid metabolism? (2p)

18. Some people claim that a high-fat, high-protein diet is better for losing weight than a low fat, normal-protein diet.

As a nutrition expert, you are asked to design a study or several studies to test if this theory is true or not.

Write down what you would do to test if a high-fat, high-protein diet is better for losing weight than a normal 'healthy' diet, and how you would interpret the likely results. Keep in mind the high scientific standards for evidence required, and that we are focusing on effects in humans.

(6 p)

19. Why do we have health claim legislation for foods? (1 p)

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

(2 p)

21. 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)

22. How would you interpret the meta-analysis figure on the next page?

Do whole grains have an effect on LDL-cholesterol concentrations in blood?

Justify your answer, based on the figure below.

The figure is from Hollænder et al Am J Clin Nutr 2015.

(6 p)

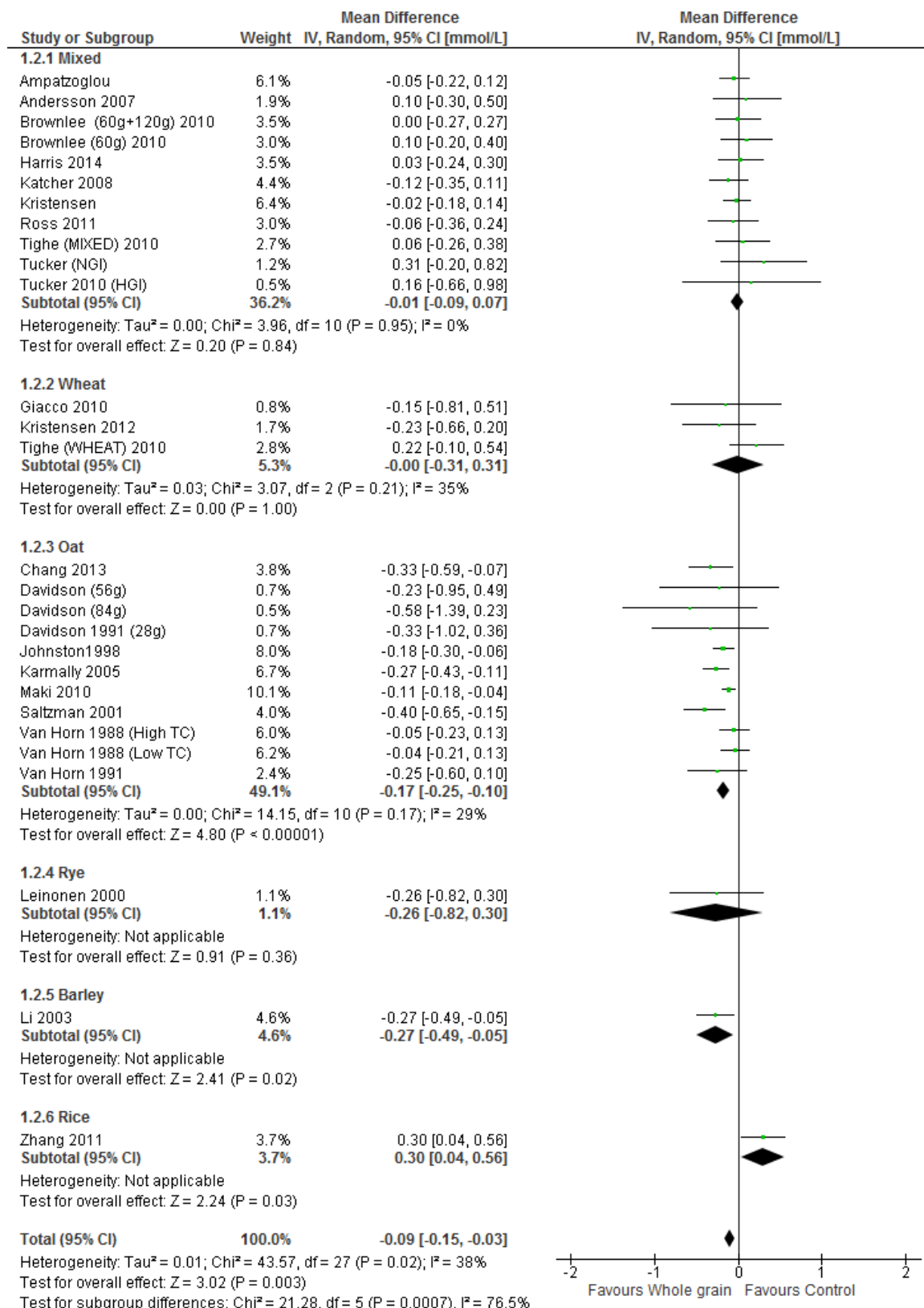


Figure 2 Forest plot of the results of the random-effects meta-analysis of change in LDL-cholesterol (mmol/L) according to grain type shown as pooled mean differences with 95% CIs. For each study, the square represents the point estimate of the intervention effect. Horizontal lines join lower and upper limits of the 95% CI of this effect. The area of shaded squares reflects the relative weight of the study in the meta-analysis. Diamonds represent the subgroup mean difference and pooled mean differences. 'Mixed' refers to diets with different combinations of cereal grains.

