



School of Public Health

Department of Human Nutrition and Dietetics Year 1

Academic year: 2021-22 Trimester 3

Module Title: Nutritional biochemistry Code: HND1251 Credits: 20

Type of Assessment: assignment1 Total number of students: 39

Instructions

1. The assignment will be submitted as a handwriting hard copy (each group should choose a member with the good handwriting skills to write the clear & readable answers).
2. You are requested to respect the order of questions. The maximum number of pages is 6 (use both sides of the paper of A4 format). Each question carries 4 marks.
3. Assignment (a) starting date: Monday, November 28, 2022 @ 02 pm; (b) submission deadline: Monday, November 5, 2022 @ 08 am. (c) submission mechanism & channel: the group leader will be submitting the daily assignments to the lecturer starting from Tuesday, November 29, 2022 at 08 am. The last question will be submitted on Monday, November 5, 2022 at 08 am.
4. The assignment oral presentations will start on Monday, November 5, 2022 @ 09 am.
Note: Each group member should present at least one topic (subquestion).
5. At the beginning of presentations, each group leader will make an introduction during which s/he will indicate the presentation relationship "*group member- subtopic to present*".
6. The cover page of the written assignment should indicate the signature of each group member. The group leader will pick the list of group members in the office of the School administrative assistant (the group leader is indicated by bolded names).
7. You are kindly advised to avoid cheating cases and other assessment irregularities.
8. Please remember always to indicate the references (source of information): For a book: to indicate the "author's name, year, title, edition, place and publisher" / For a website you should indicate the last date you have consulted it.
9. **Failure to respect the above instructions will lead to loss of marks (-1 mark/each instruction).**

1. a) Compare *fed* and *fasted states*, and outline at least 3 examples of metabolic pathways related to each state.
b) Briefly describe these metabolic pathways and indicate their physiological roles in the functioning of human body.
c) Relate and explain the stages of nutritional biochemistry to fed/fasted states.

2. Metabolism of macronutrients in the human body:
 - a) Briefly explain the importance of digestion of macronutrients in GIT.
 - b) Explain the enzymatic digestion of dietary proteins, carbohydrates (cellulose, amylose, glycogen) and lipids (steride, triglyceride, phosphatidylcholine).
 - c) Indicate 4 sources and 4 major functions of proteins, carbohydrates and lipids.
 3. Metabolism of macronutrients: briefly describe the following biochemical processes and discuss their physiological roles in the functioning of human body (relate them to catabolism/anabolism): CAR, PPPW, glycogenesis, glyconeogenesis, ketogenesis, ketolysis, β -oxidation, lipogenesis, glyoxylate cycle.
 4. Metabolism of macronutrients:
 - a) The living organisms utilize the molecules of galactose and stearic acid to produce the energy needed in various cellular activities: describe the mechanisms by which the living cells produce energy from these molecules.
 - b) Indicate *the major steps through which ATPs* are produced and calculate the total number of ATPs produced.
 - c) It is known that lipids produce more energy than carbohydrates. Considering the above subquestion **a**, confirm that lipids produce more energy than carbohydrates by calculating the energy yield per carbon atom for lipids and carbohydrates.
 5. Metabolism of macronutrients:
 - a) The molecules of acetyl-coA produced by β -oxidation can be used by the human body in different pathways to synthesize various biomolecules according to the needs. Briefly describe four pathways in which the acetyl-coA molecules can be involved and indicate their physiological importance.
 - b) During a prolonged starvation, the extrahepatic tissues use ketone bodies as source of energy needed in different cell activities: briefly describe the mechanisms by which these extrahepatic tissues use to get energy from a molecule of β -hydroxybutyrate. Then, calculate the total number of ATP that will be produced with 5 molecules of β -hydroxybutyrate.
 6. Metabolism of macronutrients: in the cases of malnutrition (undernutrition or overnutrition), the body tissues can convert some biomolecules into others: briefly describe the following conversions:
 - a) conversion of carbohydrates to proteins & lipids
 - b) conversion of proteins to carbohydrates & lipids
 - c) conversion of lipids to proteins & carbohydrates
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List of students & Groups

S/N	SURNAME	FIRST NAMES	REG. NO.	Group
1	ABE SHAULI REDEEMER	ER ADIEL	222001234	1
2	BAREKE IRADUKUNDA	LIONEL	222009771	1
3	HITAYEZU BARAKA	FRICKON	222000421	1
4	IRANKUNDA	ERIC	222005587	1
5	MANIZABAYO	EMMANUEL	222000351	1
6	MUSANABERA	KHADIDJA	222008795	1
7	NIYONSABA	PASCAL	222003893	1
8	NTIRENGANYA	EMMANUEL	222001252	1
9	TUMUKUNDE	JACQUES	222001311	1
10	UWIDUHAYE	MARIE ANGE	222010329	1
11	AGASARO	DEBORAH C. DEFFAND	222002552	2
12	BIGENIMANA	CESAR	222010196	2
13	INGABIRE	JULIENNE	222001212	2
14	ISHIMWE GISA	YVES AUXILE	222000672	2
15	MUGABE	ROBERT	222000575	2
16	NDIKUBWIMANA	JANVIER	222001046	2
17	NKURIKIYUMUKIZA	VINCENT	222000284	2
18	NYIRAHABYARIMANA	ANGELLIQUE	222000567	2
19	TUYISHIME	THOMAS	222000453	2
20	UWIMFURA	MARIE ANGE	222014774	2
21	AHISHAKIYE	AIMEE	222000339	3
22	DUSINGIZIMANA	MARIE ROSE	222000583	3
23	INGABIREYURUKUNDO	ANGELIQUE	222000649	3
24	KWIZERA	DIDIER	222000666	3
25	MUJAWIMANA	ANGELIQUE	222001182	3
26	NIBYOSE	SIYONI	222001088	3
27	NSHIMYUMUKIZA	DEO	222011481	3
28	SHIMWA KAZE	KEVINE	222003311	3
29	TWAMBAZIMANA	PIERRE CLAVER	222002685	3
30	UWITONZE	MARIE GRACE	222000619	3
31	BAGALE	GLOIRE	222001278	4
32	HABONIMANA	FABRICE	222000830	4
33	IRADUKUNDA	GEDEON	222002207	4
34	KWIZERA	ONESME	222000373	4
35	MUNEZERO	DIANE	222016652	4
36	NIYONKURU	VIVANT	222000558	4
37	NSHUTI	HENRIETTE	222001089	4
38	SHINGIRO	THIERRY	222000253	4
39	UKWISHATSE	EMILE	222002625	4