84284 Signaling Pathways in Health and Disease

14 CFU

Exam Questions

Academic Year 2021/2022

Exam method

Students who regularly attended the course of Cell Signaling will be evaluated through a **four-hour FINAL EXAM**, a cumulative **written test** with both **multiple-choice and open-ended** response formats that include topics from all the teaching modules of the integrated course of Signaling Pathways in Health and Disease.

Final Grade Fractions:

- Cell Signaling 9/32 pts;
- Metabolic Biochemistry 14/32 pts;
- Physiology 9/32 pts.

→ MAX GRADE: 30 cum laude.

The final exam for the module ofPhysiology will be an open-ended question written test.

1st Appello - 06/2022

84285 Cell Signaling 4 CFU

Maria Luisa Genova

Exam Questions

- Genova's exam was exactly this one: :/
- /liveunibo-my.sharepoint.com/personal/lahav_constantini_studio_unibo_it/_layouts/15/onedrive.aspx?id=%2Fpersonal%2Flahav%5Fconstantini%
- %5Funibo%5Fit%2FDocuments%2FMed%26Sur%20%2D%20UniBo%20English%20Course%20%2D%20Master%20Drive%2F%F0%9F%9F%A2%20Exam%20Questions%20%F0%9F%99%8B%F0%9F%8F%BB%E2%9D%93%20%2B%20Course%20Reviews%20%F0%9F%92%AD%2FYear%201%2FSemester%202%2F%F0%9F%9F%A2%2084284%20Signaling%20Pathways%20in%20Health%20and%20Disease%2FSignaling%20Pathways%20%2D%20Written%20Exam%20%2D%2025%2E06%2E21%2Epdf&parent=%2Fpersonal%2Flahav%5Fconstantini%5Fstudio%5Funibo%5Fit%2FDocuments%2FMed%26Sur%20%2D%20UniBo%20English%20Course%20%2D%20Master%20Drive%2F%F0%9F%9F%A2%20Exam%20Questions%20%F0%9F%99%8B%F0%9F%8F%BB%E2%9D%93%20%2B%20Course%20Reviews%20%F0%9F%92%AD%2FYear%201%2FSemester%202%2F%F0%9F%9F%A2%2084284%20Signaling%20Pathways%20in%20Health%20and%20Disease https

76149 Physiology 4 CFU

Davide Martelli

Exam Questions

- A lot of topics you had to explain quite confusing, you could make up stuff but idk how will he grade it.
  - Nernst equation, electrochemical potential, electrical properties of the membrane, Hodgkin cycle, action potential generation and restoration of membrane potential,

Goldman-Hodgkin-Katz equation, Ionic currents, the threshold, the regenerative mechanism, changes in ion conductance during the action, the refractory period.

- Autonomic nervous system, enteric system, autonomic reflexes The Autonomic Nervous System. Morphofunctional organization of the autonomic nervous system: sympathetic, parasympathetic and enteric divisions. Action of the sympathetic and parasympathetic systems on the main organs. Central control of the autonomic function.

84286 - Metabolic Biochemistry 6 CFU

Giorgio Lenaz

- 9 MCQ questions and explain why the other alternatives are wrong. (1pt each)
  - 0.5 pts for the right alternative + 0.5 for the justification
- 3 Open questions.
  - 1.5 pts for 2 of them and 2.0 pts for the last one

Exam Questions

- *I think all of the mcq questions were from the exercises on virtuale with the exact options*
- *Fill in the blanks with some questions repeated from previous year paper.*
- The open questions were abo in ut:
  - Write reactions of alternative pathway from **glucose 6-P** to **Fructose 6-P** (write every reaction)
  - Open question about **drawing the Pentose phosphate pathway scheme.**
  - The last open question was matching enzyme mutations with what **pathologies** it may cause and explaining why you chose it as well

1. Which of the following do you expect may contribute to elevated glycemia?

A. Glycolysis
B. glycogenolysis
C. Glucokinase reaction
D. Pentose phosphate shunt
E. GSK3 phosphorylation

2. Only one answer is wrong. Pyruvate carboxylase

A. Is present in both mitochondria and cytosol. (Only in mitochondria!)
B. Has covalently bound biotin as prosthetic group
C. Is activated by AcetylCoA
D. Requires ATP
E. Catalyzes an anaplerotic reaction

3. Concerning muscle glycogen

A. A.It is formed starting from blood glucose during exercise
B. When broken down it contributes significantly to blood glucose levels
C. Its breakdown occurs by reacting with inorganic phosphate
D. Glucagon stimulates its breakdown
E. The 1-6 glycosidic bond in its branches is broken by an isozyme of phosphorylase

4. One of the these statements is false

A. The reducing power of fatty acids biosynthesis is obtained by glucose oxidation
B. All carbon atoms of glucose will be found in palmitic acid
C. Fatty acid biosynthesis is stimulated by insulin
D. AcetylCoA carboxylase may be phosphorylated
E. AcetylCoA carboxylase is activated by citrate

5. Concerning fatty acid biosynthesis

A. Citrate activates fatty acid biosynthesis
B. Phosphorylation of fatty acid synthase is required for palmitate biosynthesis
C. Excess AcetylCoA inhibits FA biosynthesis
D. FA synthase may synthesize C16, C18, C20
E. The carbon atom of CO2 used for AcetylCoA carboxylase will be incorporated into palmitic acid

6. Chilomicrons

A. Are carried to the liver by portal circulation
B. Contain free fatty acids deriving from digestion
C. Undergo triglyceride hydrolysis by lipoprotein lipase
D. Release glycerol into adipocytes to be used for triacylglycerol re-synthesis
E. Are the only lipoproteins that do not contain phospholipids

7. Type-2 diabetics are often obese because

A. Lack of insulin stimulates transcription of fatty acid biosynthesis enzymes
B. Obesity and over feeding favor diabetes arousal
C. Lack of insulin inhibits lipolysis in adipose tissue
D. Lack of insulin enhances the transport of citrate in the cytosol
E. Glucocorticoids enhance lipogenesis

8. Which of these is a substrate for ribonucleotide reductase?

A. AMP
B. ADP
C. ATP
D. DADP
E. DAMP

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9. Which of these are substrates of thymidylate synthase?

A. DUMP and methylFH4
B. UMP and methylFH4
C. **DUMP and methyleneFH4**
D. DUDP and methyleneFH4
E. UDP and methyleneFH4

10. PPP all the pathway and write all the reactions involved

11. Associate the enzymatic defects with the pathologies

- LDL receptor - hypercholesterolemia
- Glutamate decarboxylation enzyme - altered GABA neurotransmission

- Lipoprotein lipase - hypertriglyceridemia
- AcylCoA DH - liver steatosis
- Citrate lyase - defect in FA and cholesterol biosynthesis
- Glucose-6-phosphatase - hypoglycemia
- Glucose-6-P DH - erythrocyte glutathione remains oxidized
- PFK2 - lack of response of glycolysis
- Phosphorylase b kinase - glycogen accumulation in liver
- Pyruvate DH - lactic acidosis
- SuccinylCoA acetoacetate transferase - ketonemia

12. .

2nd Appello - 07/2022

76149 Physiology 4 CFU
Davide Martelli
Exam Questions

84285 Cell Signaling 4 CFU
Maria Luisa Genova
Exam Questions

1st Part

- Insulin
- IRS1
- in
- cAMPThyroglobul
- Pertussis Toxin

2nd Part

Was the same as the 2nd part of the 1st appello

84286 - Metabolic Biochemistry 6 CFU
Giorgio Lenaz
Exam Questions

1st Part

- Concerning Pyruvate D.H.
- Glucose
- Which of the reactions does not produces NH3, and he gave some reactions
- HMG-reductase
- VLDL
- Heme Metabolism - there's a question in his material regarding the formation of CO2 (it was pretty much that one)
- All AA can form Acetyl-CoA?
- Decarboxylation of Serine
- 1C Metabolism
-

2nd Part

1) Complete:

*I don't know the exact number of blank spaces that he gave on the test, so I just placed "Blank spaces" on each side. However you can figure it out by the reaction.

- Alanine + "Blank spaces" -> Alpha Ketoglutarate + "Blank spaces"
- Citrate + "Blank spaces" -> OAA + "Blank spaces"
- HMG + "Blank spaces" -> Acetyl-CoA + "Blank spaces"
- MAlate + "Blank spaces" -> CO2 + (?) + "Blank spaces"
- CDP- + "Blank spaces" -> phosphatidylcholine + "Blank spaces"
- G3P + "Blank spaces" -> 1,3BP + "Blank spaces"
- "Blank spaces" -> methylmalonyl-CoA + "Blank spaces"
- Guanine + "Blank spaces" -> GMP + "Blank spaces"

2) Write the enzymes and coenzymes related to the molecules
There were a list of molecules that you should remember the enzymes, vitamins and cofactors related to them.

3) Describe the pathway and the ATP balance from **Glutamine to Glucose**

3rd Appello - 09/2022

76149 Physiology 4 CFU
Davide Martelli
Exam Questions

84285 Cell Signaling 4 CFU
Maria Luisa Genova
Exam Questions

84286 - Metabolic Biochemistry 6 CFU
Giorgio Lenaz
Exam Questions