**AL-FARABI KAZAKH NATIONAL UNIVERSITY**

**Higher School of Medicine Department of Fundamental Medicine**

**PROGRAM**

**final exam in the discipline cellular and molecular pathobiology**

**“Cell and molecular pathobiology” - 5 ECTS**

**Approved final exam format - written exam**

**Expected results:** Master's students at the final exam must:

1. Demonstrate knowledge of the basic concepts of cellular and molecular biology to explain the mechanisms occurring in the body under conditions of normal physiology;
2. Demonstrate knowledge of basic concepts of cellular and molecular biology to explain the mechanisms of pathological processes;
3. Demonstrate analytical skills in integrating knowledge of the mechanisms of molecular and cellular pathobiology when forming judgments regarding the mechanisms occurring in the human body during the occurrence, development of disease and therapy (mechanisms of processes at the molecular level);
4. General principles for constructing medical research;
5. Demonstrate knowledge of modern methods of molecular research in medicine.
6. Ability to apply molecular research methods in scientific work and interpret the results of molecular methods in diagnostics and prognosis (determination of molecular analysis methods);
7. Independently find, analyze and synthesize information from published scientific articles to design molecular studies in scientific papers;
8. Communicate effectively with other students, researchers and teachers regarding medical and scientific information and research results;
9. Articulate opinions clearly when discussing cellular and molecular pathobiological processes and their impacts, and work effectively as a member of a research team.

**Topics included in the final exam:**

**Approximate typology of examination tasks**

1. DNA replication and repair mechanism.
2. Transcription and translation of genetic information.
3. Genetics. Gene expression. Transcription factors: regulation of translation.  Main intracellular signal transduction pathways.
4. DNA damage and genetics of disease development.
5. Cell cycle and DNA repair. DNA damage and mutation.
6. Inflectional or viral agent responsible for disease occurrence and progression in humans. Molecular mechanism.
7. Epigenetics, epigenetic regulation of gene expression. Mechanisms of epigenetic regulation: DNA methylation.
8. Human diseases are linked with epigenetic. Example: molecular mechanism.
9. Epigenetic changes that are responsible for human diseases. Example: molecular mechanism.
10. Cancer Genetics and Genomics, Cancer genetics and genomics, hereditary cancer syndromes and familial occurrence of cancer.
11. Modern diagnostic techniques in medicine. DNA technology, genome sequencing: Sanger method, Next Generation sequencing, Immunohistochemistry, FISH.

**Instructions for exam technology**

1. The exam lasts 1.30 hours.

2. At the specified time, the student goes to the website “app.oqylyq.kz”. 3. The student receives a login and password from the Univer IS. 4. Tickets for each student are issued automatically.

5. The exam begins with a mandatory observer (the camera and microphone cannot be turned off): - You will need a laptop with a webcam or a home computer. Otherwise, you can use your smartphone's camera, for example with the DroidCam client app.

6. The answer is printed in the OQYLYQ program itself. A handwritten response form on paper is NOT accepted.

7. At the end of the exam, the student clicks the “Done” button.

**Response quality scale**

| **Grade** | **Criteria** | **Scale, points** |
| --- | --- | --- |
| Great | 1. all key aspects are included and presented logically; 2. high accuracy (relevance, without redundancy) and constant focus on the issue;  3. excellent integration of theoretical issues;  3. providing relevant examples; | 90–100 |

|  | 4. In-depth analysis and theoretical justification of the problem (if applicable), identification and interpretation of all key aspects;  5. fluency in professional terminology |  |
| --- | --- | --- |
| Fine | 1. all key aspects are included and presented logically; 2. constant attention to the issue with satisfactory accuracy, relevance and/or some redundancy;  3. satisfactory integration of theoretical issues; 3. lack of examples;  4. satisfactory analysis and theoretical justification of the problem (if applicable), identification and interpretation of most key aspects;  5. correct use of professional terminology | 75 - 89 |
| satisfied | 1. Most key aspects included;  2. satisfactory attention to issue - some lapses of relevance and/or noticeable redundancy;  3. Theoretical issues are presented without significant integration; 3. Providing unsuccessful examples or lack thereof; 4. some analysis and theoretical justification of the problem (if applicable), identifying and interpreting most of the key aspects;  5. correct use of professional terminology | 50 - 70 |
| unsatisfactory | 1. most of the key points were missed;  2. Lack of attention to the issue - lack of relevance and noticeable redundancy;  3. some theoretical issues are presented in one way or another; 3. no or irrelevant examples;  4. some analysis and theoretical justification of the problem (if applicable), most of the key aspects are missing; 5. omissions in the use of professional terminology | 25–49 |
| failed | 1. most or all key aspects are missing;  2. lack of emphasis on the issue, insignificant information; 3. missed or superficial theoretical questions;  3. no or irrelevant examples;  4. lack of analysis and theoretical justification of this problem (if applicable), most key aspects are missed; 5. omissions in the use of professional terminology | 0-24 |

**Rating system**

| **Letter grade** | **Digital**  **equivalent assessment** | **% content** | **Traditional systems assessment** |
| --- | --- | --- | --- |
| А | 4 , 0 | 95–100 | Great |

| А - | 3,67 | 90-94 |  |
| --- | --- | --- | --- |
| В + | 3,33 | 85-89 | Fine |
| В | 3,0 | 80-84 |
| В - | 2 , 67 | 75-79 |
| С + | 2 , 33 | 70-74 | Satisfied |
| С | 2 , 0 | 65–69 |
| С- | 1,67 | 60–64 |
| D + | 1,33 | 55-59 |
| D - | 1,0 | 50-54 |
| FX | 0 | 2 5-49 | Unsatisfied  “Discipline not completed” *(not taken into account when calculating GPA)* |
| F | 0 | 0-24 |
| I  (Incomplete) | - | - |
| P  (Pass) | **-** | **-** | "Passed"  *(not taken into account when calculating GPA)* |
| NP  (No Pass) | **-** | **-** | "Not counted"  *(not taken into account when calculating GPA)* |
| W  (Withdrawal) | - | - | "Refusal of Discipline"  *(not taken into account when calculating GPA)* |
| АW  (Academic withdrawal) |  |  | Refusal for academic reasons *(does not count towards GPA)* |
| AU  (Audit) | - | - | "Discipline heard"  *(not taken into account when calculating GPA)* |
| Certif. |  | 30-60  50–100 | certified |
| not certif. |  | 0–29  0–49 | not certified |
| R (Retake) | - | - | Re-learning the discipline |

**Main literature**

1. Human Genetics, Ricki Lewis. 2018
2. Medical Genetics at a Glance, Dorian J.Pritchard, Bruce R.Korf. 2013
3. Basic pathology, Robbins and Cotran Pathologic Basis of Disease [Electronic resource]: textbook / ed.: V. Kumar, A. Abbas, J. Aster. - Philadelphia : Elsevier Saunders, 2015. - 1392 p. - ISBN 978-1-4557-2613-4 : 0.00

**Additional literature**

1. Zhanna Mussazhanova et al.  The Contribution of Genetic Variants to the Risk of Papillary Thyroid Carcinoma in the Kazakh Population: Study of Common Single Nucleotide Polymorphisms and Their Clinicopathological Correlations. Front Endocrinol 2021 doi: 10.3389/fendo.2020.543500.
2. Zhanna Mussazhanova, et al. Immunohistochemical and Molecular Analyses Focusing on Mesenchymal Cells in Papillary Thyroid Carcinoma with Desmoid-Type Fibromatosis. Pathobiology. 2018. DOI: 10.1159/000492117
3. Maria Romano et al. A Structural View of SARS-CoV-2 RNA Replication Machinery: RNA Synthesis, Proofreading and Final Capping. Cell. 2020. doi:10.3390/cells9051267
4. Adriaan H. de Wilde et al. Host Factors in Coronavirus Replication. Microbiology and Immunology. 2018. DOI 10.1007/82\_2017\_25
5. Zhanna Mussazhanova, et al.  Association between p53-binding protein 1 expression and genomic instability in oncocytic follicular adenoma of the thyroid. Endocr J. 2016 doi: 10.1507/endocrj.EJ15-0629.
6. Zhanna Mussazhanova, et al. A Novel Diagnostic Method for Thyroid Follicular Tumors Based on Immunofluorescence Analysis of p53-Binding Protein 1 Expression: Detection of Genomic Instability. Thyroid. 2019. doi: 10.1089/thy.2018.0548.
7. Zhanna Mussazhanova et al. Causative role for defective expression of mitochondria-eating protein in accumulation of mitochondria in thyroid oncocytic cell tumors. Cancer Sci. 2020. doi:10.1111/cas.14501.
8. Cornelia C. Bergmann, COVID-19: Coronavirus replication, pathogenesis, and therapeutic strategies. 2020. doi:10.3949/ccjm.87a.20047
9. Yan-Rong Guo et al. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak – an update on the status. Military Medical Research 2020, https://doi.org/10.1186/s40779-020-00240-0
10. Adriaan H. et al. Host Factors in Coronavirus Replication. Microbiology and Immunology, 2018, DOI 10.1007/82\_2017\_25
11. Gupta and Mania-Pramanik, Molecular mechanisms in progression of HPV-associated cervical carcinogenesis. Journal of Biomedical Science. 2019, <https://doi.org/10.1186/s12929-019-0520-2>
12. Min Lin et al. Recent Advances on the Molecular Mechanism of Cervical Carcinogenesi. 2019.https://doi.org/10.1016/j.csbj.2019.02.001
13. Ryota Otsubo et al. A Novel Diagnostic Method for Thyroid Follicular Tumors Based on Immunofluorescence Analysis of p53-Binding Protein 1 expression: Detection of genomic instability. THYROID. 2019, DOI: 10.1089/thy.2018.0548