Federal State Budget Educational Institution
of Higher Education
Pacific State Medical University
of the Ministry of Health of the Russian Federation

APPROVED BY
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Dermatovenereology and Cosmetology
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COLLECTION OF ASSESSMENT TOOLS
Б1.О.13 Microbiology, virology
of the basic educational program
of Higher Education

Specialty	**31.05.01 General Medicine for international students (in English)** (code, name)
Degree	Specialist's degree
Profile	02 "Healthcare" (in the field of providing primary health care to the population in medical organizations: polyclinics, outpatient clinics, inpatient/outpatient facilities of the municipal health care system)
Mode of study	**Full-time**
Period of mastering the BEP	**6 years** (nominal length of study)
Department	of Microbiology, Dermatovenereology and Cosmetology

Vladivostok, 2025

1. INTRODUCTION

1.1. Collection of Assessment Tools is a document that regulates the format, content, and types of assessment tools for continuous assessment, interim examination and final (state final) examination, and graded criteria for each type of assessment tools.

1.2. Assessment tools allows to evaluate the development of universal, general professional, and professional competencies (UCs, GPCs and PCs respectively) outlined in Federal State Educational Standard of Higher Education and defined in the basic educational program of higher education for the specialty 31.05.01 General Medicine for international students (in English), profile 02 "Healthcare" (in the field of providing primary health care to the population in medical organizations: polyclinics, outpatient clinics, inpatient/outpatient facilities of the municipal health care system).

(BEP HE for the 31.05.01 General Medicine for international students (in English) specialty, section 3 Learning Outcomes Requirements of the Basic Educational Program of Higher Education)

2. DOCUMENT BODY

2.1. Types of Assessment, Formats of Assessment Tools

No.	Types of assessment	Assessment Tools Format
1	**Continuous assessment**	**Tests**
		Interview Questions
2	**Interim assessment**	**Interview Questions**
		Mini-Case Studies

3. The contents of assessment tools for continuous and interim examination are prepared by the teacher of the course

Tests

	Code	Competence description / name of labor function / name of work activity / text
S	31.05.01	General Medicine for international students (in English)
C	GPC-5	Is able to assess morphofunctional status, physiological states, and pathological processes in the human body when working to achieve objectives of professional activity
I		**ANSWER LEVEL 1 TEST QUESTIONS (ONE CORRECT ANSWER)**
		1. The main mechanism of action of β-lactam antibiotics is +1. suppression of cell wall synthesis 2. disruption of protein synthesis 3. disruption of DNA synthesis 4. disruption of ribosome functions **2. A method that is widely used for determination of sensitivity of microbes to antibiotic agents is** +1. disc-diffusion method 2. broth-dilution method in liquid medium 3. serial dilution method in solid nutrition medium 4. chromatographical method **3. The medium used to perform disc-diffusion method for**

		determination of antibiotic sensitivity is +1. Mueller-Hinton agar 2. McConkey agar 3. Sabouraud agar 4. Meat-Peptone Agar **4. The basic mechanism of antimicrobial activity of tetracyclines is** 1. inhibition of carbohydrates biosynthesis in microbial cell 2. inhibition of peptydoglican formation of the cell wall in bacteria 3. inhibition of replication of DNA microbial cell +4. inhibition of protein biosynthesis on ribosomes in microbial cell **5. Antibiogramm is** +1. the determination of sensitivity of microbes to antibiotic activity 2. the determination of sensitivity of antibiotics to microbes 3. the determination of sensitivity of human organism to antibiotics 4. the determination of sensitivity of microbes to bacteriophages **6. Bacteria susceptible to antibiotics were identified as a result of disco-diffusion method. In that case, zones of inhibited bacterial growth are characterized by** +1. a zone of complete inhibition of visible growth of bacteria 2. an inhibition zone surrounding the antibiotic disc 3. a slightly visible inhibition zone is 4. isolated colonies inside the inhibition zone
		ANSWER LEVEL 2 TEST QUESTIONS (MULTIPLE CORRECT ANSWERS)
		1. A method that is used to determine minimal concentration of antibiotic which stops the growth of analyzed bacterial culture is 1. disc-diffusion +2. E-tests +3. serial dilution 4. antibiogram **2. By sensitivity to antibiotics microorganisms are divided into** +1. sensitive +2. resistant +3. sensitive with continued exposure 4. intermediate **3. Targets for antibiotics activity include** +1. cell wall +2. ribosomes 3. flagella +4. nucleic acids

		4. Mechanisms of development of antibiotics resistance include +1. inactivation of antibiotic medicine +2. modification of the target for the antibiotic activity +3. efflux-pumps 4. adhesion

Assessment criteria

"Very good" grade is given to a student who possesses knowledge of the subject in full scope outlined in the curriculum, has a sufficiently deep insight into the subject; is able to answer all questions clearly, exhaustively, and with no outside help; structures their answers logically, with emphasis on the most important information; is able to analyze, compare, classify, summarize, refine, and structure the course content, giving particular attention to cause-and-effect relationships.

"Good" is given to a student whose knowledge of the subject is almost in full scope outlined in the curriculum (gaps are only present in the knowledge of some especially complex aspects); is able to answer questions exhaustively with little to no outside help; does not always put emphasis on the most important information, but does not make significant mistakes.

"Satisfactory" is given to a student who possesses the bulk of knowledge on the subject; has difficulties answering questions with no outside help, uses imprecise wording; makes mistakes in substantial number of their answers.

"Unsatisfactory" is given to a student who does not have the mandatory minimum of knowledge on the subject, is not able to give an answer even with additional guiding questions.

Interview questions

	Code	**Competence description / name of labor function / name of work activity / text**
S	31.05.01	General Medicine for international students (in English)
C	GPC-5	Is able to assess morphofunctional status, physiological states, and pathological processes in the human body when working to achieve objectives of professional activity
I		**ANSWER THE QUESTIONS** **Section I – General Microbiology** 1. The main historical stages in the development of microbiology, the contributions of Russian and foreign scientists. Branches of microbiology. 2. The main historical stages in the development of virology, the contributions of Russian and foreign scientists. Branches of virology. 3. Space microbiology and gnotobiology (goals, objectives, achievements, and their application in medicine). 4. Basic principles of virus classification (genetic, structural, and organotropic systems). The concept of retroviruses and defective viruses. 5. Temporary structural elements of bacterial cells (spores, capsules), their functional significance, and detection methods. 6. Basic principles of microbe classification (bacteria, viruses). 7. Morphology and main structural elements of bacteria (permanent and temporary), functional significance. 8. Microorganism motility, organelles of movement, and detection methods (direct and indirect). 9. Tinctorial properties of microorganisms, their nature, differential diagnostic value, and determination by Gram and Ziehl-Neelsen methods. 10. Virion structure, forms of interaction with the eukaryotic cell.

		11. Fungi, classification, main structural components, and detection methods. 12. Pathogenic protozoa, classification, biological properties, and detection methods. 13. Chlamydia, morphophysiological properties, and detection methods. 14. Mycoplasmas, morphology, structure, physiological characteristics, and detection methods. 15. Microbial nutrition, its types, and detection methods. 16. Nutrient media, the essence of their design, types, purpose, and quality control of nutrient media. 17. Microbial reproduction and growth phases. 18. Microbial respiration, its variants, nature, and laboratory support. 19. Principles and sequence of aerobic microorganism cultivation in laboratory conditions, their identification, typing, and principles for substantiating conclusions. 20. Principles and sequence of culturing anaerobic microorganisms in laboratory conditions, their identification, typing, and principles for substantiating conclusions. 21. Biochemical activity of microorganisms, its definition and differential diagnostic value. 22. Concept of microbial pathogenicity (factors, methods of determination). 23. Phenotypic and genotypic variability of microorganisms. Significance in microbiology. 24. Bacterial viruses – bacteriophages, their biological characteristics, scientific and practical significance, and use. 25. Antimicrobial drugs, classification, mechanism of action on microbial cells. 26. Resistance of microorganisms to antimicrobial drugs, mechanisms of its development (phenotypic and genotypic). 27. Sterilization: essence, variants, application. Quality control of sterilization. 28. Normal human microflora and its importance in the body's vital functions. 29. Forms of interaction between microbes. Biofilms. Microbiological significance. 30. Infection and the infectious process. Microbiological features of pathogen detection at different stages of the infectious process. 31. Indicator microorganisms and their characteristics. Significance for practical healthcare. 32. Methods of microbiological diagnosis of pathogens. 33. Rules for sampling, storage, and transportation of biomaterial. 34. The concept of plasmids, their types, definition, and significance. 35. Phenotypic variability, nature, forms, and practical significance. The role of ecology. 36. Biological method of diagnosing infectious diseases. Nature, variants, and application. **Section II – Clinical Microbiology** 1. Salmonella. Pathogens of typhoid and paratyphoid fever. Taxonomy, characteristics of pathogens, and microbiological diagnostics. 2. Pathogens of Escherichia coli. Taxonomy, characteristics of

		pathogens, and microbiological diagnostics. 3. Pathogens of shigellosis. Taxonomy, characteristics of pathogens, microbiological diagnostics. 4. The causative agent of cholera. Taxonomy, characteristics of the pathogen, microbiological diagnostics. 5. Staphylococci. Taxonomy and characteristics of the pathogen, microbiological diagnostics. 6. Streptococcus pyogenes – the causative agent of scarlet fever. Properties of the pathogen, principles of microbiological diagnostics. 7. Meningococci and meningococcal infection. Taxonomy, characteristics of the pathogen, microbiological diagnostics. 8. Gonococci. Taxonomy, characteristics of the pathogen, microbiological diagnostics. 9. Plague. Taxonomy, characteristics of the pathogen, microbiological diagnostics. 10. Yersinia. Taxonomy, characteristics of pathogens, and microbiological diagnosis of pseudotuberculosis and intestinal yersiniosis. 11. Cholera. General characteristics of V. cholerae (taxonomy, morphology, tinctorial and cultural properties). Principles of laboratory diagnosis of cholera. 12. Halophylloses. General characteristics of pathogens. Principles of microbiological diagnosis. 13. Gas gangrene. General characteristics of microorganisms of the genus Clostridium (taxonomy, morphology, tinctorial and cultural properties). Principles of laboratory diagnostics. 14. Tetanus. General characteristics of C. tetani (taxonomy, morphology, tinctorial and cultural properties). Principles of laboratory diagnostics. 15. Food poisoning. Botulism. General characteristics of C. botulinum (taxonomy, morphology, tinctorial and cultural properties). Principles of microbiological diagnostics. 16. Bacteria causing foodborne infections (properties of pathogens). Principles of microbiological diagnostics. 17. Zoonotic especially dangerous infections. Anthrax. General characteristics of B. anthracis. Principles of laboratory diagnostics. 18. Brucellosis. Taxonomy, characteristics of the pathogen (morphology, tinctorial and cultural properties). Principles of microbiological diagnostics. 19. Tularemia. Taxonomy, characteristics of the pathogen, microbiological diagnostics. 20. Diphtheria. General characteristics of C. diphtheriae (taxonomy, morphology, tinctorial and cultural properties). Principles of microbiological diagnostics. 21. The causative agent of tuberculosis. Taxonomy, characteristics of pathogens, microbiological diagnostics. 22. Non-tuberculous mycobacteria. Microbiological characteristics. Features of laboratory diagnostics. 23. Mycobacterium leprae. Microbiological characteristics. Features of laboratory diagnostics. 24. Leptospirosis. Taxonomy, characteristics of the pathogen, features of microbiological diagnostics.

		25. Legionellosis. Taxonomy, characteristics of the pathogen, features of microbiological diagnostics. 26. Rickettsioses. General characteristics of rickettsiae (morphology, tinctorial and cultural properties), main generic taxa. Epidemic and endemic rickettsiosis. Laboratory diagnostic methods. 27. Treponemas. The causative agent of syphilis, Treponema pallidum. Characteristics of the pathogen, microbiological diagnostics. 28. Chlamydia pathogens. Taxonomy, characteristics of pathogens, and microbiological diagnostics. 29. Mycoplasmas. Ureaplasmas. Taxonomy, characteristics of pathogens, and microbiological diagnostics. 30. Fungi causing superficial mycoses. Microbiological characteristics. Laboratory diagnostics. 31. Influenza. Taxonomy, characteristics of pathogens, and microbiological diagnostics. 32. Paramyxoviruses. Measles, mumps. Taxonomy, characteristics of pathogens, and microbiological diagnostics of measles and mumps. 33. ARI pathogens: paramyxoviruses, reoviruses, rhinoviruses, and adenoviruses. Taxonomy, characteristics of pathogens, and microbiological diagnostics. 34. Coronaviruses. Taxonomy, characteristics of the pathogen, microbiological diagnostics. 35. Viral hepatitis A, E. Taxonomy, characteristics of the pathogens, microbiological diagnostics. 36. Pathogens of parenteral viral hepatitis B, C, D. Taxonomy, characteristics of the pathogens, microbiological diagnostics. 37. Flaviviruses. The causative agent of tick-borne encephalitis. Taxonomy, characteristics of the pathogen, microbiological diagnostics. 38. The causative agent of rabies. Taxonomy, characteristics of the pathogen, microbiological diagnostics. 39. Bunyaviruses: the causative agent of HFRS. Taxonomy, characteristics of the pathogen, microbiological diagnostics. 40. Pathogens of HIV infection. Taxonomy, characteristics of the pathogens, microbiological diagnostics. 41. Nosocomial Infections. The role of opportunistic microorganisms in the development of nosocomial infections. Principles of microbiological diagnostics. 42. Rotaviruses. Taxonomy, Characteristics of the Pathogen, Microbiological Diagnostics. 43. Enteroviruses. Polioviruses. Taxonomy, Characteristics of the Pathogen, Microbiological Diagnostics. 44. Herpesviruses. Varicella-zoster virus. Taxonomy, characteristics of pathogens, microbiological diagnostics. 45. Herpesviruses. Herpes simplex virus (HSV-1, HSV-2). Taxonomy, characteristics of the pathogen, microbiological diagnostics. 46. Cytomegalovirus. Characteristics of the pathogen, microbiological diagnostics. 47. Epstein-Barr virus. Taxonomy, characteristics of the pathogen, microbiological diagnostics. 48. Spirochetes, classification, aspects of detection.

		49. Oncogenic viruses. RNA- and DNA-containing oncogenic viruses. 50. Pathogenic fungi – causative agents of occupational and household mycoses (mucormycosis, aspergillosis, penicilliosis, etc.).

Assessment criteria

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"Good" is given to a student whose knowledge of the subject is almost in full scope outlined in the curriculum (gaps are only present in the knowledge of some especially complex aspects); is able to answer questions exhaustively with little to no outside help; does not always put emphasis on the most important information, but does not make significant mistakes.

"Satisfactory" is given to a student who possesses the bulk of knowledge on the subject; has difficulties answering questions with no outside help, uses imprecise wording; makes mistakes in substantial number of their answers.

"Unsatisfactory" is given to a student who does not have the mandatory minimum of knowledge on the subject, is not able to give an answer even with additional guiding questions.

Standardized case studies and checklists for the **Б1.О.13 Microbiology, virology** course

Case Study No.1

	Code	**Competence description / name of labor function / name of work activity / text**
S	31.05.01	General Medicine for international students (in English)
C	GPC-5	Is able to assess morphofunctional status, physiological states, and pathological processes in the human body when working to achieve objectives of professional activity
I		**READ THE PROVIDED CASE DESCRIPTION AND GIVE DETAILED ANSWERS TO THE QUESTIONS** A 62-year-old man, who had recovered from chronic pneumonia and received antibiotic therapy, developed a sharp rise in temperature while in remission, and his oral mucosa became covered with a gray-white coating.
Q	1	Question: What complication might this be?
Q	2	Question: List the risk factors.
Q	3	Question: How can the etiology of a new disease be identified? Justify your answer
Q	4	Question: What biospecimen should be collected for testing? What transport systems should be used?
Q	5	Question: How long does it take to deliver biospecimen to the microbiology laboratory for testing?

Case Study No.1 Checklist

	Code	**Competence description / name of labor function / name of work activity / text**
S	31.05.01	General Medicine for international students (in English)

C	GPC-5	Is able to assess morphofunctional status, physiological states, and pathological processes in the human body when working to achieve objectives of professional activity
I		**READ THE PROVIDED CASE DESCRIPTION AND GIVE DETAILED ANSWERS TO THE QUESTIONS** A 62-year-old man, who had recovered from chronic pneumonia and received antibiotic therapy, developed a sharp rise in temperature while in remission, and his oral mucosa became covered with a gray-white coating.
Q	1	Question: What complication might this be?
A		Correct answer: Development of candidiasis after antibiotic therapy
Q	2	Question: List the risk factors.
A		Correct answer: The main risk factors for this complication are old age, antibiotic therapy, and a history of pneumonia
Q	3	Question: How can the etiology of a new disease be identified? Justify your answer
A		Correct answer: To identify the cause of the complication, it is necessary to conduct a microbiological study
Q	4	Question: What biospecimen should be collected for testing? What transport systems should be used?
A		Correct answer: To obtain biomaterial for testing, a scraping must be taken from the oral mucosa at the junction of the healthy and affected areas. The biomaterial can be collected in a transport system designed for fungal testing or in a sterile swab with a probe
Q	5	Question: How long does it take to deliver biospecimen to the microbiology laboratory for testing?
A		Correct answer: When collecting biomaterial in a transport system, delivery times are 24-48 hours; the system is stored at room temperature. When collecting material in a sterile tube (swab), it must be immediately delivered to the laboratory for testing (within 20 minutes)
R2	Very good	This grade awarded by a student if they have a full knowledge of the subject as outlined in the curriculum, understand the subject thoroughly enough; independently, in a logical sequence, and exhaustively answer all questions, emphasizing the most important points; are able to analyze, compare, classify, generalize, concretize, and systematize the material studied, highlighting the main points in it; establish cause-and-effect relationships; and clearly formulate answers.
R1	Good/Satisfactory	This grade is given to a student whose knowledge of the subject is almost in full scope outlined in the curriculum (gaps are only present in the knowledge of some especially complex aspects); is able to answer questions exhaustively with little to no outside help; does not always put emphasis on the most important information, but does not make significant mistakes.

		This grade is given to a student who possesses the bulk of knowledge on the subject; has difficulties answering questions with no outside help, uses imprecise wording; makes mistakes in substantial number of their answers.
R0	Fail	This grade is given to a student who does not have the mandatory minimum of knowledge on the subject, is not able to give an answer even with additional guiding questions.

Case Studies

	Code	**Competence description / name of labor function / name of work activity / text**
S	31.05.01	General Medicine for international students (in English)
C	GPC-5	Is able to assess morphofunctional status, physiological states, and pathological processes in the human body when working to achieve objectives of professional activity
I		**READ THE PROVIDED CASE DESCRIPTION AND GIVE DETAILED ANSWERS TO THE QUESTIONS**
	1	**Case 1:** The laboratory received sputum from a patient with a pathological process in the lungs. Develop an algorithm for microbiological analysis of the biomaterial.
	2	**Case 2:** A patient diagnosed with acute bronchopneumonia developed intestinal dysfunction in the hospital. How can the etiology of the diarrhea be determined?
	3	**Case 3:** Four out of five people in a family have contracted typhoid fever. The fifth, uninfected family member is a 50-year-old woman. She contracted typhoid fever several years ago and is currently largely healthy. However, she experiences bouts of cholecystitis once or twice a year. Could she have been the source of the infection? How (by what methods) can this be determined?
	4	**Case 4:** A patient admitted to the hospital with a diagnosis of “Foodborne Toxic Infection” experiences a sharp increase in dehydration. How can the etiology of the disease be established? Create an algorithm for microbiological research of biomaterial.
	5	**Case 5:** A newborn has been diagnosed with conjunctivitis with purulent discharge. The mother is generally healthy, but has a history of uterine adnexitis. What should be suspected, and how can the etiology of the condition be determined in both the child and mother?
	6	**Case 6:** A 62-year-old patient, who had recovered from pneumonia and received antibiotic therapy, developed a sharp rise in temperature while in remission, and his oral mucosa became covered with a gray-white coating. How can the etiology of this new disease be determined?
	7	**Case 7:** Rodent carcasses were found on a ship arriving at port. Develop a plan for microbiological identification of the pathogen.
	8	**Case 8**: A patient with a right shin injury was admitted to the surgical department. The soft tissues of the shin were crushed

		and contaminated with soil. Develop an algorithm for microbiological analysis of the bio-material.
	9	**Case 9**: A patient with clinical signs of botulism was admitted to the hospital. Vomits and canned food scraps (suspected source of infection) were delivered to the laboratory. Develop an algorithm for microbiological testing of the specimen.
	10	**Case 10**: A patient was admitted to hospital with a diagnosis of acute respiratory disease. What microbiological methods can be used to clarify the etiology of the disease?
	11	**Case 11**: A patient diagnosed with diphtheria was admitted to the infectious diseases hospital. Develop an algorithm for microbiological testing of the bio-material to determine the etiology of the disease.
	12	**Case 12**: Several cases of human infection with suspected bubonic plague were reported in a natural outbreak. One patient's bubo was examined for bacteriology and cultured on meat-peptone agar to isolate a pure culture. A smear stained with methylene blue revealed small, ovoid, bipolar rods. After 24-hour incubation of the culture, no growth was observed on the nutrient medium. To confirm the diagnosis, blood was collected from the patient, a biological sample was taken, and an impression smear was made from the animal's organs. Microscopy results with methylene blue staining revealed small, blue, ovoid, bipolar rods against a background of animal tissue cells. List the microbiological methods that confirm the etiology of the disease.
	13	**Case 13**: Upon admission to the emergency department, the physician noted a dry cough, enlarged liver, and axillary nodes that were mildly painful and had distinct borders. A preliminary diagnosis of tularemia was made. However, culturing the bubo contents on McCoy's yolk medium failed to isolate a pure culture of Francisella tularensis. Can tularemia be ruled out? Develop an algorithm for microbiological examination of the specimen.
	14	**Case 14**: A patient with a preliminary diagnosis of cutaneous anthrax was admitted to the clinic. Gram-positive rods were found in the carbuncle discharge, arranged singly, in pairs, or in short chains resembling a bamboo cane. Colonies with a lion's head-shaped edge grew on a plate containing MPA from the carbuncle discharge. A smear of an organ from a white mouse shows large rods arranged in a chain against a red background, surrounded by a colorless capsule common to the entire chain (stained with fuchsin). List the microbiological methods that confirm the etiology of the disease.
	15	**Case 15**: A patient was admitted to hospital with a diagnosis of pneumonia. His medical history revealed that he had pulmonary tuberculosis six years earlier. After four years of treatment, the patient recovered and was removed from the hospital's register. How can the etiology of this illness be determined? Develop an algorithm for microbiological testing of the specimen.
	16	**Case 16**: In the spring and summer, a patient with symptoms of encephalitis was admitted to the hospital. The patient, a

		geologist by profession, had not received prophylactic vaccinations. Prior to his illness, he had worked on an expedition in the Ussuri taiga. A laboratory diagnostic plan was developed.
	17	**Case 17**: A known pathogenic microbe has been isolated from a seemingly healthy individual. What does this indicate? Why is the pathogen present in the body, yet the disease doesn't manifest?
	18	**Case 18**: Bacteriological tests were performed on two convalescents. The pathogen was not detected in one, but it was detected in the other. How can the outcome of the disease be assessed? What could be the possible causes?
	19	**Case 19**: The lid on a jar of preserved mushrooms has bulged. Develop a microbiological algorithm to detect the cause of spoilage.
	20	**Case 20**: The microbial count in a well water sample is 15 mg/ml, the coli index is 2, and the El Tor vibrio was detected. Provide an opinion on the suitability of this water source.
	21	**Case 21**: The coli titer of the water in an open reservoir is 550 ml. A high titer of typhoid bacteriophage has been isolated from it. Is the water in this reservoir suitable for drinking?
	22	**Case 22**: A bacteriology laboratory performed a phage titer increase test (using the patient's stool). Results: On the second day of illness, the titer was 10-3. A repeat test on the third day of illness revealed a phage titer of 10-3, and on the fourth day, it was 10-2. What do these phage titer changes indicate? What test culture was presumably used?

4. Assessment criteria for learning outcomes

"Very good" grade is given to a student who possesses knowledge of the subject in full scope outlined in the curriculum, has a sufficiently deep insight into the subject; is able to answer all questions clearly, exhaustively, and with no outside help; structures their answers logically, with emphasis on the most important information; is able to analyze, compare, classify, summarize, refine, and structure the course content, giving particular attention to cause-and-effect relationships.

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