IRN AR 09058338 "Study of the antiviral activity of drugs against the SARS-COV-2 virus in vitro and conducting a molecular epidemiological analysis of circulating strains of COVID-19"

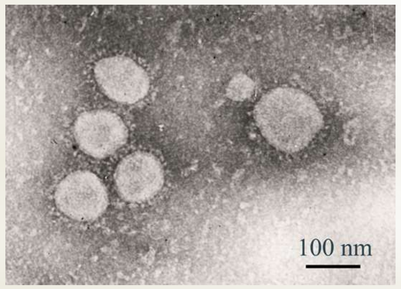
Project manager: Burashev E.D., PhD

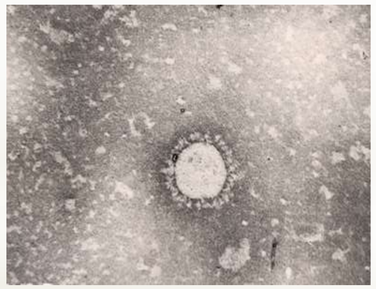
Object of study

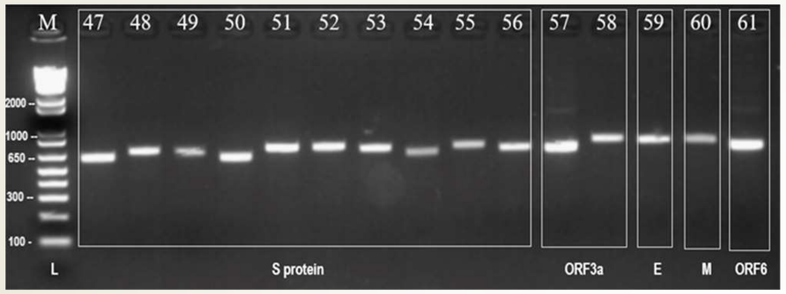
The object of the study is epidemiological data on the SARS-COV-2 virus and a group of bats common in the Zhambyl and Turkestan regions.

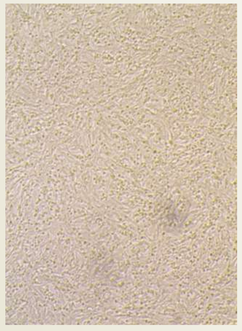
Goal

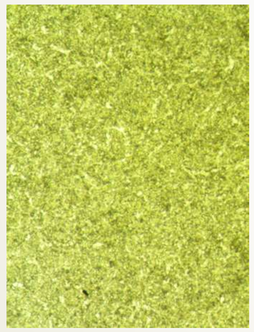
The aim of the project is to determine the activity of modern antiviral drugs against SARS-COV-2 in vitro. Observation and detection of the COVID-19 pathogen in a group of bats. Molecular epidemiological analysis of circulating strains isolated during and after the pandemic.

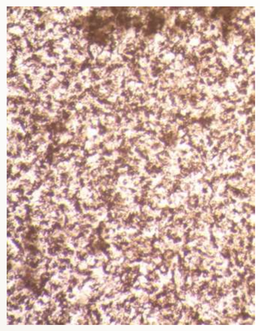












Results

An analysis was conducted on the composition of modern pharmaceutical agents capable of inhibiting the SARS-CoV-2 virus in vitro. Based on this analysis, the following drugs were selected: Dexamethasone, Ribavirin, Tenvir, and Fabiflu. The results of the study on their antiviral activity showed inhibition rates of 0%, 80%, 99.31%, and 37.37%, respectively. Tenvir demonstrated the highest inhibition rate and is considered one of the most effective drugs for the treatment of viral infections.Over a two-year monitoring period, a total of 245 samples were collected from bats and guano. All samples were then subjected to PCR identification. During testing of all bat-derived samples using Real-Time PCR, negative and false-positive results were observed, with amplification peaks occurring only after 35 cycles. Therefore, for further studies, samples collected from patients during the COVID-19 pandemic were used, obtained from the Scientific and Practical Center for Sanitary and Epidemiological Expertise and Monitoring in Almaty.Morphometric analysis of SARS-CoV-2 isolates was carried out using a JEOL Jem-100 (Japan) electron microscope. The electron microscopy study revealed that the virions are spherical in shape, with a diameter of 120–125 nanometers. These virions are characterized by the presence of spikes (surface glycoproteins) approximately 10–15 nanometers in length.Several isolates were identified and, after analysis of their biological properties, were deposited into a microorganism collection under the following designations: SARS-CoV-2/human/KAZ/B1.1/2021 and SARS-CoV-2/human/KAZ/Britain/2021.Whole-genome sequencing of the SARS-CoV-2 strain SARS-CoV-2/human/KAZ/B1.1/2021 was conducted.Based on the obtained results, a total of 10 publications were prepared in accordance with academic requirements, including 2 articles in journals recommended by the Committee for Quality Assurance in the Sphere of Education and Science of Kazakhstan (KOKSNVO), 3 abstracts in international conference proceedings, 2 articles in Scopus-indexed journals, and 3 articles in national journals.

List of publications

Публикации за 2021 год:

1. Б.С. Усербаев, Е.Д. Бурашев, К.Т. Султанкулова, М.Б. Орынбаев, Л.Б. Кутумбетов, А.А. Керимбаев, Н.С. Кожабергенов, А.М. Мелисбек, Е.О. Абдураимов., К.Д. Закарья. Эпидемиологический анализ распространения COVID-19. 2021. Биобезопасность и биотехнология. № 6. С. 6-18.
2. Б.С. Усербаев, Е.Д. Бурашев, А.М. Мелисбек, М.Ж. Ширинбеков. Возникновение новых В–коронавирусных инфекций в XXI веке. 2021. Биобезопасность и биотехнология. № 7. С. 6-15.
3. B.S. Usserbayev, E.D. Burashev, A.M. Melisbek, M.Zh. Shirinbekov. SYNTHESIS OF PRIMERS AND DEVELOPMENT OF SIGNIFICANT GENES OF B.1.1.7 (ALPHA) VARIANT OF THE SARS-CoV-2 VIRUS. . 2021. Биобезопасность и биотехнология. № 8. С. 41-48.

Публикации за 2022 год:

1. B.S. Usserbayev, Ye.D. Burashev, N.S. Kozhabergenov, A.M. Melisbek, M.Zh. Shirinbekov, Ye.O. Abduraimov, K.D. Zakarya. «Dynamics of the spread of SARS-COV-2 variants and clades». AL-FARABI KAZAKH NATIONAL UNIVERSITY EURASIAN JOURNAL of Ecology (вестник КаНУ, серия экологическая). 2022, №2 (71), https://doi.org/10.26577/EJE.2022.v71.i2.05.
2. Yerbol Burashev, Bekbolat Usserbayev, Aibarys Melisbek, Meiirzhan Shirinbekov, Saken Khaidarov. Covid-19 in Kazakhstan. Incidence statistics and new variations of the Sars-Cov-2 virus.Covid-19 in Kazakhstan. 3rd International Conference on Virology, Infectious Diseases and COVID-19. October 24-25, 2022/ Dubai, UAE.
3. Yerbol Burashev, Bekbolat Usserbayev, Lespek Kutumbetov, Yergali Abduraimov, MarkhabatKassenov, Aslan Kerimbayev, Balzhan Myrzakhmetova, Aibarys Melisbek, Meirzhan Shirinbekov, Saken Khaidarov, Edan R. Tulman. Coding Complete Genome Sequence of the SARS-CoV-2 Virus Strain, Variant B.1.1, Sampled from Kazakhstan. Microbiology Resource Announcements. 2022. DOI:10.1128/mra.01114-22.

Публикации за 2023 год:

1. Complete Coding Sequence of a Lineage AY.122 SARS-CoV-2 Virus Strain Detected in Kazakhstan. Usserbayev Bekbolat, Abduraimov Yergali, Kozhabergenov Nurlan, Melisbek Aibarys, Shirinbekov Meirzhan, Smagul Manar, Nusupbayeva Gaukhar, Nakhanov Aziz, Burashev Yerbol. Microbiology Resource Announcements. doi: 10.1128/mra.00301-23. (Scopus, процентиль 40.
2. Detection of the SARS-COV-2 virus variant B 1.1 in the Republic of Kazakhstan. Bekbolat Usserbayev, Yerbol Burashev, Nurlan Kozhabergenov, Assankadyr Zhunushov, Aibarys Melisbek, Meiirzhan Shirinbekov, Saken Khaidarov. Proceedings of the 1st International Scientific Conference «Research Retrieval and Academic Letters» (January 26-27, 2023). Warsaw, Poland, 2023. 317p.
3. S.Zh. Khaydarov, E.D. Burashev. The SARS-COV2 epoch and proper managing strategies to face the challenges both in viral research and treatment. AL-FARABI KAZAKH NATIONAL UNIVERSITY EURASIAN JOURNAL of Biology (вестник КаНУ, серия биологическая). 2022. №3 (96). https://doi.org/10.26577/eb.2023.v96.i3.01
4. Бурашев Е., Усербаев Б., Мелисбек А., Ширинбеков М., Орынбаев М., Султанкулова К., Тулендибаев А., Аргимбаева Т., Әубәкір Н., Ермекбай Т., Керимбаев А. КОРОНАВИРУС В КАЗАХСТАНЕ: ХРОНОЛОГИЯ ПАНДЕМИИ И ВАРИАЦИИ ВИРУСА SARS-COV-2. 2023. Международная научно-практическая конференция, посвященная 65-летию Научно-исследовательского института проблем биологической безопасности БИОТЕХНОЛОГИЯ И БИОЛОГИЧЕСКАЯ БЕЗОПАСНОСТЬ: ДОСТИЖЕНИЯ И ПЕРСПЕКТИВЫ РАЗВИТИЯ.