World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-32, March 2024
ISSN: 2749-3644

STUDYING THE EFFECTIVENESS OF MONOCLONAL ANTIBODIES AGAINST CORONAVIRUS INFECTION

Agzamkhodjaeva Nozimakhon Ulugbekovna
Assistant Professor, Department of Clinical Sciences, Faculty of Medicine.
Islamova Rano Karimdzhanovna
Senior Lecturer, Department of Clinical Sciences, Faculty of Medicine
"ALFRAGANUS UNIVERSITY"

Article history:

Received: 3rd January 2023
Accepted: February 26th 2024

Abstract:

Monoclonal antibodies (mAbs) have emerged as a promising therapeutic option for the prevention and treatment of coronavirus infections, particularly COVID-19 caused by the SARS-CoV-2 virus. These laboratory-made proteins target specific components of the virus, preventing viral entry into human cells and subsequent replication. Clinical trials and real-world evidence have demonstrated the efficacy of monoclonal antibodies in reducing the severity of COVID-19 symptoms, decreasing the risk of hospitalization and death, and providing immediate protection against the virus through passive immunization.

Keywords: Monoclonal antibodies, Coronavirus, SARS-CoV-2, Therapeutics, Clinical trials, Efficacy, Variants, Combination therapy, Passive immunization

INTRODUCTION

Studying the effectiveness of monoclonal antibodies (mAbs) against coronavirus infection, including the SARS-CoV-2 virus responsible for COVID-19, has been a significant focus of scientific research and clinical trials since the onset of the pandemic. Below, we will explore the main points.

MAIN PART

Mechanism of action: Monoclonal antibodies are laboratory-made proteins that mimic the immune system's ability to fight off harmful pathogens such as viruses. They target specific proteins on the surface of the virus, preventing it from entering human cells and replicating.

Reasearch and development: Several pharmaceutical companies and research institutions have developed monoclonal antibodies targeting various components of the SARS-CoV-2 virus, including the spike protein. These antibodies are designed to neutralize the virus and prevent it from causing infection.

Clinical trials: Clinical trials have been conducted to evaluate the safety and efficacy of monoclonal antibodies in preventing and treating COVID-19. These trials have involved patients with mild to moderate symptoms as well as those at high risk of severe illness, such as the elderly and individuals with underlying health conditions.

Emergency Use Authorization: In many countries, including the United States, monoclonal antibodies have been granted emergency use authorization for the treatment of COVID-19 in certain patient populations. This authorization allows healthcare providers to administer these antibodies outside of clinical trials to patients who meet specific criteria.

Effectiveness: Clinical trial data and real-world evidence suggest that monoclonal antibodies can reduce the severity of COVID-19 symptoms and decrease the risk of hospitalization and death, particularly when administered early in the course of the illness. However, their effectiveness may vary depending on factors such as the timing of administration, the specific antibodies used, and the presence of viral variants.

Challenges and considerations: Despite their potential benefits, monoclonal antibodies face challenges such as limited availability, logistical complexities associated with administration (such as the need for intravenous infusion or subcutaneous injection), and the emergence of viral variants that may impact their efficacy.

Future directions: Ongoing research is focused on improving the accessibility, affordability, and effectiveness of monoclonal antibodies for the prevention and treatment of COVID-19. This includes the development of new antibodies targeting different regions of the virus and exploring alternative delivery methods, such as inhalation or oral administration.

Variants and efficacy: The emergence of SARS-CoV-2 variants, such as the Delta and Omicron variants, has raised concerns about the effectiveness of existing monoclonal antibodies. Some variants may have mutations in the spike protein that could potentially reduce the binding affinity of antibodies and compromise their ability to neutralize the virus. Research is ongoing to assess the efficacy of existing monoclonal antibodies against these variants and to

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-32, March 2024
ISSN: 2749-3644

develop new antibodies that may be more effective against a broader range of variants.

Combination therapy: Researchers are exploring the use of combination therapy with multiple monoclonal antibodies targeting different epitopes on the virus. This approach may help overcome the challenges posed by viral variants and reduce the risk of resistance developing to a single antibody. Clinical trials are underway to evaluate the safety and efficacy of combination therapies for COVID-19.

Passive immunization: Monoclonal antibodies can also be used for passive immunization in individuals who have been exposed to the virus or are at high risk of infection, such as healthcare workers and household contacts of COVID-19 patients. Passive immunization involves administering antibodies directly to individuals to provide immediate protection against the virus. This approach has been used in outbreaks and is being explored as a potential preventive strategy for COVID-19.

RESULTS AND DISCUSSION

Monoclonal antibody therapies have been a crucial part of the ongoing battle against COVID-19. These laboratory-produced proteins are designed to bind to the SARS-CoV-2 virus, preventing it from attaching to human cells. However, their effectiveness can vary due to the virus's mutations. Here are some key points about monoclonal antibody therapies:

1. Authorized Therapies:
   - Bamlanivimab plus etesevimab: This combination was authorized for emergency use by the FDA but is no longer effective against the omicron variant.
   - Casirivimab plus imdevimab (REGEN-COV): Like bamlanivimab, it is ineffective against omicron and is no longer used.
   - Sotrovimab: Currently, sotrovimab appears to be effective against the newest variants, including omicron. It is authorized to treat mild to moderate COVID-19 in high-risk patients.
   - EvuSheld: This therapy is authorized for preexposure prophylaxis in certain high-risk individuals who cannot develop immunity from vaccination.
2. Criteria for Sotrovimab Use:
   - Patients must:
   - Test positive for COVID-19.
   - Begin treatment within 10 days of symptom onset.
   - Not require oxygen supplementation.
   - Not be hospitalized for COVID-19.
3. EvuSheld for Preexposure Prophylaxis:
   - EvuSheld is authorized to prevent COVID-19 before exposure in individuals who:
   - Have a weakened immune system.
   - Cannot respond to COVID-19 vaccination or are unable to get vaccinated for medical reasons.
4. Oral Antiviral Pills:
   - The FDA has granted emergency use authorization for two oral antiviral pills:
   - Nirmatrelvir tablets plus ritonavir (Paxlovid)
   - Molnupiravir (for high-risk patients).

CONCLUSION

In summary, monoclonal antibodies represent a promising tool in the fight against COVID-19, but their role in managing the pandemic will depend on continued research, clinical experience, and efforts to address logistical and scientific challenges. Remember that while monoclonal antibodies play a vital role, vaccination remains the best preventive measure against COVID-19. Stay informed and follow public health guidelines to protect yourself and others.

REFERENCES:

1. M. Dougan, A. Nirula, M. Azizad, *et al.* Bamlanivimab plus etesevimab in mild or moderate Covid-19 N. Engl. J. Med., 385 (July 14 2021), pp. 1382-1392, 10.1056/NEJMoa2102685
2. D.M. Weinreich, S. Sivapalasingam, T. Norton, *et al.* REGN-COV2, a neutralizing antibody cocktail, in outpatients with Covid-19 N. Engl. J. Med., 384 (January 21 2021), pp. 238-251, 10.1056/NEJMoa2035002
3. J.R. Bariola, E.K. McCreary, R.J. Wadas, *et al.* Impact of bamlanivimab monoclonal antibody treatment on hospitalization and mortality among nonhospitalized adults with severe acute respiratory syndrome Coronavirus 2 infection Open Forum Infect Dis, 8 (July 2021), 10.1093/ofid/ofab254 ofab254
4. P. Chen, A. Nirula, B. Heller, *et al.* SARS-CoV-2 neutralizing antibody LY-CoV555 in outpatients with Covid-19 N. Engl. J. Med., 384 (January 21 2021), pp. 229-237, 10.1056/NEJMoa2029849
5. S. Jiang, C. Hillyer, L. Du Neutralizing antibodies against SARS-CoV-2 and other human coronaviruses Trends Immunol., 41 (May 2020), pp. 355-359, 10.1016/j.it.2020.03.007
6. D.M. Weinreich, S. Sivapalasingam, T. Norton, *et al.* REGEN-COV antibody cocktail clinical outcomes study in Covid-19 outpatients medRxiv (2021), 10.1101/2021.05.19.21257469 2021.05.19.21257469
7. U.S. Food and Drug Administration Fact Sheet for Health Care Providers Emergency Use Authorization (EUA) of Bamlanivimab and Etesevimab https://www.fda.gov/media/145802/download (November 9, 2020) (accessed July 20, 2021)

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-32, March 2024
ISSN: 2749-3644

8. U.S. Food and Drug Administration Fact sheet for Health Care Providers Emergency Use Authorization (EUA) of Bamlanivimab