Monoclonal antibodies (mAbs) in Infectious Diseases

Mary Herbert-Grant, MD FAAP

Disclosure

• Nothing to disclose
Objectives

• Give a brief overview of mAbs

• Highlight the use of mAbs in infectious diseases

• Review the use of mAbs in the SARS CoV-2 pandemic
mAbs - Overview

- A mAb is a pure collection of identical antibody (Ab) molecules with the same specificity.

- mAbs are derived from a unique parent B lymphocyte/plasma cell.

- Most therapeutic mAbs are immunoglobulin (Ig) G

mAbs actions
- Antagonism
- Signalling
- Ab dependent cellular cytotoxicity (ADCC)
- Complement dependent cytotoxicity (CDC)
- Ab dependent cellular phagocytosis
mAbs - Overview

- mAb applications
  - Identification of phenotypic markers unique to particular cells
  - Immunodiagnosis
  - Tumor identification
  - Therapy
  - Functional analysis of cell surface and secreted molecules
mAbs - Immunodagnosis

• Radioimmunoassays
  - radioactive decay

• Enzyme linked immunoassays
  - enzyme color conversion

• Immunohistochemical staining
  - labelling and detection of antigens in cells/tissues

mAbs - Therapeutics

**Pros**

• Highly specific
• Long half lives
• Amenable to molecular engineering

**Cons**

• Adverse effects
  • Therapeutic effect
  • Mechanism of action
  • Immunogenicity

• Cost
mAbs – ID Therapeutics

• competition from other forms of treatment/prevention (esp vaccines)

• complexity of pathology, immunology and epidemiology of infection (e.g. dengue, influenza)

• microbes
mAbs in the SARS CoV-2 Pandemic

- Emergency use authorizations (EUA)
  - casirivimab/imdevimab (Nov 2020)
  - bamlanivimab/etesevimab (Feb 2021)
  - sotrovimab (May 2021)
  - tixagevimab/cilgavimab (Dec 2021)
  - bebtelovimab (Feb 2022)
Summary

• mAbs are an important facet of infectious diseases diagnostics as well as vaccine development research

• mAbs for therapeutics in infectious diseases are limited by the availability of effective drugs, prophylactic strategies in addition to the variability and complexity of microbial antigens

• Represent a viable option for bridging treatments in the management of emerging infections.

References

5. Salazar, G. et al. npj Vaccines 2017, 2:19 doi:10.1038/s41541-017-0019-3
8. Abbas, AK et al. Cellular and Molecular Immunology 9th ed. 2018