MONOCLONAL ANTIBODIES: DEVELOPMENT PROSPECTS

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The use of antibodies in immunohistochemistry and therapeutics is an important tool in science. Monoclonal antibodies are used due to their characteristic high epitope specificity and sensitivity, target identification at the protein level, and localization at the cellular and subcellular scale.

The immune system made up of complex networks of cells, chemicals, tissues and organs defends the body from invading pathogens. An underactive immune system can lead to many illness while an overactive immune system can lead to disorders and autoimmune diseases. Antibodies produced by the immune system to fight the invading pathogens, are made up of immunoglobulins which are glycoproteins produced by the B-cells [2, 3]. Antibodies are grouped into monoclonal and polyclonal antibodies based on their origin from lymphocytes and on their antigen binding site. Polyclonal antibodies interacts with multiple epitope on the same antigen while monoclonal antibody are monospecific in nature targeting a single epitope on an antigen [1].

Monoclonal antibodies (mAbs) represents the most important biopharmaceutical products as full length mammalian cells glycosylated antibodies which allow human-like N-glycosylation are used in its production [5]. Monoclonal antibodies are used to detect, purify and also characterize any substance of interest [3].Use of monoclonal antibodies in treatment is a major advance in the management of inflammatory diseases and have been applied in cancer detection and therapy[4]. Mammalian cells are used most often for production of mAbs due to their ability to perform post-translational modifications (PTM), especially human-like N-glycosylation. Their use simplifies subsequent medical applications by eliminating the risk of an immunogenic response in patients due to incompatible N-glycans on the protein [5].

Advances in biotechnological processes such as in expression systems, strain engineering and production processes using microbes have been used in the production of monoclonal antibodies. Much interest and investment have been given to monoclonal antibody development due to the advancements in antibody engineering technologies, novel antigen discovery and in discovering disease pathway [5].

Conclusion: Monoclonal antibodies have been applied as a standard and characterized part in medical and pharmaceutical practice. Although, the first group of monoclonal antibodies produced had some challenges resulting to its withdrawal, however it led to improvement and development of more functional monoclonal antibody used in treatment and diagnosis of different diseases including cancer and autoimmune diseases. The specificity of target of monoclonal antibodies offers less side effects as opposed to the traditional cancer treatment. Different technologies have

been developed leading to possibility of producing more monoclonal antibodies for treating and detecting many diseases.

1. Zehra E., Mouhamad R., Esteban C., Vicki S. and Veysel K. (2017). The state-of-play and future of antibody therapeutics, Advanced Drug Delivery Reviews 122; 2–19.
2. Nicholas A. B., Simon J. H., Mary M., Jacintha M. S. and Lolke H. (2012). Monoclonal antibody therapeutics: history and future, Current Opinion in Pharmacology, 12:615–622
3. Hilal A. P., Shivangi S., Sweety S., Tripti S., Shubbir A., Chandresh S., and Rajesh K. (2020). Hybridoma technology a versatile method for isolation of monoclonal antibodies, its applicability across species, limitations, advancement and future perspectives, International Immunopharmacology 85,1066392.
4. Vibeke S., Alejandro B., Jamal A., Leonor B. F.,Takahiko H., Tsutomu T., Sadiq L., Charles H., Blerina K., Lisa M. (2017). Immunogenicity of Biologics in Chronic Inflammatory Diseases: A Systematic Review BioDrugs 31:299–316.
5. Oliver S., Simona C., Florian K., Anton G., and Christoph H. (2014). Microbials for the production of monoclonal antibodies and antibody fragments, Trends in Biotechnology 32 (1): 54-60.