Antibody Cross Reactivity: in the Context of COVID-19

Antibody cross-reactivity is the ability of an antibody to react with similar antigenic sites on different proteins. In immunology, an antigen is a molecule or molecular structure, such as may be present on the outside of a pathogen, that may be bound by an antigen-specific antibody or B-cell antigen receptor. The presence of antigens in the body normally triggers an immune response. B-cells fight bacteria and viruses by making Y-shaped proteins called antibodies, which are specific to each pathogen and can lock onto the surface of an invading cell and tag it for destruction by other immune cells.

COVID-19 is a respiratory disease caused by the coronavirus SARS-CoV-2 that causes mild symptoms in most individuals. However, dependent on their underlying health issues and other factors such as age, gender, or genetic makeup, symptoms can vary dramatically in severity. A complete and accurate immune response assessment of COVID-19 patients or vaccinated individuals based on the two key determining factors: antibody concentration and affinity. It is important to understand the severity of the disease and assess the strength and duration of the acquired immunity. It is also essential to evaluate the mechanisms and immunological effects of virus-neutralizing antibodies. And characterizing cross-reactivity with other, less harmful, coronaviruses.

A blog article I read by Drug Baron stated that: "Monoclonal antibodies are now well-established as a mainstay of the therapeutic armory." A monoclonal antibody is an antibody made by cloning a unique white blood cell. All subsequent antibodies derived this way trace back to a single parent cell. Monoclonal antibodies can have monovalent affinity, binding only to the same antigenic determinant.

Why is this important? Many antibodies (in the order of hundreds) have now been approved as drugs. This reflects several advantages of antibodies over older, more established drugs consisting of smaller molecules. Their specific characteristics allow for harmful effects to be lessened or eliminated. Their longer shelf life makes them suitable for less frequent dosing and, in some cases, as little as twice a year.

It cannot be overstated that although a lot of guesswork and luck has gone into the process of drug discovery. It is paramount that drug discovery companies consider the advantages and disadvantages of different discovery platforms. The bottom line is to find the ideal vaccine, meaning a drug with the highest possible beneficial effects and the least side effects.

To optimize the immune response to coronavirus disease (COVID-19), we must understand the antibody response to individual proteins on the severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) and the antibody's cross-reactivity to other related viruses. The connection between the response with those of other coronaviruses implies that the antibodies are cross-reactive and generated to widespread viruses within these hosts; this must be considered in clinical studies. We can conclude that considerable variation in antibody generation against coronavirus proteins will directly affect interpretations of the data in the clinical setting. Cross-reactivity studies can provide extremely useful information about target distribution and potential unexpected binding. For monoclonal antibodies, assessment of cross-reactivity is of vital importance.