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Antibody Production

Carol Brattey and Robert Burns

1. Introduction

Antibodies are produced by the immune systems of animals in response to the presence of foreign substances. Antibodies raised against regions of the viral coat protein (CP) (epitopes) can be exploited for virus detection; in 1977 Clark and Adams described the use of antibodies in ELISA to rapidly test a large number of plant sap samples for the presence of virus ***(1)***. Antibodies produced against virus particles can also be used in Western blots (*see* Chapter 45) to assay CP expression in transformed plants ***(2,3)***.

Originally, all antibodies were derived from the serum of animals following immunization with the virus of interest. These polyclonal antibodies (PAbs) are essentially a heterogeneic mixture of molecules that will recognize several epitopes on the target protein. The main advantage of PAbs is that their broad specificity may give a more robust test, perhaps allowing detection of most strains of a virus or even all members of a virus group. Paradoxically, the relative lack of specificity is also their main limitation, because they sometimes produce crossreactions with plant proteins that can give false positives in assays. Additionally, because they are produced on a batch basis, variable reactions may be encountered between bleeds from the same animal and between individual animals.

In 1975, Kohler and Milstein reported that antibodies could be produced in tissue culture by creating recombinant cell lines from mouse myeloma cells and spleen cells from an immunized mouse ***(4)***. Antibodies made in this way are known as monoclonal antibodies (MAbs), because they are produced by cell lines derived from single recombinant parent cells.

A good PAb is perfectly adequate for many purposes, but MAbs have the advantages of sensitivity, specificity, reproducibility, and consistent supply

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