

# Demystifying Diagnostics: The Agdia ImmunoStrip®

## Part Two: All About Antibodies

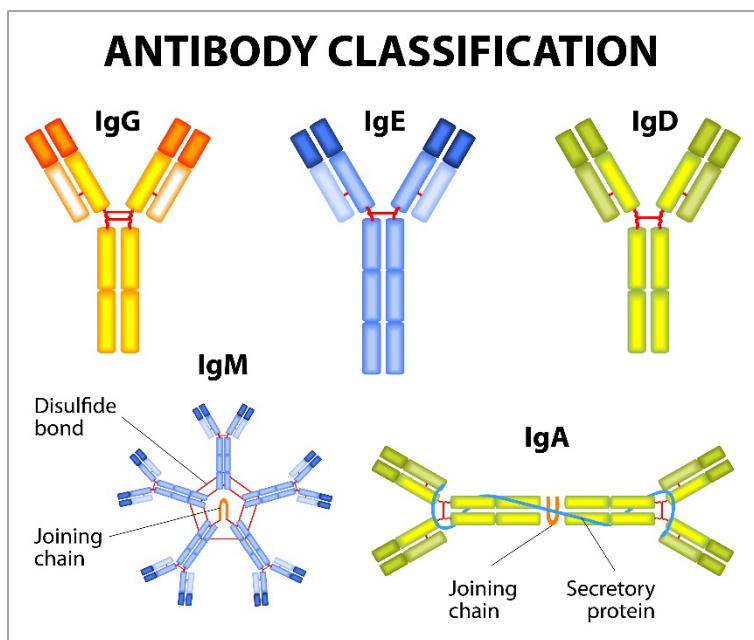
Robert Emmitt

Hopefully, you now have a general understanding of what antibodies are and their importance to our health through adaptive immunity. Nevertheless, as I acknowledged at the conclusion of part one, you might be wondering what part antibodies play in the development of a lateral flow device such as the ImmunoStrip®. This is an excellent question, and it will be answered, I promise.

Most higher vertebrates generate antibodies within their immune systems, but the specific structure of those antibodies differs slightly according to the class of animal. For example, mammalian antibodies differ from those of reptiles and birds, which differ from those of fishes. In general, mammals, including humans, produce five specific functional classes of antibodies: immunoglobulin (Ig) A, D, E, G and M (**Figure 1**). Of these, immunoglobulin G (IgG) provides the preponderance of antibody-based protection from invading pathogens. These antibodies are utilized regularly in medical, veterinary and plant diagnostic devices and will be the focus of our discussion for use on the ImmunoStrip®.

Antibodies produced commercially can be divided into two types: polyclonal (pAb) and monoclonal (mAb). Polyclonal antibodies are extracted from the blood serum of animals inoculated with the target antigen. These antibodies are the heterogeneous product of a collective B cell response, including multiple lineages, identifying multiple epitopes on the target antigen. Many refer to pAbs as antiserum. In contrast, monoclonal antibodies are homogeneous and represent a response from a single B cell lineage, binding to a specific epitope. These B cells are removed with spleen tissue from an inoculated animal and fused with a cancerous myeloma cell *in vitro*, forming a hybridoma. Hybridomas are maintained in culture and generate mAbs indefinitely. They are referred to as cell lines. Neither type of antibody is the proverbial silver bullet, and both have advantages and limitations, depending on the application. In fact, the types can be used in coordination on a single device, facilitating comprehensive detection of the antigen invader.

Antibodies are produced on an industrial scale by companies, private and public, with expertise in biological and manufacturing methodologies. The raw antibodies are then purified and stabilized in solution for evaluation of use in the final product. It is important to understand that



**Figure 1.** Five functional types of mammalian antibodies



antibody production is simply the initial step in developing a lateral flow device such as the ImmunoStrip®. While being of paramount importance for detecting the target antigen on an ImmunoStrip®, antibodies must perform effectively in concert with an ensemble of functional components, chemical and physical. When Agdia receives the antibodies, the evaluation research commences to determine the antibody's competence as an antigen detector and its ability to navigate the gauntlet of ImmunoStrip® architecture.

At this point, I have discussed what antibodies are and where they are generated. Moreover, I am confident you are aware that antibodies are used as the agent of antigen detection on the ImmunoStrip®. Stay tuned for my next installment for discussion of the reactions that take place on the ImmunoStrip® and how multiple components work together to provide the fastest and most accurate results.

### **About the author**

Robert Emmitt serves as the Domestic Account Manager of Plant Pathogen Diagnostics at Agdia, Inc., where he has been for six years. Robert earned his B.S. in Crop and Soil Science from the University of Kentucky and his M.S. in Plant Pathology from the University of Georgia. Before joining Agdia, Robert spent 18 years in the landscape management industry, culminating as a Plant Health Manager on private estates in Cincinnati and Northern Kentucky, which is where he grew up and became interested in plant health. Moreover, he holds associate degrees in Horticulture and Turfgrass Management and has several years of professional experience in landscape design. Robert can be reached at [robert.emmitt@agdia](mailto:robert.emmitt@agdia) or 574-327-6065.