

## **CPRC Update**

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### **VACCINE TECHNOLOGY NEARING COMMERCIALIZATION**

The road from research discovery to commercial application is sometimes long. In the October 2010 issue of the CPRC update, we introduced you to new vaccine technology being developed by Dr. Eva Nagy and her team at the University of Guelph. Since that time, these researchers and the University have been busy refining the technology and working with Avimex Animal Health to bring it to commercial application.

#### **Better vaccines: an introduction**

While vaccines are used with great success to protect poultry from a range of diseases, many are not without their drawbacks. Vaccines based on live virus, for example, can sometimes cause symptoms of the disease they are designed to prevent. Killed vaccines are generally safer, but are often less effective. As more is learned about pathogens and the host's immune responses to them, new vaccine types are emerging that overcome the shortcomings of their predecessors and incorporate features that improve their effectiveness and utility. For example, scientists have identified specific viral proteins that elicit a protective immune response. Inoculating birds with these immunogenic proteins, or "antigens", eliminates the need for, and associated risks of, using intact virus. The challenge is to find an effective way to deliver these antigens to the body.

#### **The technology, in brief**

Dr. Nagy's team is meeting that challenge by exploiting a virus' natural ability to deliver genetic information into biological cells. Specifically, the researchers are working with a strain of fowl adenovirus (FAdV-9; a strain that does not cause disease in poultry). Adenovirus particles are extremely small and, compared to a cell, are quite simple. They consist only of a set of genetic instructions (DNA) and a coat of protein that protects the DNA. Adenoviruses do not have the chemical machinery necessary to reproduce themselves. As part of their lifecycle, these viruses attach to a host cell and introduce genetic instructions that trick the cell into producing new virus particles. Nagy's team engineered FAdV-9 to instead instruct the cell to make specific antigens. These antigens are, in turn, presented to the immune system to elicit the appropriate immune response.

The FAdV-9 system is very powerful and flexible. Using the same biological platform, a wide array of antigens can be produced. Antigens can be co-introduced with proteins that enhance the bird's immune response. Multivalent vaccines can be produced that simultaneously protect poultry from more than one disease. Additionally, these vaccines can be engineered to allow distinction between birds that were vaccinated and those that were naturally infected by intact virus. Formally known as "Differentiation of naturally Infected from Vaccinated Animals" (DIVA), this feature will be an important component of many commercially viable vaccination strategies in the future.

#### **Commercial application**

The key to bringing scientific discoveries to commercial application is to connect research expertise with companies that can take the technology to the marketplace. In Dr. Nagy's case, this connection was made with the help of the Catalyst Centre (CC), the University of Guelph's technology transfer and industrial liaison office. The CC works with faculty, staff and students "to protect intellectual property and maximize potential economic, social and environmental benefits". CC staff connected Dr. Nagy with Avimex and helped navigate issues around intellectual property and technology licensing. Avimex, based in Mexico (there are no Canadian vaccine manufacturers), produces poultry vaccines and

pharmaceuticals for poultry and other agricultural species for markets in more than 25 countries. Having done its own due diligence, Avimex is confident that Dr. Nagy's technology platform will be a success and is working on registration and scaling up production.

Congratulations to Dr. Nagy's team on their ingenuity and perseverance, and to the Catalyst Centre and Avimex for helping these researchers navigate the long road from idea to marketplace.

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*The membership of the CPRC consists of Chicken Farmers of Canada, Canadian Hatching Egg Producers, Turkey Farmers of Canada, Egg Farmers of Canada and the Canadian Poultry and Egg Processors' Council. CPRC's mission is to address its members' needs through dynamic leadership in the creation and implementation of programs for poultry research in Canada, which may also include societal concerns.*