

# REVOLUTIONIZING VACCINE PRODUCTION

## HOW RNA-BASED VACCINES WORK

Vaccination has long been key to preventing disease and protecting animal and human health. Classically, vaccines mimic infection using inactivated whole pathogens (antigens) to stimulate the immune system.

Exposing the body to antigens leads to the production of antibodies specifically directed against them. Memory cells release antibodies and other factors to enable a more rapid and efficient response the next time the cell is exposed to the antigen.

RNA vaccines, a revolutionary new class of vaccines, rely on a different way to present an antigen.

For a conventional vaccine, the antigen is grown in the lab, deactivated or killed, and then presented to the body. However, in the case of this revolutionary technology, an electronic gene sequence is utilized.

SEQUIVITY™ RNA Particle Technology from Merck Animal Health utilizes only the known gene of interest (GOI), specific to the pathogen. The gene of interest provides instructions to the dendritic (immune) cells to translate the sequence into proteins that act as antigens. Then, when presented with an actual pathogen challenge, the animal's immune system recognizes the antigen and a targeted immune response is triggered.

The SEQUIVITY technology targets specific pathogens to produce prescription, customized, herd-specific vaccines against both viral and bacterial pathogens. It also gives veterinarians and producers a tool to help address specific diseases that cannot always be addressed by conventional measures.

## WHAT MAKES SEQUIVITY UNIQUE

In a world where diseases evolve and mutate continuously, Merck Animal Health is helping producers address their animals' health with strain-specific vaccines.

This unique way to approach vaccine production offers a safe and innovative solution to today's herd health challenges. The SEQUIVITY technology takes a generic sequence from a targeted pathogen, isolated from an infected animal, to create a herd-specific vaccine in a matter of weeks.

In most cases, the process starts with the veterinary herd visit. A sample is collected from the infected herd and sent to a diagnostic lab where the pathogen strain's gene of interest is sequenced and sent electronically to Merck Animal Health. This maximizes safety and biosecurity.

After receiving the gene sequence, it is synthesized and inserted synthetically into the RNA production platform. After incubation, RNA particles (RPs) released from the production cells are then harvested, purified and formulated into a final vaccine.

The RPs are able to enter immune cells and carry the GOI of the disease identified. Each RP targets the dendritic cells of the animal that are involved in presenting an antigen to the immune system. The animal's immune system recognizes the protein encoded by the GOI and triggers an immune response.

Because RPs are designed just to deliver the information and not to replicate themselves, safety is maximized. The SEQUIVITY technology also lets producers and veterinarians target multiple pathogens in one bottle.

## BIOLOGICALS OF THE FUTURE

With SEQUIVITY, Merck Animal Health offers producers an innovative, safe, flexible and precise solution when herd health management requires the most advanced, tailored vaccination solutions.

SEQUIVITY RNA Particle Technology is used to create innovative, highly advanced vaccine solutions that are:

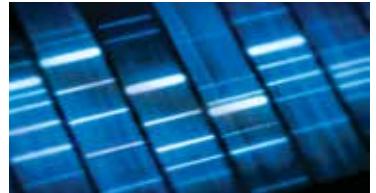
**FLEXIBLE SAFE PRECISE**

## Our Process

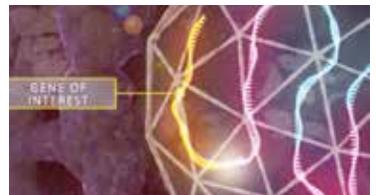
Gene of Interest = GOI  
RNA Particles = RPs



1. A sample is collected and sent to the lab by a veterinarian.



2. GOI is sequenced and sent electronically.



3. Sequence is synthesized and inserted into the RNA production platform.



4. After incubation, RPs released from the production cells are harvested, purified and formulated into a final vaccine.

For more information about the SEQUIVITY Technology, talk to your local Merck Animal Health sales representative or visit [www.SEQUIVITY.com](http://www.SEQUIVITY.com).