

Canada's defense sector and Tekmira lead the way to finding Ebola cure

✘ The Ebola outbreak shows no sign of stopping and 500 new cases have been identified since Canada promised to a hundred doses of an experimental vaccine to the World Health Organization (WHO). The doses remain at the National Microbiology Laboratory in Winnipeg. This latest Ebola epidemic started in Guinea in early 2014 and then spread quickly to Liberia and Sierra Leone, threatening Nigeria, Africa's most populous country.

As cynical as it may sound, there is no doubt that the Ebola epidemic has stimulated the biotech sector to work on specialized vaccines. The outbreaks in West Africa will enable private and government research facilities to measure the effectiveness and safety of the vaccines or serums allow for development with international partners and gain an understanding of the risks and side effects as compared to benefits. Moreover, the data collected in the field will serve as the basis to secure approval by regulatory authorities and speed up clinical trials; normally, vaccines are tested for years before their use is permitted. The companies with experimental drugs to treat Ebola include Tekmira Pharmaceuticals ('Tekmira', NASDAQ: TKMR), BioCryst Pharma (NASDAQ: BCRX), NewLink Genetics (NASDAQ: NLNK), and Sarepta Therapeutics (NASDAQ: SRPT). Of these Tekmira has the best chance of success thanks to the fact it is working on an actual drug able to fight Ebola even in patients who has already contracted the disease a week. Ebola symptoms tend to show up days after the infection with the virus occurs, so drugs are needed to stop the developing illness.

Shares of Vancouver based Biotechnology Company Tekmira

Pharmaceuticals have returned to yearly highs over the month of August. The recent Ebola epidemic was first noted last January but the world did not take notice until a few months later. The recent trading success was prompted by the fact that, given the magnitude of the emergency, American authorities have partially allow its use of as part of the experimental treatments to combat the epidemic. The market is betting that Tekmira has the remedy, soaring close to 50% in August trading, and boosted by the prospect of the use of one of its experimental Ebola treatments may have as much success in 90% of cases. The US Federal Drug Administration (FDA) informed Tekmira that it had decided to speed up the validation process and paved the way for its use to combat the epidemic in Africa.

Tekmira has the advantage of being the only vaccine to be tested on humans (even if only healthy patients participated in the testing) making Tekmira the scientific community's treatment of choice against Ebola for the time being. In August, Tekmira won a USD\$ 140 million contract with the United States Department of Defense to further develop the TKM-Ebola treatment. Some analysts have suggested that Tekmira, a small company, may generate more than USD\$ 100 million in revenue by 2017 through its Ebola remedy alone. In perspective, in the first quarter 2014, Tekmira generated USD\$ 4.4 million in revenue and a net loss worth more than four times that amount. It should be noted that much of the advancements made by Tekmira and all the other companies searching for a drug to fight Ebola came courtesy of Canada's Department of National Defence, which invested several million dollars into programs aimed at protecting Canada from Ebola and other diseases considered to be security threats.

Defence Research and Development Canada (DRDC) has supported the National Microbiology Laboratory in contributing to the development of Winnipeg, ZMapp and Tekmira. Nevertheless, after having proven to be successful in treating some affected

medics, the new vaccine remains complicated to deliver. It must remain stored at very low temperatures to work and shipped accordingly. The priority remains to ensure availability of the vaccines to health care workers – as they risk their lives to save others and are essential – but the problem is that there is a limited supply and producing new ones can take two to three months. Fears of an Ebola epidemic from breaking out domestically has also forced the Canadian Health ministry to maintain 500 to 700 doses of vaccine in the country. In fact there are two potential vaccines or serums against Ebola.

The experimental, Canadian developed, VSV-EB0V vaccine is the one that is expected to be delivered to West Africa even though the equally experimental serum ZMapp has already been used to cure two American aid workers. The San Diego based Mapp Biopharmaceutical (NASDAQ: MAPP) is having difficulty increasing production in time even if it has addressed the emergency situation, noting that it is working with commercial and government entities to meet demand. A Canadian lab only has a dose of ZMapp left while three doses of serum are required to treat a single patient; it takes three or four months to produce a small amount. Zmapp has successfully treated two American workers.

The main difference between VSV-EB0V (vaccine) and ZMapp (serum) is that the vaccine is not produced using a virus from the same family as the rabies virus, vesicular stomatitis, which is transmitted from animals to humans. The serum is plant based and, being a serum, it works after a person has been exposed to the virus. VSV-EB0, as a vaccine it acts 'preemptively'. Unlike serums vaccines are generally designed to be used to prevent an infection before it occurs. VSV-EB0V, similar to an anti-rabies vaccine, may also have success if used on patients already affected by Ebola, because anti-rabies vaccines have shown to be effective if used quickly – that is they can cause an immune response if they are adopted

before the virus 'wins'. Injected after exposure to virus, the VSV-EB0V proved somewhat effective in animals.