The multi-tasking reovirus

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In the past couple of years, researchers at Oncolytics Biotech have been developing a harmless virus as a potent cancer killer, but they have also been accumulating data that suggests in addition to directly killing tumor cells, the reovirus may prime the immune system to mount a separate, powerful and long lasting defence against cancer.

Evidence for this theory has been mounting for the past year. On January 10, 2007, Dr. Sheila Fraser of St. James's University Hospital in Leeds, U.K. delivered a paper at the Society of Academic & Research Surgery Conference in Cambridge, U.K., in which she described a test tube experiment further supporting this claim. Fraser's presentation, titled "Reovirus as a Potentially Immunogenic as well as Cytotoxic Therapy for Metastatic Colorectal Cancer," reported how cells taken from a colorectal cancer liver metastases were more susceptible to death many weeks after treatment with reovirus, and long after the virus had cleared the patient's system. These cells, when cultured in the laboratory, also appeared to be vulnerable to re-infection with reovirus. Moreover, Dr. Fraser noted that dendritic cells, which prime the immune system against cancer, were activated by exposure to the reovirus.

"We understand how the reovirus replicates within and kills cancer cells," explains Dr. Matt Coffey, Chief Scientific Officer at Oncolytics, "but we also observed that tumors sometimes continue to shrink long after the virus is gone." Immunologic work now suggests that reovirus exposure is "educating" the immune system to recognize and kill the same cancer cells that were attacked by reovirus. "If you can teach the immune system to recognize cancer cells," says Coffey, "it may be

possible to fight off the disease for much longer than we originally anticipated."

Late in 2006, another collaborator, Dr. Alan Melcher of the Cancer Research UK Clinical Centre in Leeds, hypothesized that reovirus activation of dendritic cells, which are key to early detection of infection (through the innate immune response), may "instruct" cells belonging to the adaptive immune response, namely natural killer cells and T cells, to attack the tumor even after the virus no longer remains in the body. That poster was presented at the European National Societies of Immunology Meeting in Paris.

Interestingly, another study conducted in 2006 at the Mayo Clinic suggested that momentarily suppressing the immune system allows the virus to continue replicating, leading to increased cancer cell killing. This in turn leads to the creation of more tumor antigens (the elements that educate the immune system), thereby increasing the vaccinating effect of the virus and perhaps improving the efficacy of oncolytic virus therapy.

"The apparent dual mechanism of action for oncolytic viruses will need to be tested further, both in patients and in the laboratory. If the effects turn out to be genuine, the implications for long-term survival from many types of cancer could be significant," says Coffey. Researchers believe that therapies working simultaneously, but through different mechanisms, may overcome the resistance to treatment that is typically seen in cancer. In addition, this double attack on cancer could point to new treatment regimens based on conventional therapies like radiation and chemotherapy with biological agents.

Source: Oncolytics Biotech Inc.