Cancer therapy goes viral: Results of world-first viral therapy trial in cancer patients announced

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Researchers from the Ottawa Hospital Research Institute (OHRI), the University of Ottawa (uOttawa), Jennerex Inc. and several other institutions today reported promising results of a world-first cancer therapy trial in renowned journal *Nature*. The trial is the first to show that an intravenously-delivered viral therapy can consistently infect and spread within tumours without harming normal tissues in humans. It is also the first to show tumour-selective expression of a foreign gene after intravenous delivery.

The trial involved 23 patients (including seven at The Ottawa Hospital), all with advanced cancers that had spread to multiple organs and failed to respond to standard treatments. The patients received a single intravenous infusion of a virus called JX-594, at one of five dose levels, and biopsies were obtained eight to 10 days later. Seven of eight patients (87 per cent) in the two highest dose groups had evidence of viral replication in their tumour, but not in normal tissues. All of these patients also showed tumour-selective expression of a foreign gene that was engineered into the virus to help with detection. The virus was well tolerated at all dose levels, with the most common side effect being mild to moderate flu-like symptoms that lasted less than one day.

"We are very excited because this is the first time in medical history that a viral therapy has been shown to consistently and selectively replicate in cancer tissue after intravenous infusion in humans," said Dr. John Bell, a

Senior Scientist at OHRI, Professor of Medicine at uOttawa and senior co-author on the publication. "Intravenous delivery is crucial for cancer treatment because it allows us to target tumours throughout the body as opposed to just those that we can directly inject. The study is also important because it shows that we can use this approach to selectively express foreign genes in tumours, opening the door to a whole new suite of targeted cancer therapies."

Dr. Bell and his team have been investigating cancer-fighting (oncolytic) viruses at OHRI for more than 10 years. JX-594 was developed in partnership with Jennerex Inc., a biotherpeutics company co-founded by Dr. Bell in Ottawa and Dr. David Kirn in San Francisco. JX-594 is derived from a strain of vaccinia virus that has been used extensively as a live vaccine against smallpox. It has a natural ability to replicate preferentially in cancer cells, but it has also been genetically engineered to enhance its anti-cancer properties.

"Oncolytic viruses are unique because they can attack tumours in multiple ways, they have very mild side effects compared to other treatments, and they can be easily customized for different kinds of cancer," said Dr. Bell. "We're still in the early stages of testing these viruses in patients, but I believe that someday, viruses and other biological therapies could truly transform our approach for treating cancer."

Although the current trial was designed primarily to assess safety and delivery of JX-594, anti-tumour activity was also evaluated. Six of eight patients (75%) in the two highest dose groups experienced a shrinking or stabilization of their tumour, while those in lower dose groups were less likely to experience this effect.

"These results are promising, especially for such an early-stage trial, with only one dose of therapy," said Dr. Bell. "But of course, we will need to

do more trials to know if this virus can truly make a difference for patients. We are working hard to get these trials started, and at the same time, we are also working in the laboratory to advance our understanding of these viruses and figure out how best to use them."

"On behalf of everyone involved in this research, I want to thank all the courageous patients who participated in this trial," added Dr. Bell. I also want to thank the community and funding organizations for their generous support."

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