

Erectile dysfunction drugs and flu vaccine may work together to help immune system fight cancer after surgery

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New research shows that erectile dysfunction drugs and flu vaccine may work together to help the immune system fight cancer after surgery. Credit: The Ottawa Hospital

A new study suggests that a common treatment for erectile dysfunction combined with the flu vaccine may be able to help the immune system mop up cancer cells left behind after surgery. The study, published in *OncoImmunology*, shows that this unconventional strategy can reduce the spread of cancer by more than 90 percent in a mouse model. It is now being evaluated in a world-first clinical trial.

"Surgery is very effective in removing solid tumours," said senior author Dr. Rebecca Auer, surgical oncologist and head of [cancer](#) research at The Ottawa Hospital and associate professor at the University of Ottawa. "However, we're now realizing that, tragically, surgery can also suppress the immune system in a way that makes it easier for any remaining [cancer cells](#) to persist and spread to other organs. Our research suggests that combining [erectile dysfunction](#) drugs with the [flu vaccine](#) may be able to block this phenomenon and help prevent cancer from coming back after surgery."

The current study investigated sildenafil (Viagra), tadalafil (Cialis) and an inactivated influenza vaccine (Agriflu) in a mouse model that mimics the spread of cancer (metastasis) after surgery. The researchers evaluated these treatments by counting the number of metastases in mouse lungs. They found an average of:

- 37 metastases with cancer [cells](#) alone
- 129 metastases with cancer cells and surgery
- 24 metastases with cancer cells, surgery and one of the erectile dysfunction drugs
- 11 metastases with cancer cells, surgery, one of the erectile dysfunction drugs and the flu vaccine



Surgery is very effective in removing solid tumors, but researchers now know that it also changes the immune system in a way that allows tiny cancers (metastases) to grow and spread. Credit: Rebecca Auer, Lisa MacKenzie

Dr. Auer is now leading the first clinical trial in the world of an erectile dysfunction [drug](#) (tadalafil) and the flu vaccine in people with cancer. It will involve 24 patients at The Ottawa Hospital undergoing abdominal cancer surgery. This trial is designed to evaluate safety and look for changes in the immune system. If successful, larger trials could look at possible benefits to patients.

"We're really excited about this research because it suggests that two safe and relatively inexpensive therapies may be able to solve a big problem in cancer," said Dr. Auer. "If confirmed in clinical trials, this could become the first therapy to address the immune problems caused by cancer surgery."

Using a variety of mouse and human models, Dr. Auer's team has also made progress in understanding how erectile dysfunction drugs and the flu vaccine affect cancer after surgery. Normally, immune cells called natural killer (NK) cells play a major role in killing metastatic cancer cells. But surgery causes another kind of immune cell, called a myeloid derived suppressor cell (MDSC), to block the NK cells. Dr. Auer's team has found that erectile dysfunction drugs block these MDSCs, which allows the NK cells to do their job fighting cancer. The flu vaccine further stimulates the NK cells.

"Cancer immunotherapy is a huge area of research right now, but we're still learning how best to use it in the time around [surgery](#)," said first author Dr. Lee-Hwa Tai, former postdoctoral fellow in Dr. Auer's lab and now assistant professor at the Université de Sherbrooke. "This research is an important step forward that opens up many possibilities."

Dr. Auer noted that although erectile dysfunction drugs and the flu [vaccine](#) are widely available, people with cancer should not self-medicate. Any changes in medication should be discussed with an oncologist.

More information: Lee-Hwa Tai et al, Phosphodiesterase-5 inhibition reduces postoperative metastatic disease by targeting surgery-induced myeloid derived suppressor cell-dependent inhibition of Natural Killer cell cytotoxicity, *OncImmunology* (2018). [DOI: 10.1080/2162402X.2018.1431082](#)

Provided by The Ottawa Hospital

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