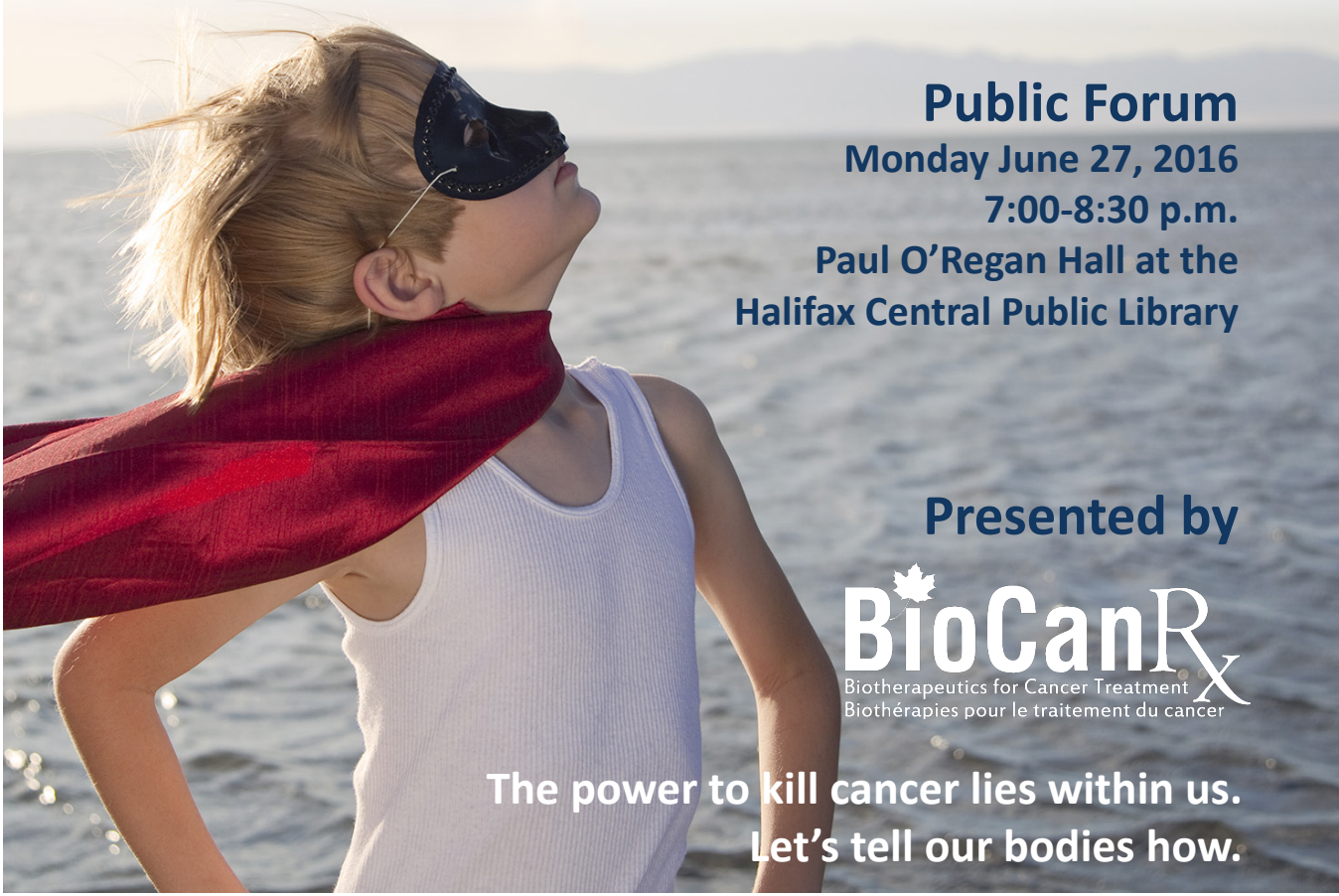
Hype or Reality

Can our immune system actually beat cancer?



Public Forum

Monday June 27, 2016
7:00-8:30 p.m.
Paul O'Regan Hall at the
Halifax Central Public Library

Presented by

BioCanRx
Biotherapeutics for Cancer Treatment
Biothérapies pour le traitement du cancer

The power to kill cancer lies within us.
Let's tell our bodies how.

Moderator:
Pauline Dakin
University of King's College
Long-time health reporter for
CBC National News

Patient:
Terry Jaillet
Moncton, N.B.

Experts:

Dr. John Bell
BioCanRx
The Ottawa Hospital
University of Ottawa

Dr. Marcus Butler
Princess Margaret Cancer Centre
University Health Network

Dr. Linh Nguyen
Princess Margaret Cancer Centre
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Dr. Stephanie Snow
QEII Health Sciences Centre
Dalhousie University

Thanks also to Let's Talk Science Dalhousie for their help this evening.

Cancer immunotherapy is emerging as the way forward for curing cancer, a disease that affects two in every five Canadians.

But haven't we heard hype like this before?

This public forum provides members of the public a chance to separate fact from fiction by hearing the latest advances in cancer immunotherapy research from experts developing ground-breaking therapeutics that harness the body's immune system to fight cancer.

A bit about biotherapeutics and immunotherapy

People often think surgery, chemotherapy or radiation when talking about cancer treatment.

BioCanRx, a Network of Centres of Excellence, is working with researchers across the country to change this.

To help achieve this goal, the BioCanRx network is using the knowledge discovered by researchers about how cancer works, what makes it so difficult to treat and how we can use the body's own defence mechanisms to outsmart and kill it.

This brochure provides brief, general answers to the following questions:

- What are cancer biotherapeutics?
- How do biotherapies work?
    - Oncolytic virus therapy
    - Adoptive cell therapy
    - Antibody therapy
- What is the real potential of biotherapeutics for cancer treatment?
- Would cancer biotherapeutics be good for me?

What are cancer biotherapeutics?

The term cancer biotherapeutics encompasses all biologically derived materials that have been processed or engineered to treat cancer, including cancer-killing viruses, immune cell therapies and antibody therapies. All of these therapies have mechanisms that enlist the immune system (are immunotherapeutic), are highly promising and targeted, and are the subject of much excitement in research.

In contrast to conventional therapies, biotherapeutics for cancer treatment are not based on man-made chemicals that flood the system with toxins. Biotherapeutics are designed to specifically target cancer cells without harming healthy cells, which results in greater effectiveness and fewer, less severe, side effects. Even in early phase clinical trials, biotherapeutics have provided complete remission for a number of patients who had run out of treatment options.

How do biotherapies work?

In the course of our lives, our cells multiply billions of times and sometimes this doesn't work perfectly. Mutations occur. Most of the time, our body recognizes the problem and a mutant cell simply dies or is killed off by our immune system before anything harmful happens.

However, with cancers, these mutant cells replicate themselves and become tumours that fly under the radar of our immune system. One of the real difficulties is that cancers convince our immune system to carry on as if nothing is wrong.

Because we know more about how cancers are tricking our immune system and we have discovered some of cancers' weaknesses, we can apply biologically based techniques to get around this deception.

Each biotherapeutic approach does this differently. However, all of these therapies are extremely targeted, which means that they directly attack only cancer cells — not healthy cells.

Oncolytic virus therapy

Oncolytic viruses take advantage of the fact that many cancer cells in a tumour do not have the defences that healthy cells possess to fight off viral infection. As a result, specially engineered viruses can find cancer cells in the body, infect them, and replicate inside them until they disintegrate (or lyse) and die. The virus does not harm the healthy cells. This also brings the tumour's existence to the attention of the immune system, which is activated to attack the cancer. In addition, the immune system is trained to recognize the cancer as a threat and can prevent it from spreading to other locations.

Adoptive cell therapy

Immune cell therapy involves engineering or isolating cancer-fighting immune cells (T cells), growing large numbers of these cells in the laboratory and then infusing them back into patients. Immune cells are naturally present in most tumours, but usually have been deactivated by the cancer or simply lack the numbers to eradicate the cancer on their own. The immune cells can be genetically or biologically manipulated to become more powerful and reactivated. This approach has led to some unprecedented clinical responses in patients with advanced cancers.

Antibody therapy

Antibodies are large, Y-shaped proteins produced by the immune system when it detects harmful substances called antigens. Antigens are found on microorganisms (bacteria, fungi, parasites and viruses), chemicals and cancers. Antibodies can be purified, enhanced or designed for use as cancer treatments that work in a number of ways. Antibody therapies can:

- alert the immune system to a cancer cell,
- deliver a toxic drug specifically to a cancer cell,
- manipulate the immune response to a cancer cell, or
- disrupt how a cancer cell works to survive.

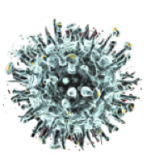
Cancers are successful partly because they have developed the ability to deceive the immune system into thinking they are a normal part of the body. Certain antibodies can be created to overcome these signals of deception, which then reveals the cancer to the immune system and activates T cells to attack the cancer.

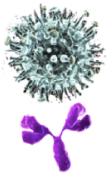
These types of antibodies are called immune checkpoint inhibitor antibodies and have shown great promise in the clinic.

What is the potential of biotherapeutics for cancer treatment?

As promising as each approach is individually, researchers have good reason to believe that biotherapeutics could be even more effective in combination.

For example, the combination of T-Vec (an oncolytic virus derived from the herpes virus) with Yervoy (an immune checkpoint inhibitor with the biologic ipilimumab) has shown exciting and, arguably, predictable responses in advanced melanoma patients. The table below shows how the combination of the two biotherapies in a 2013 clinical trial resulted in one-third of the study's participants having a complete response, meaning they were cancer-free.





	T-Vec (Clinical trial published 2003)	Yervoy (Clinical trial published 2000)	Combination (Clinical trial published 2013)
Overall response rate	26%	8%	56%
Complete response	11%	3%	33%

This combination was only tested once Yervoy entered the market (approved in the United States in 2011 and 2012 in Canada). BioCanRx is committed to testing rational biotherapeutic combinations during development (before market entry) in order to accelerate the discovery of the most promising biotherapeutic combinations.

Would cancer biotherapeutics be good for me or a loved one?

The best answer to this question will be the result of a conversation with your oncologist.

The research community is working diligently to develop these therapies and learn more about when they are most effective, and why.

There are still many things to understand and learn about biotherapies for cancer treatment, including why some people respond to them and others don't, how best to produce them, how best to administer them and how to combine them.

While a few cancer biotherapies are available on the market, most are still in clinical and preclinical testing.

Clinical trials are registered on www.clinicaltrials.gov. There you can search for clinical trials using specific terms (e.g., "oncolytic virus"). Among the details listed in these records are eligibility criteria for a trial, as well as its sites and investigators. This information can form the basis of a discussion you might have with your oncologist.

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