



CAR-T Cells and Therapy explained

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B-cell acute lymphoblastic leukemia (B-ALL) is the most common form of childhood leukemia, and is diagnosed in roughly



DR. AMANDA LI

30-40 British Columbian children each year. Children with B-ALL are treated with intensive chemotherapy for several years and with that, have cure rates of upwards of 85%. That means 15 out of 100 children with B-ALL need other types of therapy to achieve long term cure. Traditionally, this could include additional chemotherapy, radiation, and bone marrow transplant. However, each of these carry risks of significant short term and permanent effects, including infertility, cognitive blunting, risks of secondary malignancies, endocrinopathies, cardiac toxicity, and graft versus host disease, amongst others.

Physicians and scientists have been working for decades on figuring out how to use the immune system of a patient to fight their own cancer. The natural role of the immune system is to protect itself from foreign invaders, such as viruses, bacteria, or foreign cells. In order to do that, the immune system must 1) figure out a way of recognising when something foreign is present in the body, and 2) activate the appropriate immune cells and eliminate the foreign cell, and it must be able to do this without harming the normal healthy tissues in the body.

In August 2017, the US Food and Drug Agency (FDA) approved the first chimeric antigen receptor (CAR) T-cell therapy for treatment of B-cell acute lymphoblastic leukemia (B-ALL). This was the first gene therapy approved in the world - and in an unprecedented manner, approval was granted first to pediatric patients before adults. In the preceding month, the Oncologic Drug Advisory Committee scrutinized the evidence presented by the medical, scientific, pharmaceutical, and patient communities. They noted that CAR T cell therapy production is complex (and costly), and that severe, possibly even life-threatening complications can arise from this therapy. Despite that, ODAC members voted 10-0 unanimously in favour of recommending FDA approval of CAR T cell therapy, impressed by early data showing very promising response rates in patients with multiple relapses and highly unresponsive to other therapy.

What is CAR T cell therapy? T cells are a type of lymphocyte immune cell which normally function to eliminate foreign invaders such as viruses and bacteria. Because T cells are such effective destroyers, they are normally kept in very tight control to prevent them from attacking our normal tissue. T cells are activated only when their receptor

recognizes a foreign marker (antigen) on the surface of a target cell. CAR T cell therapy turns this T cell response against B-cell leukemia cells by altering the T cell receptor to recognize B cell markers.

The process is complex. First, the patient undergoes collection of their T cells by a process called apheresis. Lymphocytes are sent to specialized manufacturing laboratories, and the T cells are isolated and grown in culture. A piece of DNA encoding a new T cell receptor is inserted into the T cells by using a piece of virus machinery. This DNA

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**ADULT CHILDHOOD
CANCER SURVIVORS**
(ACCS) Patient & Family Education Day
BC Cancer – Victoria

This education day is for adults (18 & over) with a history of childhood cancer & their family/close supporters

Saturday, November 2, 2019
10:00 am: Doors open. Sign-in & coffee
10:30 am – 2:30 pm: Program

PLACE:
BC Cancer – Victoria
2410 Lee Avenue, Victoria, B.C. V8R 6V5

- TOPICS:**
- Childhood cancer late-effects
 - Community resources
 - Nutrition & physical activity

REGISTRATION: required by October 21, 2019
Registration free-of-charge. Lunch provided

For more information or to register, please contact Bronwyn or Sharon at the Late Effects, Assessment and Follow-up (LEAF) Clinic:

Bronwyn at bronwyn.barrett@bccancer.bc.ca or phone 604.877.6070 ext. 3
Sharon at sharon.paulse2@bccancer.bc.ca or phone 604.877.6070 ext. 4

#Innovations in Pediatric Oncology Hematology Education Day

Dr. Elaine Peddie, MD

Chair of the Pediatric Oncology Hematology Education Day Planning Committee

Reading a newsletter is one way of learning about what's going on in Hematology and Oncology in BC, but there's nothing quite as interesting and inspiring as hearing about new developments from the experts. Our POHN education day on November 22 this year is a great opportunity to network, put 'faces to the names', ask questions and hear about what we'll be working on in BC in the next few years.



DR. ELAINE PEDDIE

I'm especially looking forward to our Palliative Care dinner and discussion on the evening before the conference. This year we have a panel of speakers facilitated by Camara van Breemen from Canuck Place. We keep this event small and personal to allow for deeper discussion and if you haven't been able to get a ticket this year, remember to register early next time!

Social media has intruded in all aspects of our personal and professional lives, and we'll start out the Friday with a timely presentation on privacy in the digital age from Dennis Desai of the Canadian Medical Protective Society.

We move on with updates on how far Neuroblastoma treatment has come and where it's going to. Amanda Li will be demystifying CAR-T cells, which we hope to be introducing to BCCH in the near future. We'll have another update on one of our

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becomes a permanent part of the T cell, and new receptors activate the T cell any time they encounter a B cell.

When turned on, effector T cells destroy the foreign pathogen and, in anticipation of having to fight and contain further infection, release chemical signals called cytokines to expand, divide, and recruit other T cells to activate.

parents' favourite and most misunderstood topics...Cannabis in the era of legalization. Whether we like it or not, it's here to stay, and we're going to be asked the questions, so let's be informed.

At lunch you'll have an opportunity to sit down with your BCCH colleagues from various disciplines and pick their brains. They'll be distributed at different tables, so grab a plate of food and sit with them... remember there are NO stupid questions!

The afternoon will consist of 2 workshop sessions from a choice of 5 different topics, with the opportunity to learn in a small group interactive format.

- The session on 'Life After Cancer' will give you the chance to hear from one of our brave and eloquent survivors who is starting out on her own journey towards a career in nursing.
- 'Sexuality in Adolescents' will help us answer some of the more awkward and unexpected questions and to understand what advice we should be giving our teenagers.
- Turning the focus on ourselves, I strongly recommend Janie Brown's workshop on 'Gratitude' as a healing tool to bring us comfort in an emotionally exhausting career.
- For those of you who have patients with bleeding disorders in your community, Erica Crilly will be helping you advise parents on how to help their children lead normal lives while staying safe.
- The leaders of our Acute Pain Service will be discussing the safe use of opioids in the midst of the Fentanyl Crisis.

The day will end with a presentation on 'Motivational Parenting at the bedside' by Dr. Shimi Kang. You may have heard her speak

Emily Whitehead and her parents were present at the ODAC review and together with other families of both survivors and bereaved families, presented their stories of CAR T cell therapy in support of its approval. Emily was the first pediatric patient with B-ALL to be treated with CAR T cell therapy. Please go to this link to learn more about Emily's story: <https://www.ascopost.com/issues/january-25-2018/against-all-odds/>



Pediatric Oncology/Hematology Education Day BC Children's Hospital Chan Centre Auditorium

registration: <https://events.eply.com/POHED2019>
website: <https://ubccpd.ca/POHED2019>

about many aspects of parenting on CBC radio, television and the TED stage. We've all seen how parents struggle to maintain discipline and boundaries when their child has a serious illness. Dr Kang is an engaging and entertaining speaker, and who of us doesn't like to hear parenting advice from an expert?

We look forward to meeting you all!

THE PROVINCIAL PEDIATRIC ONCOLOGY/HEMATOLOGY NETWORK

The Network is an interdisciplinary organization whose goal is to ensure appropriate diagnosis, management, follow-up, and end-of-life care for pediatric patients with malignancies and blood disorders.

The Network supports community hospitals and practitioners, and develops partnerships with other health care facilities to enable seamless and integrated care for patients and families on treatment and off treatment.

It will further develop and enhance the research programs of basic, translational, and clinical research to better childhood cancer control and improve outcomes for these patients and their families.

FOR MORE INFORMATION

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