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Improving Accessibility of Cancer Research (Canadian Cancer Society - Research Information Outreach Team)

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CANADIAN CANCER SOCIETY

Research Information Outreach Team (RIOT) London

Canadian Cancer Society | R.I.O.T
Research Information Outreach Team

Biochemistry 4455G
Community Engaged Learning course

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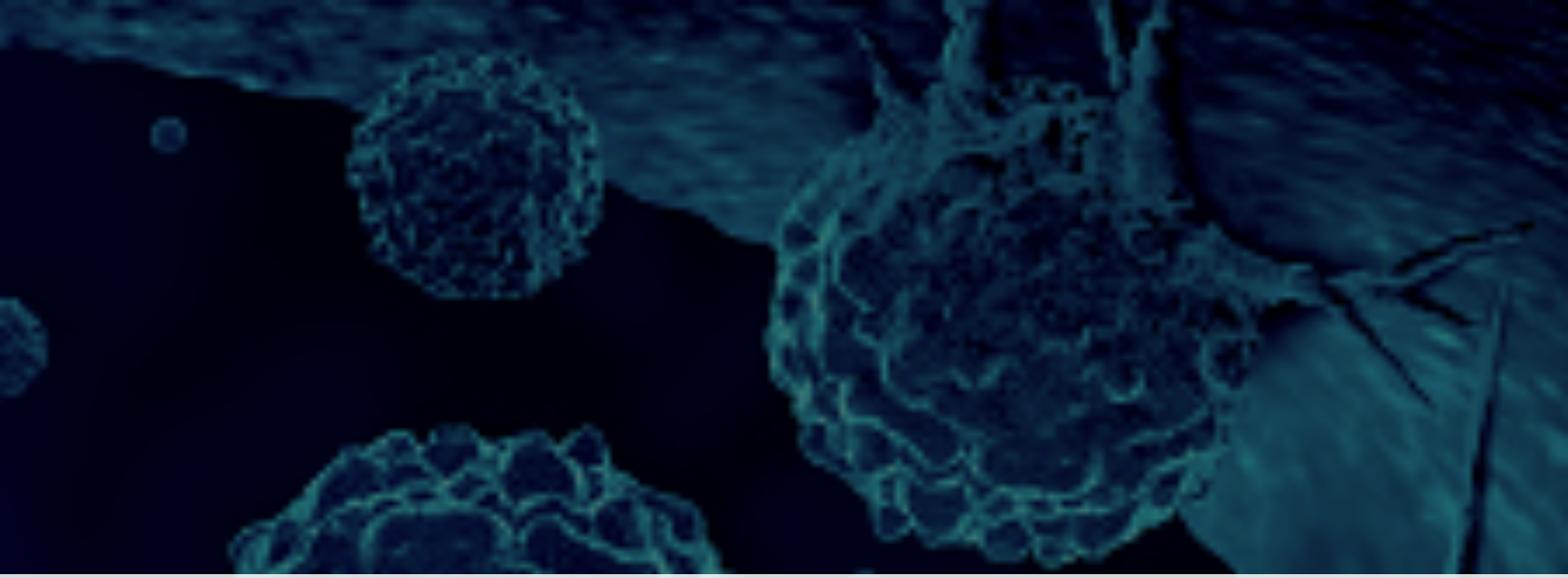
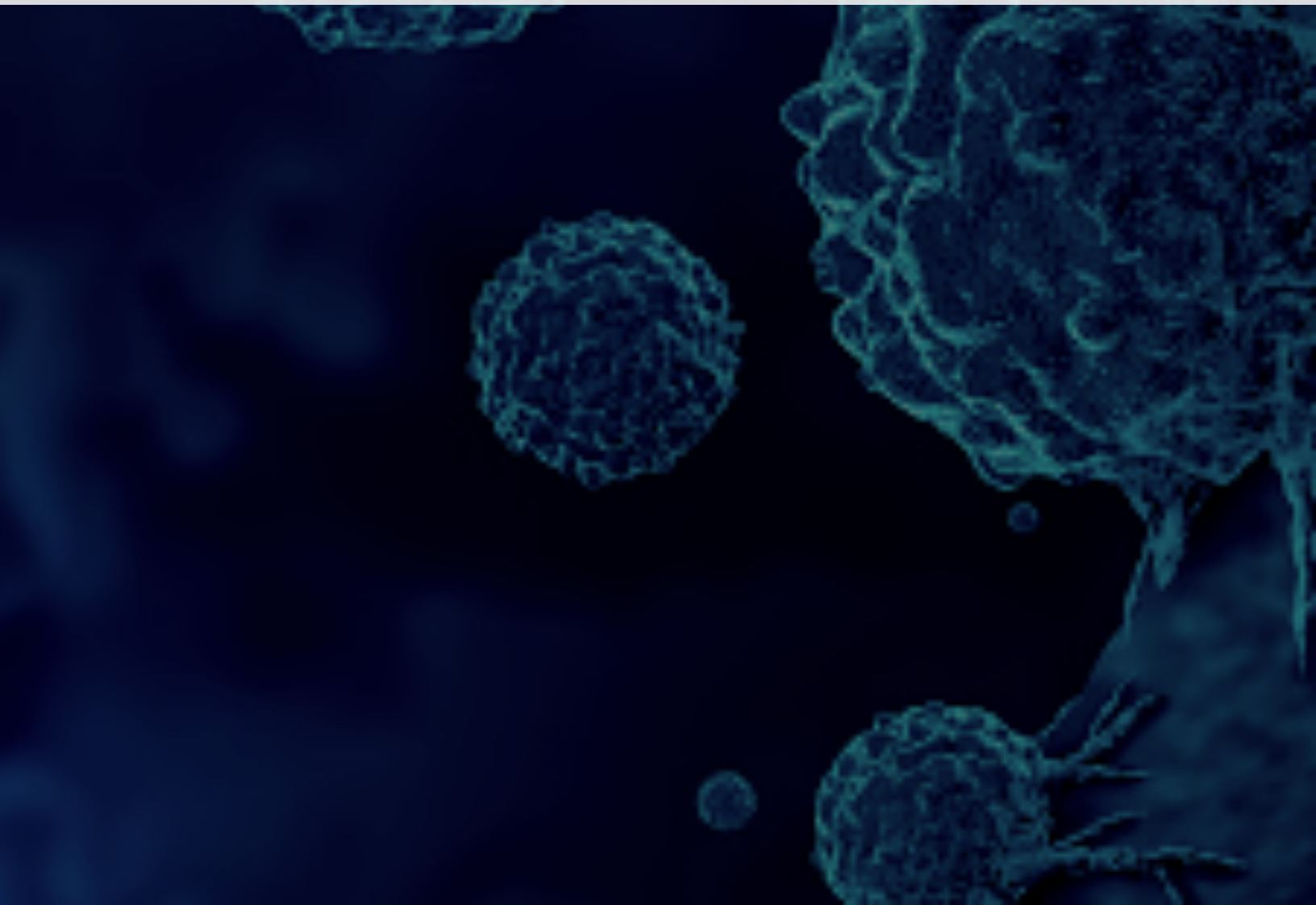


Improving Accessibility of Cancer Research



Introduction

Cancer is one of the largest human health problems faced globally. Therefore, it is an important focus of research for many disciplines. Cancer research has made significant advancements as clinicians and researchers have expanded their knowledge to better understand this complex disease. Throughout this semester we completed a community engagement learning (CEL) project with the Research Information Outreach Team (RIOT) team from the Canadian Cancer Society (CCS) to promote cancer research amongst adolescents and the general public. We completed blog posts for their website, along with promotional material for their Let's Talk Cancer (LTC) event and infographics for their social media channels. Blogs were designed to engage adolescents in cancer research and related careers. Promotional material was generated to attract high school students to the event, where they can engage in cancer-related workshops and learn about the emerging fields of cancer research. Lastly, infographics were created for a general audience to summarize research on common cancers.

Background

RIOT is an organization in London, ON, established in 2010, composed of cancer researchers/trainees, community volunteers and a local CCS representative. A primary obstacle in understanding cancer research is that information is not easily accessible to the general public because of the complexities of scientific research such as jargon and complicated concepts. Therefore, RIOT's primary objective is to spread awareness about advancements in the field of cancer research that is understandable by larger audiences. To do this, RIOT has been working on a variety of materials for the public to learn more about cancer including video interviews, events, social media postings, and educational blogs. The target audience for these materials includes

potential/current volunteers, donors, CCS community partners, individuals impacted by cancer and younger individuals interested in the cancer field.

Objectives

The main goal of our project was to provide informational blogs that convey information about cancer research in an easy-to-understand manner so that they can appeal to younger audiences. Through these blogs, we hope to raise awareness of the breadth of careers that exist within the field of cancer research and how they are progressing. The second goal of our project was to provide promotional material for the annual LTC event, a two-day symposium for high school students who are interested in cancer research. At this event, students are exposed to the interdisciplinary nature of cancer research and explore the different fields that work together to solve issues in cancer. There are also keynote speeches from cancer experts and workshops held by graduate students or clinicians. The last goal of our project was to bring awareness to a variety of common cancers in a concise way using infographics. With these deliverables, we hope to further close the gap between cancer research and the general public.

Methodological Approach

To address the first goal, blogs were broken down into main and sub-blogs. Based on literature review and previous blogs, our team decided to focus on the topic of pharmacology. The main blog introduced the field of pharmacology and how it relates to cancer research, whereas sub-blogs discussed the various careers one can pursue as a cancer researcher in pharmacology. Upon literature review, the topics chosen for the sub-blogs included pharmacist, toxicologist, pharmaceutical scientist and pharmacogenetics. Each sub-blog included what the field is, where it is headed, how it relates to cancer and the requirements you would need to pursue a career in that field. Logos were designed for each blog to fit in with the website theme. Our group also re-wrote

a blog on systems immunology so that it included accurate and credible information. To write our blogs, we looked at review articles and extracted the most important information to deliver to the audience. Our community partners also provided a Google drive, which contained blog guidelines and past logos to help us. We received edits from experts in the area and our community partners. This ensured accuracy and credibility and allowed for a community perspective on how understandable the blogs are for a lay audience, respectively. Overall, with the aid of literature review, community partners and experts, the blogs were completed and are in their final stages of review before publication.

To reach the second goal, our team promoted the LTC event through a 'Save the Date' poster. Additionally, a program schedule graphic was created to outline the times of keynote speakers and workshops. Finally, our group created workshop descriptions along with profiles for the keynote speakers. Workshop descriptions included the workshop leader(s), the concept of the workshop, and the activity planned. Profiles of the speakers and workshop leaders included their current position, educational background, and research interests. To retrieve information regarding their research interests, individuals were emailed. The Google drive included past material such as 'Save the Date' posters, program schedule and speaker profiles to give us an idea of how to structure our deliverables. We also created zoom backgrounds to be used at the event for both speakers and attendees. All deliverables were created using Canva and a general theme was designed based on other promotional material found online and previous RIOT examples. Multiple design themes were created and feedback was received from the RIOT team to improve graphics and ensure all the information needed was included. These deliverables will be published soon to promote the event.

To achieve our third goal, we created infographics regarding common cancers that RIOT has not already discussed. Through prior course knowledge and literature review, our team decided to focus on lung cancer, pancreatic cancer and ovarian cancer. Information on the infographics included: the subtypes within that specific cancer type, the statistics regarding incidence and mortality, risk factors, detection, prevention and treatment. To find this information, we utilized various scientific resources. We then condensed our research to summarize the main points and included definitions of any scientific terms so posts are easy to understand. For the design of the infographics, previous posts from RIOT's Instagram page and other infographics series were considered. The design was created using Canva and a general theme was maintained across posts so that they would be visually appealing and easy to identify as part of a series**.**

Deliverables

Our first deliverable was blog posts on the topic of pharmacology and logos that corresponded to each one (Appendix 1, 2). We also created an Instagram story post for each blog to promote them once they are published on the website (Appendix 3). Next, we completed promotional material for Let's Talk Cancer. This included the 'Save the Date', program schedule, speaker profiles, workshop summaries and zoom backgrounds (Appendix 4). Lastly, we created infographics on lung, ovarian and pancreatic cancer (Appendix 5).

Challenges

Throughout the project, we received many tasks from our community leaders so we had to plan accordingly. At times it was challenging to follow all the deadlines and keep track of our tasks. Efficient communication ensured we met deadlines, assigned responsibilities and split work evenly amongst ourselves. It was challenging to schedule regular meetings as other course

assignments and thesis work kept us busy, but we did our best to keep each other updated through group chats.

Every blog contained a section about the advancements related to cancer. A main goal of pharmacology-related cancer research is advancing personalized treatment options. Because we were writing each section individually, we did not realize that each member wrote about personalized medicine. This led to overlapping information in the final blogs. We initially thought the overlap tied the blogs together but instead, it appeared repetitive. To solve this, we brainstormed other areas we wanted to address and made the corresponding changes to the blogs. For example, instead of writing about personalized medicine in the main blog, we addressed another issue in cancer treatment which is overcoming therapeutic resistance.

Translating information from scientific articles into lay terms so that it can be understood by individuals with less scientific knowledge, is a difficult task. Furthermore, this content had to be concise (approximately 1-page) which created a larger challenge for us. It took multiple tries to simplify the information which required reading and editing the blogs several times. After overcoming these challenges, we believe we were able to produce final blogs that can be easily read and understood to benefit the target audience.

Benefits to our Community Partner

The overarching goal of RIOT is to bring awareness and maintain a clear message to the community regarding the progress and promise of cancer research. To advance this mission, we wrote educational blogs to act as a starting point for adolescents to learn about the integration of pharmacology within cancer research. They can learn about potential careers within pharmacology along with the educational requirements to work towards those careers. We placed an emphasis on

ensuring the content was accessible to students by embedding links from the CCS dictionary for complex terms in the blogs for easy access to definitions while reading. We took complex ideas such as bioinformatics and genomic technologies and introduced them in a simplified manner. Additionally, the LTC event is critical to spreading awareness about cancer research as it is geared towards educating high school students about topics such as medical imaging, and epidemiology. For this event, we provided promotional material to encourage students to attend. Furthermore, the infographics summarized important research pertaining to common cancers.

As a research-focused organization, RIOT aims to produce material that leads to a better understanding of cancer and basic science. We created reader-friendly infographics for lung, ovarian and pancreatic cancer by condensing information that was available online and adding definitions for difficult terms. These were developed to draw attention to important content in a visually appealing manner for viewers to learn the basics of these cancer types.

Another part of RIOT's mission is to convey messages through a variety of outlets to target audiences. To address this mission, we designed content to be shared on different platforms for viewing. The blogs will be available on the RIOT website while our infographics will be posted through Instagram. Lastly, the LTC promotional materials will be distributed through different social media platforms.

Future Studies

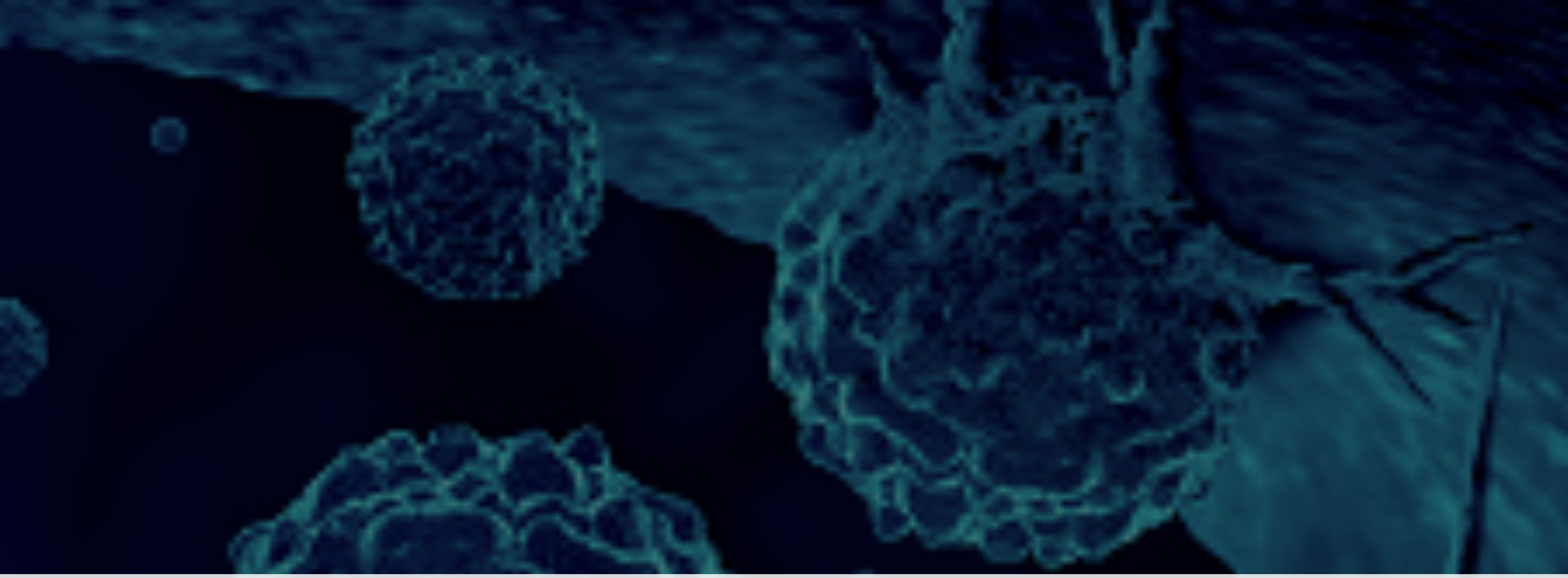
In the future, RIOT can continue to add to the existing blogs on their website to address other topics such as anatomy and pathology to build a valuable resource for viewers to explore. Another way to build on our CEL project would be to engage with a larger audience by potentially featuring content from RIOT London on the main CCS Instagram which has a greater

follower count. Additionally, RIOT could use TikTok, a rising social platform to produce engaging “day in the life” videos that captivate the minds of young adolescents who are at the start of their careers. RIOT could consider an LTC event that is not just restricted to high school students to involve more of the London community.

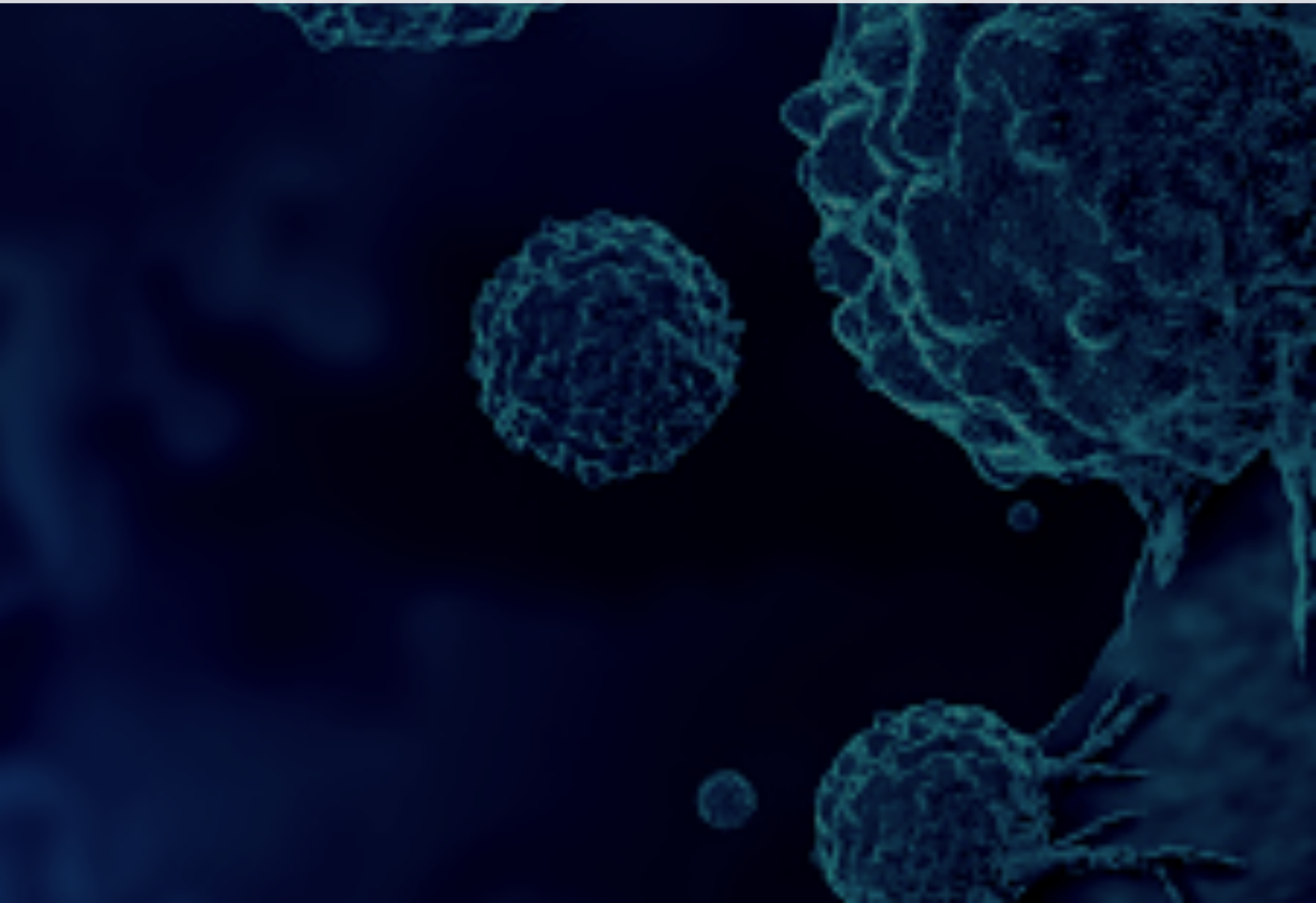
Summary

With cancer being a major healthcare problem, it is of great importance to educate and interest people in cancer research. With that in mind, the goals of both our CEL project and RIOT are to bring awareness to the public about cancer and educate them on the advancements in the field, as well as how they can get involved. These goals tie well with one of the main outcomes of Biochemistry 4455, which is the importance of cancer knowledge for both patients and the public. Overall, we believe that through the blogs, informational posts and supporting events organized by RIOT, we will achieve these goals and have a meaningful impact on the community.

Word Count: 1905



Appendix



Appendix 1: Blog Posts

Main Blog

LET'S TALK: PHARMACOLOGY!

Prescribing New Ideas for Cancer Research

How Does Pharmacology Relate to Cancer Research?

Pharmacology is the study of drugs and their effects on the body[1]. A drug is a molecule that interacts with cellular components in the body (i.e., proteins and cell receptors) to initiate its effects[2]. Cell receptors are found on the inside of the cell or on the surface of the cell and function when they receive a signal[3]. Pharmacology can involve studying the drug's journey in the body, as well as the drug's therapeutic and harmful effects on the body[1]. Harmful effects can include bleeding, high blood pressure, etc[4]. By studying these areas, it can help researchers develop new drugs to help patients fight their cancer[5]. Cancer is a complicated disease, which results from the genetic changes (i.e., mutations) of normal cells in our body[6]. These changes cause cancer cells to arise and keep growing, although a minority of normal cells can die[6]. Pharmacology can help cancer researchers create drugs that target these specific features of cancer cells[5]. This will help slow the patient's cancer progression and hopefully lengthen their life span[5].

What Jobs in Pharmacology Can you Pursue If You're Interested in Cancer Research?

There are a number of careers in the field of pharmacology that relate to cancer research. Take a look at our blog posts about:

Pharmacist
Pharmaceutical Scientist
Toxicologist
Pharmacogenetics

Where is Pharmacology Headed?

Traditional cancer therapy, such as chemotherapy, does not only affect cancer cells but normal cells too, which results in side effects that can be harsh to patients (6). Often, the treatment outcomes are poor due to those side effects and can cause more bad than good to the patient (5). Therefore, a main focus in research is to identify and target unique features of cancer cells that make them different from normal cells. This field is known as personalized medicine. Another problem that arises with cancer treatment is the concept of drug resistance. This is when cancer cells stop responding to a treatment, rendering the treatment ineffective and could lead to the continued spread of cancer (8, 9). A large part of current research is dedicated to understanding how drug resistance works and how cancer cells develop resistance (9). By focusing on topics such as personalized medicine and drug resistance, the field of pharmacology is improving the safety and effectiveness of cancer therapies.

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Pharmacogenetics

LET'S TALK: PHARMACOGENETICS!

What is pharmacogenetics?

Pharmacogenetics describes how genes can influence how well a drug works or how toxic it can be (1). Once a drug enters the body, the body attempts to break it down and/or eliminate it. There are also drugs, known as prodrugs, that have no activity until they are modified by chemical reactions in the body. Proteins are the machinery responsible for breaking down and modifying these drugs. The instructions to make each protein are encoded by a gene. People naturally have variations in genes, and as a result, some proteins will work differently from person to person (2). Through understanding these differences, doctors can prescribe cancer therapies that are personalized to each patient. Understanding the body's response to a drug is especially important in cancer therapies, as there is often a narrow range of doses where the treatment is both effective and avoids severe adverse effects (1). Accounting for a patient's genetic makeup can help to reduce drug toxicity or determine the optimal dose of a drug while improving the care of the patient (1).

What does it take to work in pharmacogenetics?

Studying pharmacogenetics can lead to a career in research. An undergraduate degree in pharmacology, genetics or a combination is one point of entry. To further research opportunities, it would be beneficial to complete a Master's degree or PhD in pharmacogenetics. Areas of study could include identifying the natural variations that exist between people and the effects of these variations on the breakdown or modification of specific drugs, developing tests to easily and cost-effectively detect these variations, understanding specific patterns of cancers and developing treatments based on these patterns (3). A researcher in the field of pharmacogenetics can interpret genetic testing results, investigate and understand the functions and variations that exist in genes and apply this knowledge to discern the effects of drugs in the body. It is important to have an interest in pharmacology (the study of drugs) and genetics (the study of genes) and gain experience in these topics. Further, understanding fundamental concepts in chemistry, biology and biochemistry is essential.

Where is the field of pharmacogenetics heading?

Research in the pharmacogenetic field contributes to the field of personalized medicine, an approach that takes into account information about a person's own unique background (such as genes or lifestyle) to prevent, diagnose or treat a disease. With advancements in personalized medicine, different cancers can be targeted more specifically to ensure a better quality of life for patients. Using pharmacogenetics, there will be a greater understanding of how certain medication reacts depending on specific genes. As more genetic variations are understood, more therapies can be optimized to better the livelihood of patients (2).

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Pharmaceutical Scientists

LET'S TALK: PHARMACEUTICAL SCIENTISTS

What Are Pharmaceutical Scientists?

Pharmaceutical scientists are individuals who perform various experiments related to drug discovery research in hopes of developing new drugs[1]. They mainly work in laboratories and can collaborate with other members of the team to develop and test these drugs[2]. The experiments they perform primarily involve using cell culture models first and then animal models in order to test the drug's function, side effects, as well as its safety and effectiveness[2]. Pharmaceutical scientists can then collect and analyze the data they receive from these experiments and if the results seem promising, they can translate that data into human studies, such as clinical trials[2]. If the trials are successful, the new drug can be approved for clinical use to improve the effectiveness of current therapies and provide patients with a better quality of life by decreasing the size of their tumours and alleviating some of their symptoms[3]. Pharmaceutical scientists are often employed by pharmaceutical and biotechnology companies but can also work in universities, research facilities, government agencies such as Health Canada, among many others[4].

What Does It Take to Be a Pharmaceutical Scientist?

Pharmaceutical scientists often hold an undergraduate degree in pharmaceutical science or in a related area of study[4]. This degree can lead to careers in drug analysis and drug manufacturing, but most pharmaceutical scientists obtain a graduate degree to pursue a career in drug development[4]. They can undertake a master's degree in pharmaceutical science or pharmacology, with some even pursuing a PhD degree[4]. Pharmaceutical scientists can also benefit from an internship placement, which can be a requirement of their undergraduate program[4]. This will allow them to gain extensive research and laboratory experience, which can be valuable when applying for graduate school[4].

Where Is the Field of Pharmaceutical Science Heading?

Genomic technologies are used to analyze an individual's genomic information, which encompasses all the genes in their body[5]. New genomic technologies are rapidly being developed, which can open new possibilities for pharmaceutical scientists to further expand their research and knowledge[5]. For example, bioinformatics can be used to investigate the specific genetic changes in a certain patient's cancer[5]. This can allow pharmaceutical scientists to develop new biotechnology-based drugs based on these genetic changes[5]. For more information about how genetics can be incorporated with drug development, see our blog on pharmacogenetics.

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Pharmacist

LET'S TALK: PHARMACIST

What is a pharmacist?

Pharmacists are health care professionals who are trained to prepare and give out prescription drugs and medical equipment (1). They are also involved in the prevention and education of diseases. Some of their responsibilities include checking prescriptions for appropriate dosages (https://cancer.ca/en/cancer-information/resources/glossary/d/dose), measuring and mixing drugs, and maintaining medication profiles for patients (2). Initially, pharmacists only prepared and supplied drugs but over time, their role has become more integrated into the healthcare team (3). They act as a bridge between the doctor and patients to promote safe and effective use of drugs by providing consultation to patients and healthcare providers (2). Pharmacists are one of the most accessible health care professionals because they are easier to visit; therefore they can be seen as the point of primary care. They can provide advice on side effects, drug interactions with food, and safe dosages (4). Pharmacists can focus on gaining education in cancer treatments to play an important role in cancer care teams as oncology pharmacists. Since cancer patients will often be prescribed drug treatments such as chemotherapy, pharmacists can provide advice on initial treatment decisions and management through the course of the disease (5). They can work in a variety of different areas such as hospital and retail pharmacies, industrial settings or government departments (2).

What does it take to become a pharmacist?

In order to become a pharmacist, a Doctor of Pharmacy (PharmD) degree can be completed. There are different ways to go about acquiring this degree and admission requirements can differ depending on the school. In general, university-level courses in subjects such as biology, chemistry, math, biochemistry and more can be completed in an undergraduate program to develop a strong background. Once in pharmacy school, students have the opportunity to do a combination of coursework, laboratory experience, and experiential rotations in the community, hospital or other settings. After completing the degree, an examination can be done through the Pharmacy Examining Board of Canada (PEBC). Then, more hands-on experience can be acquired through an internship or apprenticeship to become a licensed pharmacist (6).

Where is the field of pharmacy headed?

The importance of pharmacy continues to grow as countries are encouraging greater involvement of pharmacists in the primary care team (4). In Ontario, it has been shown that including pharmacists in these teams is improving medication consultation, reducing visits to the emergency room, and saving health system costs (4). By having pharmacists in the primary care team for cancer patients, it allows them to better support other health care professionals and improve patient experiences (4). Advances in technology are freeing up pharmacists from simply preparing drugs to allow them to gain training in direct patient care (5). Pharmacists are receiving the opportunity

to provide their expertise at the bedside and in the clinic during treatment decisions (5). As we progress towards a more collaborative health care team, cancer pharmacists can educate other health care providers regarding safety and administration of cancer drugs (5). Cancer patients encounter many obstacles such as expensive treatments, shortages in medications and having to deal with many side effects from the drugs (5). As a result, cancer pharmacists can provide insight important to determining the best direction for care to improve quality of life for these patients (5).

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Toxicologist

LET'S TALK: TOXICOLOGIST

What is a toxicologist?

Toxicology is a field of science that deals with understanding what the harmful effects of chemicals are to people, animals, and the environment, as well as how these effects take place (1). It is known as "Science of Safety" because it focuses on evaluating the safety of compounds (1). A toxicologist is a scientist who aims to understand the processes and the responses to certain chemicals and what dosages can be safe or harmful (2). There are many sub-categories of toxicology such as those that focus on reproduction, development, and the immune system (2). In the pharmaceutical industry, a toxicologist can be hired to assess the safety of a drug prior to human trials (1). Toxicologists are also commonly employed by academic institutions, the government for regulatory agencies, as a consultant, or in research (2). Toxicology research is involved in understanding the causes for cancer by investigating how certain chemicals damage cells and lead to the development of cancer (3). In addition to this, toxicologists evaluate how toxic cancer drugs are to cancer cells. Further, toxicologists evaluate the safety of anti-cancer drugs and investigate possible side effects they may have on patients (3, 1).

What does it take to become a toxicologist?

A toxicologist is a scientist who has a strong foundation in multiple disciplines such as biology and chemistry (1). Enrolling in an undergraduate program in toxicology is one option, but a major in biology or chemistry with additional courses in biochemistry, molecular biology, physiology, and physics or statistics will also provide a background to enter the field of toxicology. Admission into a graduate toxicology program requires a bachelor's degree in biology or chemistry with advanced knowledge of organic chemistry. Obtaining a Master's and a PhD degree is often beneficial for a career in toxicology. After obtaining a doctoral degree in either toxicology or biomedical sciences, one can pursue postdoctoral training which involves 2-3 years of work in a toxicology laboratory. This step is necessary for most academic and research positions. There are many government- or industry-sponsored programs that employ toxicologists to complete their postdoctoral training (2). Mature careers may be in the fields of research, product safety evaluation, teaching/education, improvement in public service, laws and regulations concerning drugs, and in consulting (2).

Where is the field of toxicology headed?

An important branch of toxicology is predictive toxicology which involves predicting the toxicological effects of a drug or compound using non-animal testing methods. Machine learning is a method that uses computer simulations to predict the response to a chemical. This method has applications in predictive toxicology and advancements in technology allow better prediction of how people respond to drugs. This can be beneficial because it will minimize the risk of side effects that people could experience once the drug has reached the market (4). Machine learning can be used to predict the response and side effects to cancer treatments, which will help identify the most

appropriate therapy for the patient (5). The genes of an individual play a crucial role in the response to drugs (6). Therefore, combining toxicology, machine learning, and pharmacogenetics, which is another sub-field of pharmacology, will lead to a more accurate prediction of the treatment outcome.

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Systems Immunology

LET'S TALK: SYSTEMS IMMUNOLOGY

What is systems immunology?

Systems immunology is a subdiscipline in systems biology, a scientific approach to understand systems as a whole rather than in separate parts. In this field, systems immunology scientists use large-scale strategies to understand complex interactions within the immune system and how they work together. The immune system is made up of a lot of individual parts such as immune cells and cytokines. Instead, systems immunology aims to study all the individual parts together and how they interconnect to help protect our body against diseases. Systems immunology is a new way by which we can understand human immunity at a holistic level and figure out ways to take advantage of the immune system to fight diseases such as cancer. Individuals in this field work with a wide variety of advanced technologies to analyze genetics of the immune cells and the proteins involved. More specifically, they can analyze the changes that happen when a person develops cancer. By understanding these changes, system immunologists can provide unique insight into immune therapies. These therapies can use parts of the immune system and help them to target and kill the cancer cells (1).

What does it take to be a systems immunologist?

By studying systems immunology, a career in research can be pursued. A strong background in immunology and other basic medical sciences is useful for this area of research. This background can be acquired with an undergraduate degree in immunology or a related medical sciences field (e.g. biochemistry and molecular cell biology) followed by a graduate degree (master's and/or doctorate). For a graduate degree, the research specialty could be immunology. There is also research that focuses on cancer systems immunology to learn about the relationship between cancer and immunology. In this program, students learn about immune interactions and its relationship to other organ systems (2). In addition, it is useful to be experienced in mathematical and computational methods because systems immunologists will typically use different technologies to analyze immune networks and work with large amounts of data (1).

Where is the field of systems immunology heading?

While there is a solid foundation to systems immunology, there are still many areas that can be improved upon. Currently, better models of research are being developed to translate research from animals, like mice, to humans. Using systems immunology and these models to understand a complex disease like cancer will provide researchers with better information that could support cancer research. Areas in cancer research that have struggled in the past such as cancer vaccine development can benefit from the research in systems immunology (1). There are also new technological and computational advances for large scale data analysis to better understand the interactions within the immune system (2). As the field advances, systems immunologists can provide tools to clinicians that integrate a large amount of information to make appropriate

decisions for cancer patients. Overall, the immune system is designed to help the body and by learning more about it, medical practices and diagnostic tools can be improved to better serve cancer patients (1).

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Appendix 2: Blog logos


pharmaceutical scientist
R.I.O.T.
Research Information Outreach Team


pharmacist
R.I.O.T.
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pharmacogenetics
R.I.O.T.
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toxicologist
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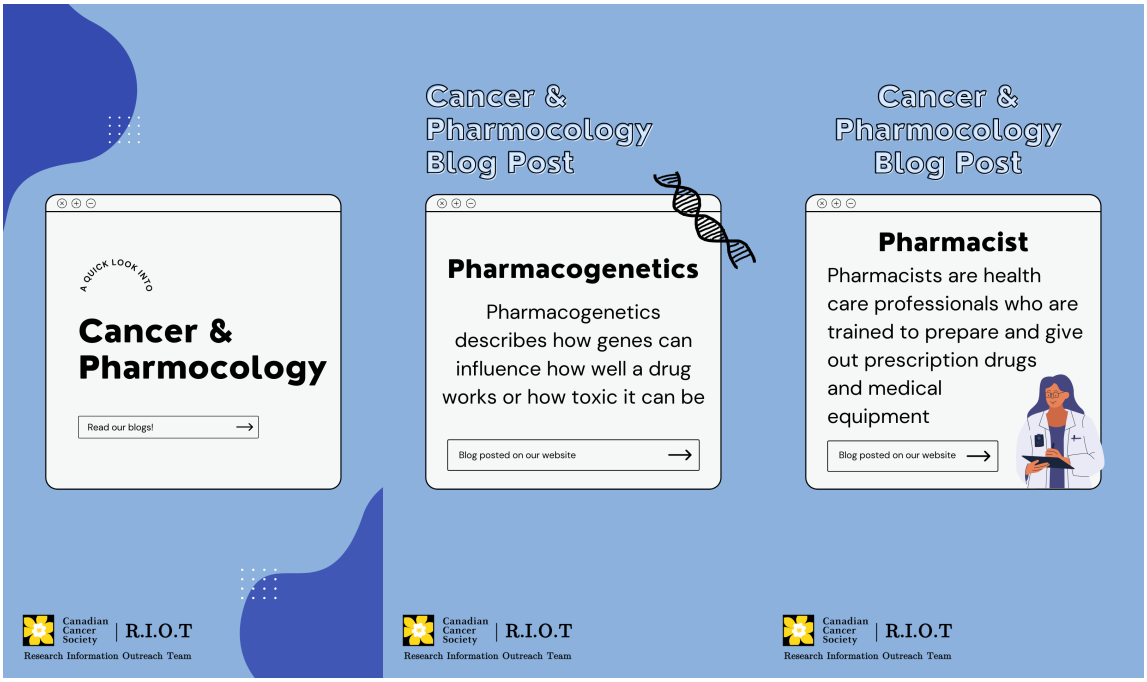
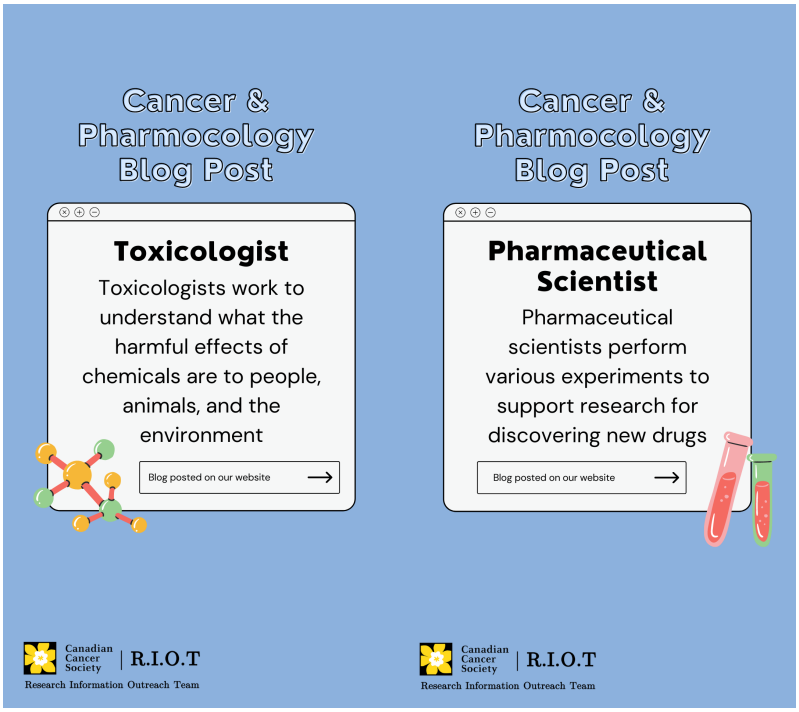
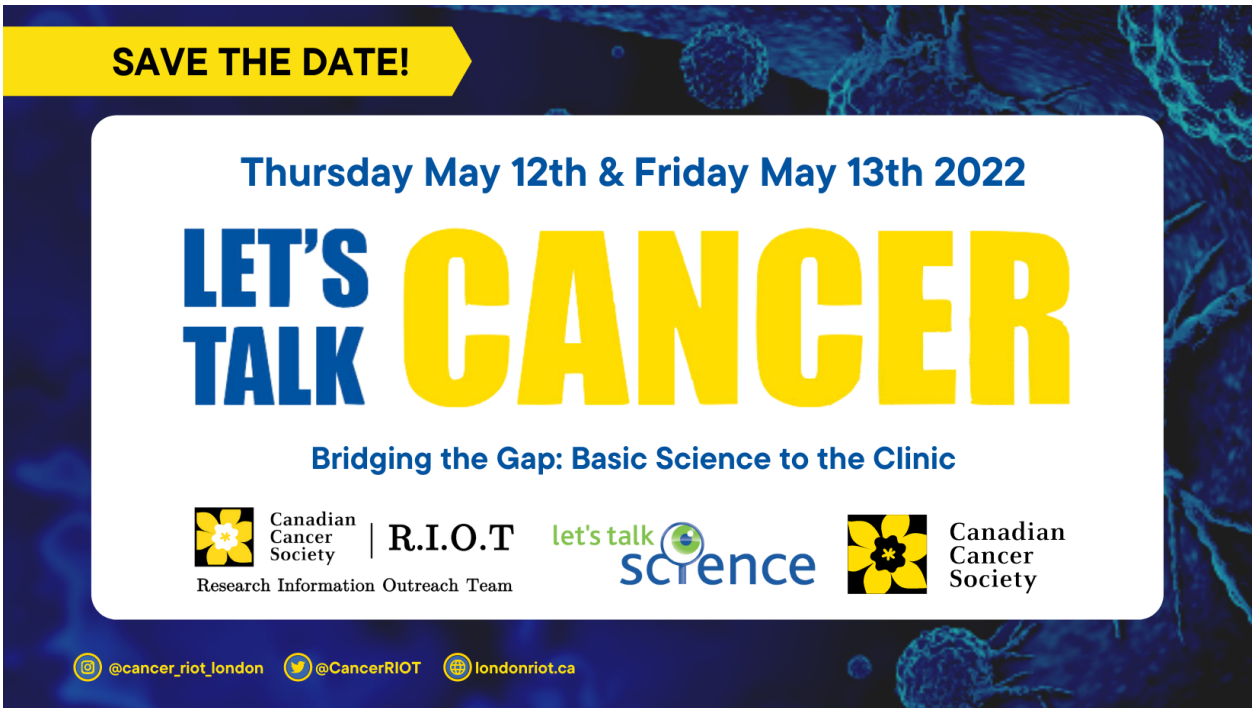
Appendix 3: Blog promotion instagram stories



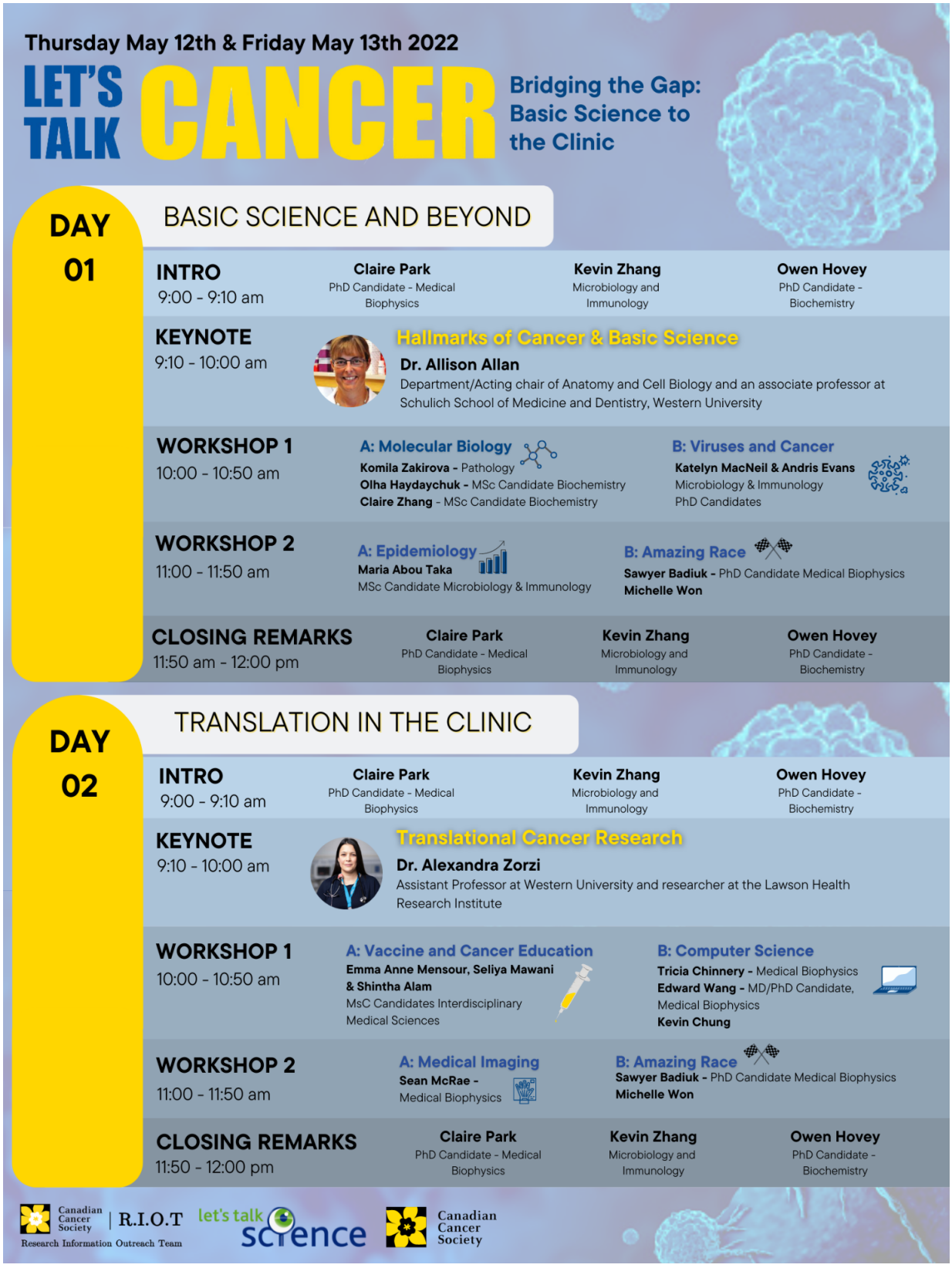


Appendix 4: LTC Promotional Material

Save the Date



Program Schedule



Speaker Introductions

LET'S TALK CANCER

DAY 2 SPEAKER

MAY 13 2022

TRANSLATIONAL CANCER RESEARCH

Dr. Alexandra Zorzi, MD

Dr. Alexandra Zorzi joined the Department of Paediatrics as a pediatric hematologist/oncologist at the Children's Hospital London Health Sciences in April 2013. She is currently an Assistant Professor at Western University and researcher at the Lawson Health Research Institute.

Education: Dr. Zorzi received her Honours Bachelor of Science degree at the University of Toronto and obtained her medical degree from the Schulich School of Medicine and Dentistry at Western University. She completed her pediatric residency at the University of British Columbia and obtained certification in Pediatrics. She then completed a subspecialty residency in paediatric haematology/oncology at the Hospital for Sick Children. Dr. Zorzi is pursuing a Master's of Science degree at Western University in the Division of Physiology and Pharmacology.

Research Interest: Focused on the pharmacogenomics of chemotherapeutic agents, more specifically chemotherapy-related toxicity and developmental therapeutics for childhood cancer patients..

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LET'S TALK CANCER

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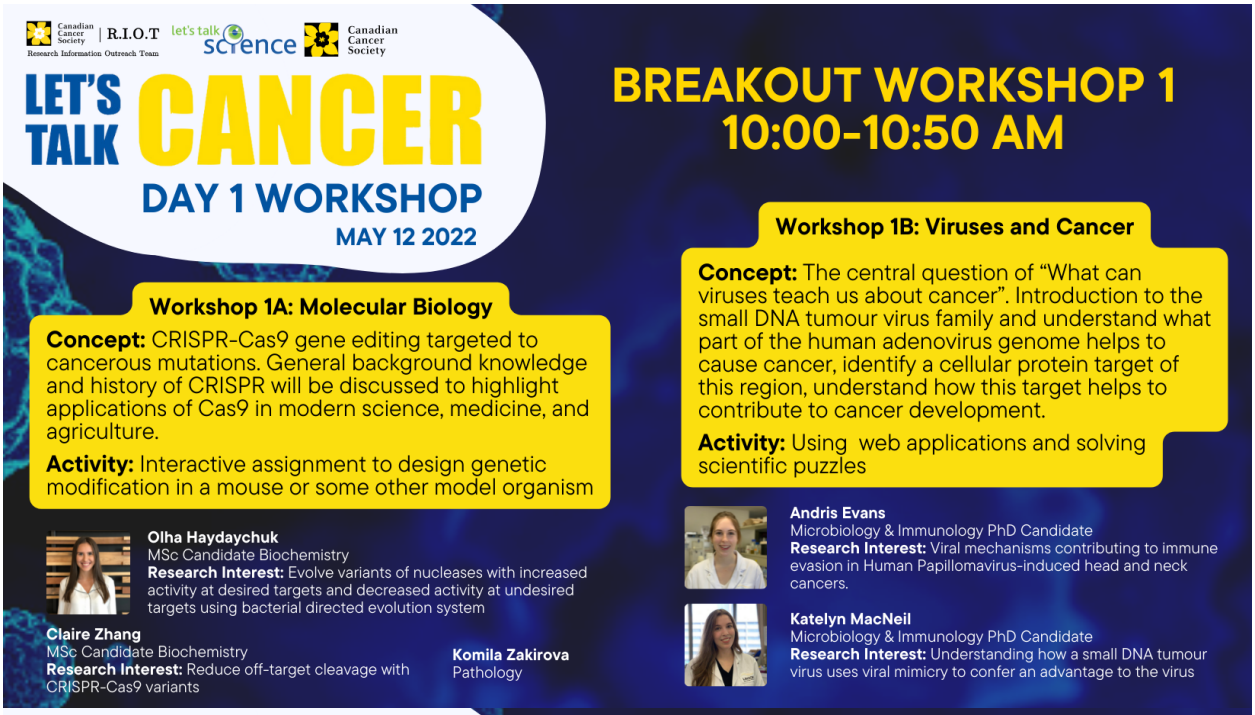
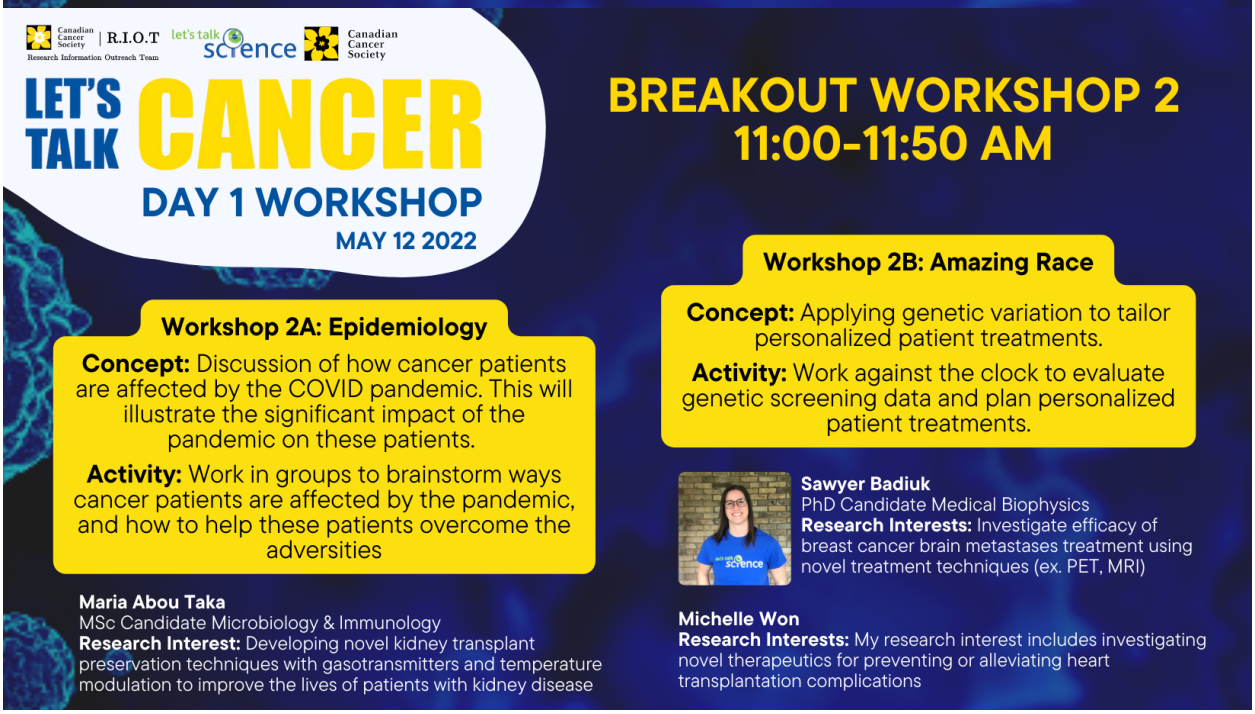
Workshop Information





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LET'S TALK CANCER

DAY 2 WORKSHOP

MAY 13 2022

BREAKOUT WORKSHOP 1
10:00-10:50 AM

Workshop 1A: Vaccine and Cancer Education

Concept: A workshop aimed at teaching students how vaccines work and the importance of the HPV vaccine (a vaccine of great importance for adolescents) and its relation to cervical cancer

Activity: Spin the wheel to answer questions and bingo

Emma Anne Mensour
MSc Candidate Interdisciplinary Medical Sciences
Research Interest: Examining health disparities in cervical cancer outcomes among Indigenous women in Canada.

Shintha Alam
MSc Candidate Interdisciplinary Medical Sciences
Research Interest: Investigating health disparities in cervical cancer in Indigenous populations in Canada

Seliya Mawani
MSc Candidate Interdisciplinary Medical Sciences

Workshop 1B: Computer Science

Concept: Medical imaging and machine learning. Follow along-type interactive coding component using MATLAB.

Activity: Fill-in-the-blanks in the code provided, while answering questions

Tricia Chinnery
Medical Biophysics
Research Interest: Extract image info from CTs of oropharyngeal cancer patients to predict patient outcomes

Edward Wang
MD/PhD Candidate, Medical Biophysics
Research Interest: Using machine learning techniques to study outcomes in patients who receive radiation treatment for cancer

Kevin Chung
Microbiology & Immunology PhD Candidate
Research Interest: Simplyfying diagnostic imaging for stroke patients

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LET'S TALK CANCER

DAY 2 WORKSHOP

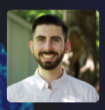
MAY 13 2022

BREAKOUT WORKSHOP 2
11:00-11:50 AM

Workshop 2A: Medical Imaging

Concept: Basic physics principles behind medical imaging. Cover the issues with access to scans, the risks associated for patients, and the research that is being conducted to help overcome them.

Activity: Brainstorm issues with accessibility of medical imaging. Quiz/kahoot activity to identify what kind of image they are looking at



Sean McRae
MSc Candidate Medical Biophysics
Research Interest: Molecular imaging, MRI reporter genes, paramagnetic contrast agents

Workshop 2B: Amazing Race

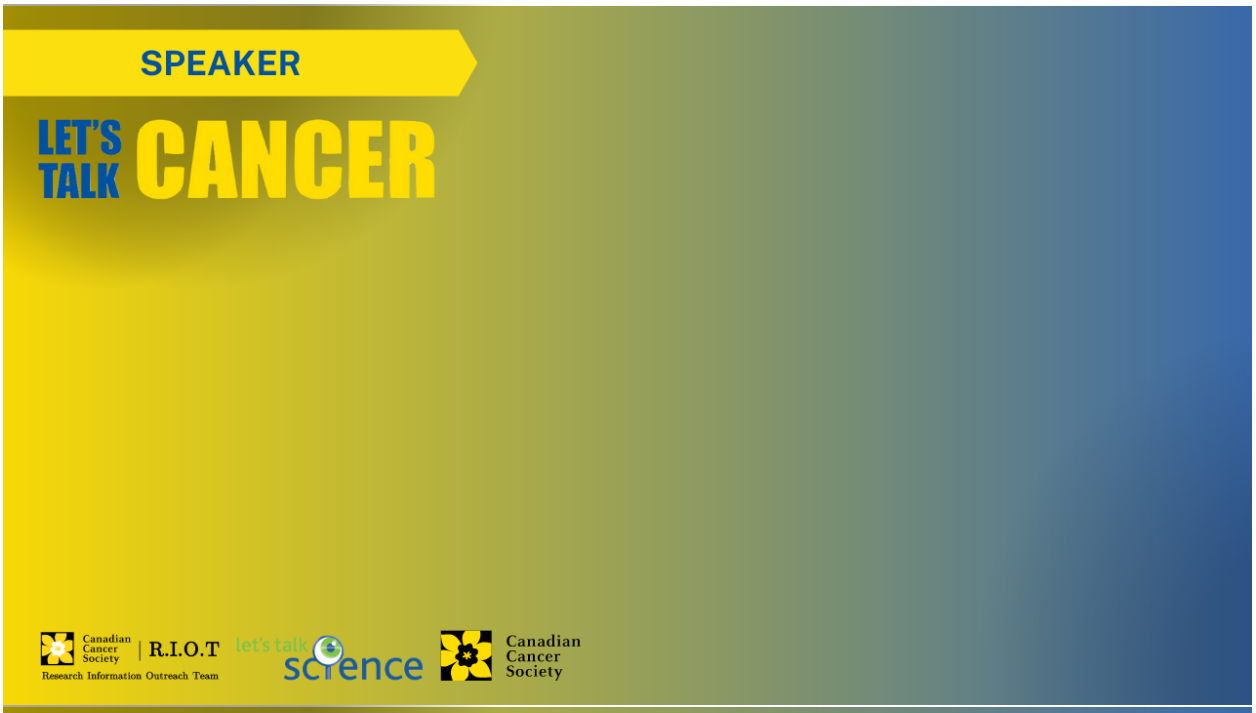
Concept: Applying genetic variation to tailor personalized patient treatments.

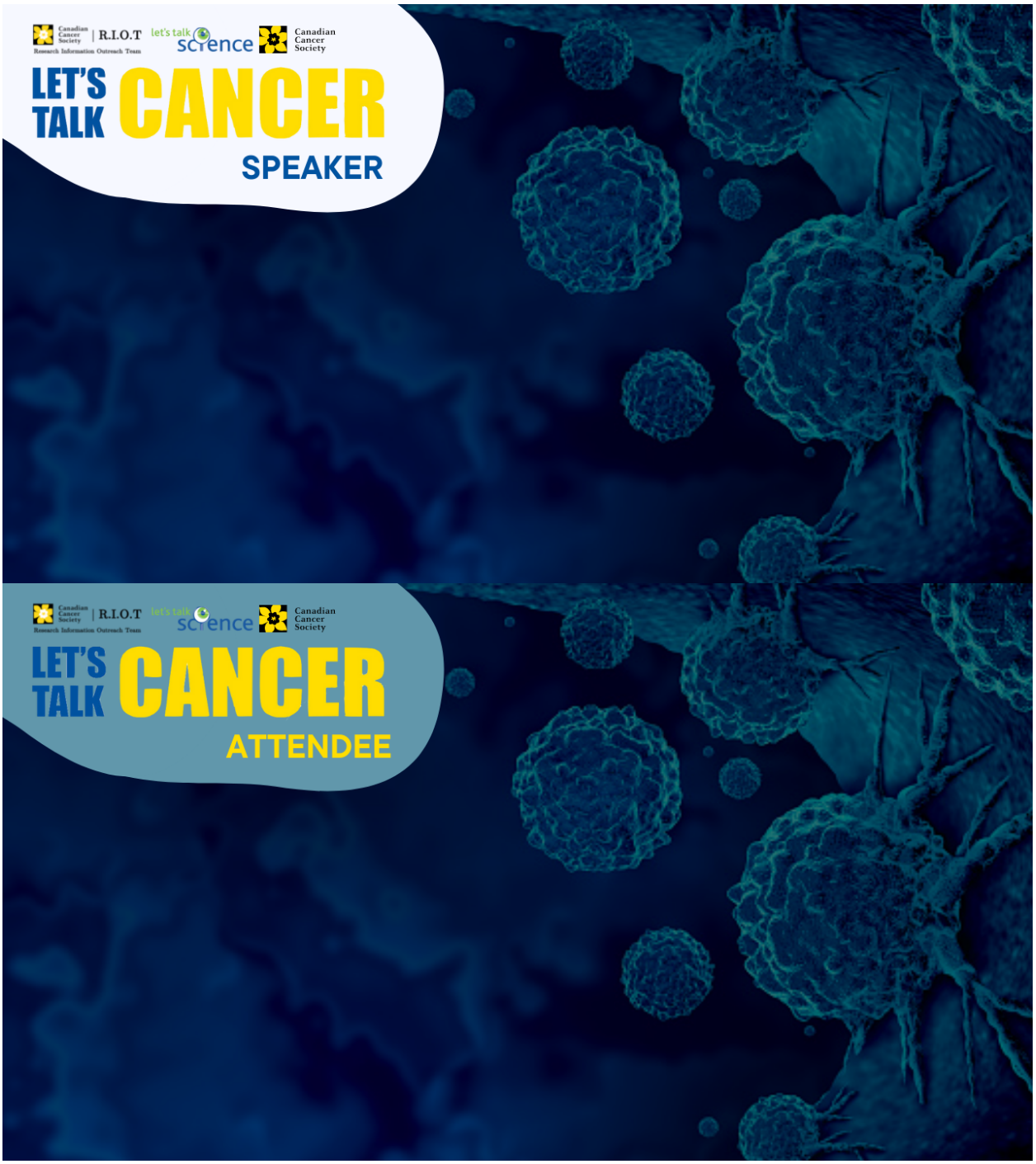
Activity: Work against the clock to evaluate genetic screening data and plan personalized patient treatments.

Sawyer Badiuk
PhD Candidate Medical Biophysics
Research Interests: Investigate efficacy of breast cancer brain metastases treatment using novel treatment techniques (ex. PET, MRI)

Michelle Won
Research Interests: My research interest includes investigating novel therapeutics for preventing or alleviating heart transplantation complications

Zoom Backgrounds

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SPEAKER
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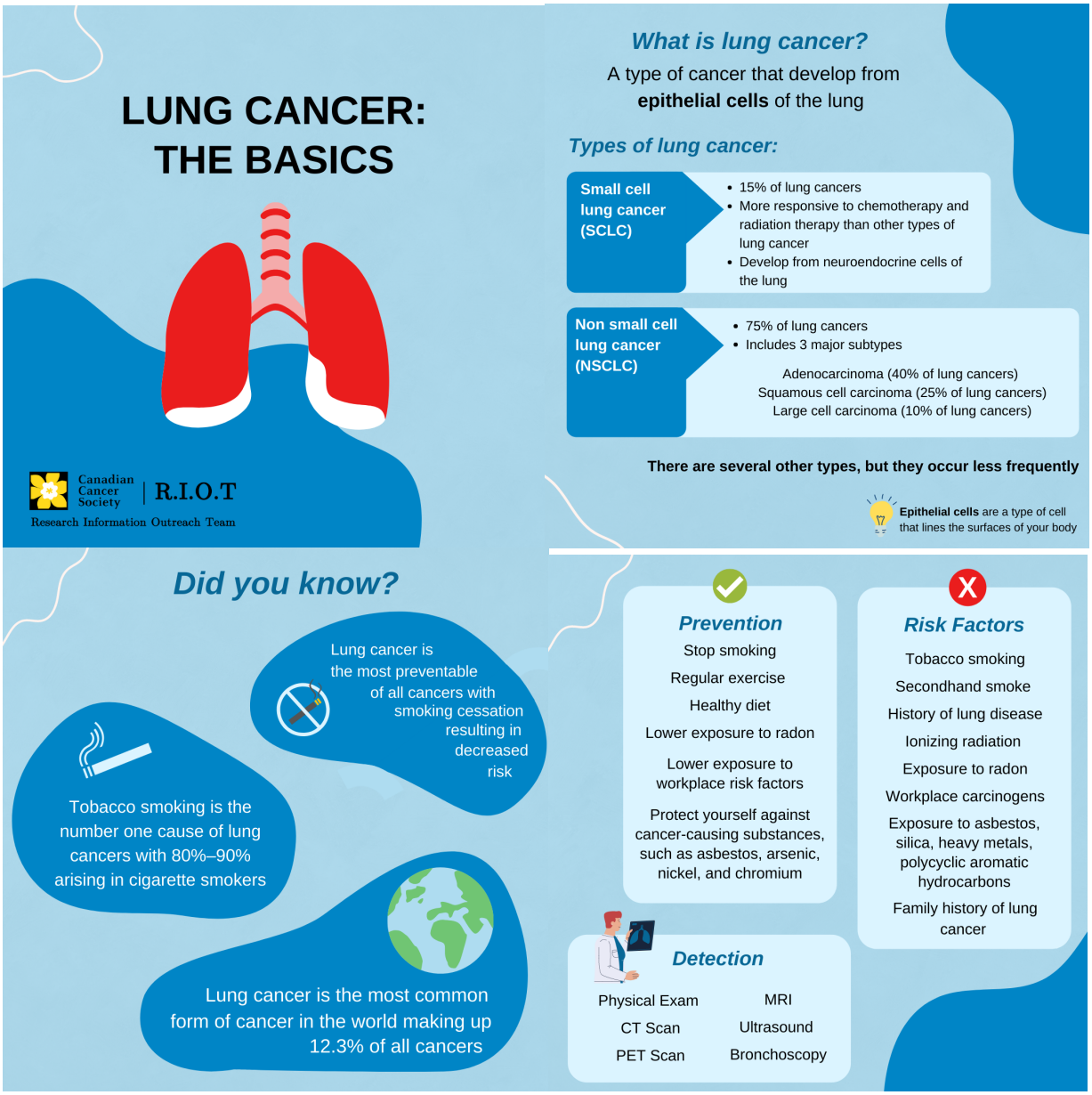
ATTENDEE

Appendix 5: Infographics



Treatment

Radiation Therapy
External: Machine outside the body sends radiation towards the site of the tumor
Internal: radioactive substances sealed in needles, wires, catheters or seeds are placed directly into the tumor

Surgery
Tumor is surgically removed, including a small portion of the surrounding tissue

Chemotherapy
Use of drugs to stop the growth of the cancer cells or directly kill them.

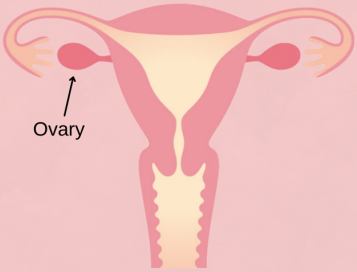
Immunotherapy
Substances are used to boost, restore, or direct the immune system against the cancer cells

Laser Therapy
Treatment that uses a narrow beam of intense light to kill the cells

References

1. https://www.cancer.gov/types/lung/patient/small-cell-lung-treatment-pdq
2. https://www.cancer.gov/types/lung/patient/non-small-cell-lung-treatment-pdq
3. https://www.cell.com/action/showPdf?pii=S1535-6108%2802%2900027-2
4. https://cancer.ca/en/cancer-information/cancer-types/lung/risks
5. https://cancer.ca/en/cancer-information/cancer-types/lung/diagnosis
6. https://www.cancer.gov

OVARIAN CANCER: THE BASICS



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What is ovarian cancer?

Cancer that develops in the ovaries

Types of ovarian cancer:

Depends on the tissue they develop from

Epithelial ovarian cancer
- 85-95% of ovarian cancer cases originate from epithelial cells
- Usually occur in women older than 50 years

Stromal cell tumour
- 5-8% percent of ovarian cancer cases originate from stromal cells
- Occurs in women of any age

Germ cell tumour
- 3-5% of ovarian cancer cases originate from germ cells
- Usually occur in females that are 15 to 19 years of age

Epithelial cells are a type of cell that lines the surfaces of your body
Stromal cells are connective tissue cells of any organ
Germ cells are reproductive cells of the body

Did you know?

Most cases occur in women older than 50 years but the diagnosis may be made at any age

Women who have a family history of ovarian cancer are at an increased risk of ovarian cancer

Ovarian cancer is the fifth most common cause of cancer death among women worldwide and leading cause of death from gynecological cancers

Prevention

Prophylactic bilateral salpingo-oophorectomy (BSO): removal of both the ovaries and fallopian tube lowers the risk of developing cancer

Oral contraceptives

Giving birth

Breastfeeding

Women who breastfeed for at least 8 to 10 months have the greatest decrease in risk of ovarian cancer.

Risk Factors

Family history of ovarian cancer

BRCA1/2 (a breast cancer gene) mutations

Lynch syndrome

Family or personal history of breast cancer

Endometriosis

Detection

Physical Exam
Pelvic and rectal exam to check uterus, vagina, ovaries, fallopian tube, bladder & rectum for unusual changes

Tumour Markers
Check levels of certain proteins related to ovarian cancer in the blood, tissues or fluids

Pelvic or Transvaginal Ultrasound
Find tumour, evaluate size and shape of the ovary and any abnormalities

CT Scans
Examine pelvis, abdomen, and lymph nodes around ovaries

Genetic Testing
Look for mutations in genes associated with ovarian cancer (ex. BRCA1/2)

Treatment

Ovarian Epithelial Cancer

Surgery
Removal of the uterus, sometimes the cervix or removal of the ovary and the fallopian tube

Chemotherapy
Use a combination of 2-3 drugs every 3-4 weeks

Targeted therapy
Drugs that target specific molecules and sometimes used in specific cases

Olaparib: Given to patients with a BRCA1 or BRCA2 mutation

Stromal Cell Tumour

Surgery
Same strategies as ovarian epithelial cancer

Chemotherapy
Common for stage 2-4 tumours and uses combinations of drugs

Hormonal Therapy
Offered to patients after surgery who cannot tolerate chemotherapy due to side effects or other health issues

Germ Cell Tumour

Surgery
Same strategies as ovarian epithelial cancer

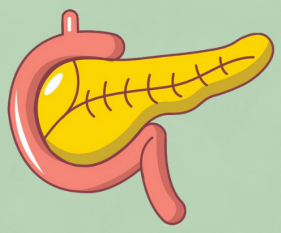
Chemotherapy
Combination of drugs

Radiation therapy
Used for certain types of germ cell tumours

References

1. https://www.cancer.gov/types/ovarian/patient/ovarian-epithelial-treatment-pdq
2. https://cancer.ca/en/cancer-information/cancer-types/ovarian/diagnosis
3. https://www.cancer.gov/types/ovarian/patient/ovarian-prevention-pdq
4. https://cancer.ca/en/cancer-information/cancer-types/ovarian/treatment

PANCREATIC CANCER: THE BASICS



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What is pancreatic cancer?

Cancer that develops in the pancreas

Types of pancreatic cancer:

2 main types

Adenocarcinoma

- 85% of all pancreatic cancers
- Develop from exocrine cells in the pancreas
- More common and usually found in the advances stage

Pancreatic Endocrine Tumours

- Make up for less than 5% of all cases
- Develop from neuroendocrine cells (islet cells) in the pancreas
- Have a better prognosis

Exocrine cells produce special proteins called enzymes in the pancreas
Islet cells are a cluster of cells found in the pancreas

Did you know?

Pancreatic cancer is difficult to diagnose early and currently no standard early detection tool available

Pancreatic cancer remains one of the most deadly common cancer types with the Mortality/Incidence ratio at 98%

The incidence and mortality of pancreatic cancer is slightly more common in men then in women

Prevention

Reduce alcohol use

Maintain a healthy weight

Diet high in fruits and vegetables

Regular exercise

Quit Smoking

It has been estimated that about 30% of pancreatic cancers could be prevented by prevention of smoking

Risk Factors

Tobacco use

Obesity

Family history of pancreatic cancer

Chronic pancreatitis

Detection

Physical Exam
Check skin and whites of the eye for jaundice and feel abdomen for lumps or swelling

Tumour Markers
Check levels of certain proteins related to pancreatic cancer in the blood, tissues or fluids

Magnetic resonance cholangiopancreatography (MRCP)
Special type of MRI to produce images of the pancreas and pancreatic duct

CT Scans
Find tumour and its size and if it's spread to nearby organs and tissues

Endoscopic ultrasound (EUS)
Passed into first part of small intestine to take pictures find small tumours, and collect tissue samples

Treatment

Surgery

- **Whipple procedure:** Head of the pancreas, the gallbladder, part of the stomach, part of small intestine, and bile duct removed
- **Total pancreatectomy:** Removal of the whole pancreas, part of stomach, part of small intestine, common bile duct, gallbladder, spleen, and nearby lymph nodes
- **Distal pancreatectomy:** removal of the body and tail of the pancreas

Targeted Therapy

- Molecules that bind a stop the action of specific proteins
- Erlotinib is used for pancreatic cancer

Radiation Therapy

- Sends radiation to tumour to kill cancer cells

Chemotherapy

- Use of drugs to stop the growth of the cancer cells or directly kill them

References

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5124974/pdf/WJG-22-9694.pdf
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