



MEDIC MAGAZINE

UBC BIOMOD

**An interview with
one of the top design
teams at UBC**

Tuberculosis

**A disease of the past
makes its presence
known in the present**

MARCH EDITION

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MEDIC Organization



TABLE of CONTENTS

Sneak Peek into the Lab **02**

An update from our research teams

Looking into the Future **03**

The newest plans for MEDIC in 2025

A Conversation UBC BIOMOD **05**

An interview with a top design team at UBC

Lymphedema: A Swelling Program **07**

Learn about lymphedema and its effects on people

Tuberculosis: The Number One Killer **09**

Educate yourself on the top infectious disease killer

Sneak peek into the lab



Low cost diabetes medical technology

Our Diabetes team has moved into the second phase of the project, with the goal of developing a non-invasive and continuous monitoring system to detect early diabetic ketoacidosis (DKA). The team is working on compiling a scope review to highlight the lack of existing research in biomarkers which can be used for early DKA diagnosis. Literature reviews will continue throughout summer and plan to finish around November.

Galvanic vestibular technology

GVS is a non-invasive brain stimulation technique that affects the firing of the vestibular system by conducting an electrical current to the mastoid process behind the ears through electrodes (2-pole system). The research has since evolved into a 3-pole system and our team aims to determine if 3-pole GVS induces improvement in motor performance when compared to 2-pole GVS. Publishing has been completed for data.

Cancer Profiler Precision Medicine

Our Cancer Research Team (CREPE) is contributing to work that attempts to identify biological patterns within cancer patients of various types. The team is progressing a software pipeline that works with pathological image representations from different types of cancer, which supports future analysis.

IBD/Crohn's Monitor Prediction System

Our Crohn's and IBD Team have completed the preliminary rounds of research and have been hard at work contacting doctors and professors for stakeholder engagement. Biomarker research is currently being done to establish detection tools for target. Our team is currently being trained on technical skills.



Looking into the Future



The year continues as our teams are hard at work with our various projects.

February has passed, and two months into the year, MEDIC is well underway preparations and plans for the year. Expansion of our Senior Outreach Program continues with new partnerships and many new eager volunteers. Our team continues to grow, and as does our ideas too. MEDIC is proud that our projects

flourish. With our lab teams, there has been advancement in various projects that aim to help people with chronic diseases. Passionate students make passionate teams, and with that, there is a future of innovation and change that can only be driven by bright minds. This, is the goal of MEDIC.

With expansions across teams, MEDIC continues its growth in more ways than one. March is underway and as are our volunteer programs.



The MEDIC Foundation is UBC's non-profit student-led chronic disease research and advocacy hub. Founded and led by UBC biomedical engineering students and partnered with the UBC School of Biomedical Engineering, we are finding new ways to conduct innovative research and solve real-world problems through our

projects that look to create devices that tackle different chronic diagnoses. Student driven, we seek people who are passionate about our values and goals to join our cause. Our sub-teams each specialize in the combined successful operations of our organization as we strive to collectively improve the lives of people who have chronic disease.

Expectations of our organization is to improve the general and daily lifestyles of the people living with chronic disease. Student-run and student-led, MEDIC is driven by the passion and innovation of young minds that extend beyond just an academic setting.

A Conversation with UBC BIOMOD

UBC BIOMOD, a student-led biomedical engineering team, has continually provided the opportunity for UBC undergraduate students from various disciplines to deliver solutions for real-world medical problems.

BY: AKILESH SHANKAR
AND MO SUBERU

PHOTOGRAPHY CREDIT BY
CANVA

For over 9 years, UBC BIOMOD have established themselves as a leading research group that harnesses the intersections of biochemistry, computational biology, and biomedical research to tackle real-world medical challenges. As they celebrated their 10th anniversary in February, the team has continued to grow significantly with students like Karina Akhmedova, a 4th year biomedical engineering student, and Paniz Ghavimi, a 5th year science student, who are now serving as co-captains. This year, their hard work was showcased in their impressive performance at the BIOMOD Jamboree which took place in December 2024 in Japan, where they were awarded multiple awards, including Best Presentation. In our recent interview with them, we had the opportunity to understand their projects over the years, and their aspirations for the future of STEM.

UBC BIOMOD leverage their expertise in nanotherapeutics to develop treatments for multiple different types of cancer such as leukemia, glioblastoma, lymphoma, and prostate tumors. They have been primarily concerned with improving the efficiency of current treatment regimens for cancer, because of the nonspecific



mechanism of chemotherapy drugs that often impair healthy cells in the environment, which has frequently led to unpredictable and harmful side effects. To resolve this, they have been developing methods that deliver medical therapies directly to the tumor site, which was the driving force behind many of their successful projects such as the DNA Origami Box, and the NanoHinge.

But, as a student-based team, the motives of their group have not pertained to only biomedical research. “We hope to get our people to learn new skills personally and professionally (...) and help create a generation of new scientists and engineers”, says co-captain Akhmedova. One of their main long-term objectives has been to maintain the great learning environment they have fostered for so many years for their members. Moreover, their greatest strength as a team has been their ability to bring collective minds together, because as co-captain Ghavimi has said, they recognize the differences between students with engineering backgrounds, students specializing in data science, and students specializing in theoretical biology, and they utilize such different perspectives to learn about the multiple possibilities of a solution. Such interdisciplinary collaborations are fundamental to the success of a biotechnology research team, as it prepares early-stage researchers for networking with people outside their

program. The team also sought the advice of experts such as Dr. Steven Hallam, whose supervision significantly boosted their clarity and allowed them to continue learning without the continuous pressure of delivering results. Having such a reliable team of multifaceted researchers enabled them to overcome various challenges to project implementation, such as researching, scaling, financing, and presenting, and gave them the confidence to develop comprehensive biomedical technology.

The students may have different skill sets, but they are united by one goal - as Akhmedova boldly says - which is to “move science further”. They aspire to build the future of biomedicine piece by piece, no matter how strenuous the process. UBC BIOMOD have been motivated by the prospect of sharing their findings at jamborees and presentations because of their commitment as citizens of the scientific community, and ultimately seek to inspire curiosity and hope about the future of cancer cures to many audiences. They are also expanding to larger initiatives that engage multiple communities within Greater Vancouver, including summer camps for high school students and potential opportunities for collaboration with other Vancouver-based science initiatives. UBC BIOMOD have thus continued to pave the way to create leaders of biomedical innovation and communication.

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Lymphedema: A Swelling Problem

BY: GINA ZHANG

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Lymphedema is a condition where lymph fluid builds up in the tissues, causing swelling, often in the arms or legs. The lymphatic system, which normally helps drain excess fluid from the body, gets blocked or damaged, leading to this buildup. This fluid accumulation can be uncomfortable, limit movement, and if left untreated, cause more serious problems down the road. The lymphatic system is a network of vessels and nodes that helps keep fluid balanced, fights infections, and absorbs fats from the digestive system. When these pathways are disrupted, lymph fluid can't drain properly. There are different reasons why this might happen, like surgery that removes lymph nodes, radiation treatment for cancer, infections, or even trauma. In rarer cases, it can be congenital—meaning someone is born with a lymphatic system that doesn't work quite right.

Lymphedema is typically categorized into two types: primary and secondary. Primary lymphedema occurs when there's no clear cause, often due to genetic factors. Secondary lymphedema is much more common and develops after an event like surgery or cancer treatment that damages the lymphatic system.

The first sign of lymphedema is usually swelling. It might start slowly, and in the beginning, the swelling can feel soft. Over time, though, it can become firmer and harder to manage. People with lymphedema often describe a feeling of heaviness or tightness, and the affected skin may stretch or feel uncomfortable. In some cases, fluid buildup can lead to infections or wounds, and if left unchecked, the swelling can become more permanent as tissues thicken.

Although there's no cure for lymphedema, the condition can be managed with the right treatment. The earlier it's identified and treated, the better the outcomes. Manual lymphatic drainage (MLD) is one common treatment, where a specialist uses a gentle massage technique to help move the fluid out of the swollen area. Compression therapy, which uses garments to apply gentle pressure, can also help keep the swelling down and promote lymph flow.

Exercise can also play an important role in managing lymphedema. However, it's always best to consult with a healthcare provider before starting any exercise routine to make sure it's safe.

Taking care of the skin is another key part of managing lymphedema. Moisturizing regularly, avoiding cuts or scrapes, and being quick to address any signs of infection can help prevent complications. Education on self-care and recognizing when the symptoms might be getting worse is also crucial.

Living with lymphedema isn't easy—it's a lifelong condition that requires ongoing care. But with the right treatment plan, it's possible to lead an active, fulfilling life. The key is working with a healthcare team that understands the condition and can guide you in managing it. With a combination of professional treatment, lifestyle changes, and daily care, many people with lymphedema find ways to minimize the impact it has on their lives and keep moving forward.

Learn more here:
<https://www.cancer.gov/about-cancer/treatment/side-effects/lymphedema>





Tuberculosis: The Number One Killer

Tuberculosis (TB) is a serious infectious disease that primarily affects the lungs, but it can impact other parts of the body as well. It is caused by a bacteria called *Mycobacterium tuberculosis*, and it spreads from person to person through the air when someone with active TB coughs or sneezes. While TB may sound like a thing of the past, it remains a significant global health issue, claiming millions of lives each year. The good news is that TB is treatable, and with awareness and early intervention, we can make a real difference in reducing its spread.

One of the challenges with TB is that it can often develop without obvious symptoms at first. Early on, many people with TB might not feel sick or show clear signs of the disease. This is why it is important to be aware of the potential warning signs and to seek medical attention if you experience prolonged coughing, chest pain, unexplained weight loss, fever, or night sweats. The symptoms can often be mistaken for a common cold or other respiratory illnesses, which can delay diagnosis and treatment.

BY: GINA ZHANG

PHOTOGRAPHY
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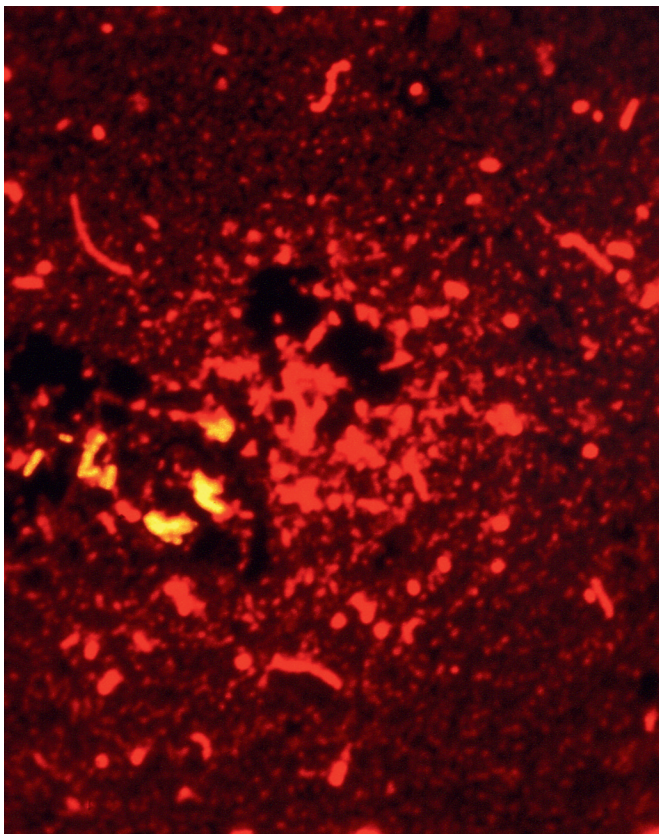
TB typically spreads through close contact with someone who has an active case of the disease. This makes crowded living conditions, places with limited access to healthcare, and communities with higher rates of TB particularly vulnerable. But even in countries with better healthcare systems, TB still exists and remains a public health concern, especially in populations who are more susceptible, such as people with weakened immune systems (like those living with HIV) or those in poverty.

One of the biggest challenges with TB is drug-resistant TB. This happens when people do not complete their full course of antibiotics or when the bacteria evolve to become resistant to the medications commonly used to treat the disease. Drug-resistant TB is harder to treat and requires longer, more complex treatment regimens. That is why finishing a full course of treatment is crucial not only for the person with TB but for the broader community as well. Failing to do so can lead to the bacteria spreading to others or becoming resistant to treatment, which ultimately makes controlling TB much harder.

The key to managing TB is early detection and consistent treatment. TB is treatable with antibiotics, but treatment typically lasts for several months. It is important for patients to adhere strictly to the treatment plan to prevent the disease from coming back or becoming resistant. In many cases, people can fully recover from TB with the right care, but the process requires patience, perseverance, and medical support. Awareness is one of the most powerful tools in the fight against TB. Many people do not realize how easily the disease can spread, or they might not be aware of the symptoms to watch for. Educating people about the importance of seeking medical help early and completing a full course of treatment can go a long way in reducing the spread of TB. Governments, health organizations, and local communities all have a role to play in raising awareness, improving access to healthcare, and providing the support needed to combat TB effectively.

Learn more here:

<https://www.who.int/campaigns/world-tb-day>






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