SCLERODERMA ASSOCIATION of B.C.

PO Box 16155 Lynn Valley North Vancouver, BC V7J 3H2
604-371-1005
Email: info@sclerodermabc.ca • **Website:** sclerodermabc.ca

SCLERODATA 2024

In This Issue:

Good to Know

2024's Educational Webinars

One of SABC's goals is to educate our members about scleroderma symptoms, provide resources and coping strategies and encourage self-advocacy.

Virtual Yoga Classes
Tuesdays: Chair Yoga starts January 30, 2024 | Time: 1:00 pm PDT
Thursdays: Easy Flow Yoga starts February 1, 2024 | Time: 6:30 pm PDT

Led by Teressa Colosimo who is certified with 200 hr. of Yoga and Movement Teacher Training. Teressa is also the SABC Community Support Representative for Valemount and Northern Rural Communities.
Both classes will include meditation, breathing techniques, and performing yoga postures. Each class will be 45 minutes to an hour.

Teressa is looking forward to sharing her passion for yoga with everyone!

To register and for more information please email Teressa at pattess72@hotmail.ca or call at **250-566-3165.** At that time, Teressa will send the waiver and zoom registration to get started!

For future Educational Webinars, remember to keep an eye on your inbox and social notifications for the ***Time to Register*** *reminders.*

Did you miss the recent February 28th webinar? ***Raynaud's and Digital Ulcers with Dr. Hyein Kim MD, MPH, FRCPC*** - an informational webinar on Raynaud's and digital ulcers including the symptoms, diagnosis, and treatment options.

No worries! Click Here to catch up on all the valuable information presented by viewing the webinars on SABC's YouTube channel.

Good to Know cont'd

2024's Virtual Support & Connection Meetings: Come Zoom With Us

The Scleroderma Association of B.C. strongly believes in the merits of support groups. Support group meetings create an environment conducive to discussion by providing a safe place where people affected by the disease, their families, friends and caregivers can give and receive practical and emotional support.

Currently, SABC is offering virtual support (Come Zoom With Us) meetings featuring various topics for discussion on Wednesdays, 7:00 – 8:00pm PST. Keep an eye on your inbox and social notifications for the **Come Zoom With Us *Time to Register*** reminders:

Wednesday, March 13, 2024 | 7:00 to 8:00pm PST

Follow-up Chat - Raynaud's

Please join us for a session to follow-up on and share your thoughts about Dr. Hyein Kim's webinar on Raynaud's in Systemic Sclerosis. Participants are encouraged to share 3 items or products that help manage their Raynaud's symptoms. For the ***Show and Share*** you are welcome to bring the items or post photos/links in the chat.

Here's the link to register: **Follow-up Chat - Raynaud's**

Wednesday, April 17, 2024 | 7:00 to 8:00pm PST

Managing Scleroderma

Please join us for a discussion on managing scleroderma and share what works for you.

Here's the link to register: **Managing Scleroderma**

Wednesday, May 15, 2024 | 7:00 to 8:00pm PST

Let's Chat About Gastro-Part II

Gastrointestinal (GI) complaints are among the most common problems in people with Scleroderma. Please join us for a discussion about gastro issues.

Here's the link to register: **Let's Chat About Gastro-Part II**

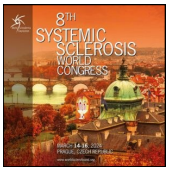
Missed previous Meet-Ups? No worries! If you would like information about the resources provided during those meetings, please email Kelly at sabckelly@gmail.com

SABC Community Support Groups

COME ZOOM WITH US

Good to Know cont'd

Who's Going to Prague in March?



The first 5 Systemic Sclerosis World Congresses (Florence 2010, Madrid 2012, Rome 2014, Lisbon 2016, Bordeaux 2018, and 2 virtual in 2020 and 2022) were a huge success in contributing to the knowledge about scleroderma all over the world. Both the **patient** and **scientific/medical programs** of the congress have grown significantly becoming extensive and well attended.

FESCA is once again teaming up with the World Scleroderma Foundation to deliver the patient portion of the congress. Year upon year, the event has gained significant international interest among scleroderma patients, providing a platform for patient education, networking, capacity building and exchange of ideas and experiences. With a program designed by and for scleroderma patients, the attendees will hear from renowned scleroderma professionals and patient advocates in a friendly and open environment, with plenty of room for questions and discussions. **For more information on the Patient Congress click** HERE.

Global researchers from different specialties and health professionals contribute to the high scientific profile of the congress in interactive sessions. The scientific/medical portion of the congress provides the combination of hands-on workshops, lectures, oral presentations and satellite sessions featuring an exciting mix of experiences for all attendees that devote their work to people with scleroderma. **For more information on the Scientific Congress click** HERE.

Everyone is looking forward to finally being all together again, March 15-16th in Prague, Czech Republic for a new and stimulating experience in the world of scleroderma.

Congratulations to the following SABC Members heading to Prague this month:

Workshop Trainer

Dr. Daniel Furst, Physician/Professor from UCLA

Lecturing, demonstrating and training health professionals on the mRSS (modified Rodnan skin score), standardization of testing. The mRSS uses palpation to estimate skin thickness, and is currently considered the most appropriate technique for measuring skin involvement in Systemic Sclerosis.

Top of SSc Science - Best from Journals Presenter

Dr. Janet Pope, Western University

State-of-the-art evidence in the treatment of SSc, Nature Reviews Rheumatology

Poster Presenters

Genetics / Epigenetics - Dr. Kevin Keen, SABC Research Program

Biomarkers Identified by Differentially Expressed RNA in Systemic Sclerosis

ILD - Dr. Sabrina Hoa, Centre hospitalier de l'Université de Montréal

Characterisation of incident interstitial lung disease in late systemic sclerosis

Patient Reported Outcomes - Dr. Tiffany Dal Santo, SPIN

Factors Associated with Satisfaction with Social Roles and Activities among People with Systemic Sclerosis: A Scleroderma Patient-centered Intervention Network (SPIN) Cohort Cross-sectional Study

Factors Associated with Physical Function among People with Systemic Sclerosis: A Scleroderma Patient-centered Intervention Network (SPIN) Cohort Cross-sectional Study

Quality of Life - Dr. Tiffany Dal Santo, SPIN

Development of a Tool to Document Systemic Sclerosis Pain Sources, Patterns, and Management Barriers: A Scleroderma Patient-Centered Intervention Network (SPIN) Patient-Researcher Partnership

Patient Empowerment - Dr. Janet Pope, Western University

Underrepresented Groups in Randomized Controlled Trials of Scleroderma Over the Last 5 Years (2018-2022)

Good to Know cont'd

June Awareness 2024!

June is Scleroderma Awareness Month across Canada and the United States with June 29th as World Scleroderma Awareness Day. This special time is dedicated to educate and raise public awareness about this little-known and often misunderstood orphan disease and stress the critical importance of funding research to find a cure and support quality of life for people living with scleroderma.

As one of our objectives is to encourage as many people as possible to learn more about this disease which affects over 20,000 Canadians, the SABC holds awareness and fundraising events throughout the province with our "***Moving to Cure Scleroderma***" campaign.

LADNER
SATURDAY, JUNE 8th / GROOVE FOR SCLERO, LADNER COMMUNITY CENTRE - Ladner, BC V4K 3R8
CONCERT COORDINATOR: KENNY REID - LADNER

VANCOUVER
SUNDAY, JUNE 16th / BIKE RIDE/WALK, STANLEY PARK - Vancouver, BC V6G 1Z4
RIDE/WALK COORDINATORS: ROSANNE & DAVID QUEEN - NORTH VANCOUVER

VICTORIA
SUNDAY, JUNE 23rd / WALK, WEST SHORE PARKS - Victoria, BC V9B 1J1
WALK COORDINATOR: LINDA BARNES - VICTORIA

ANYWHERE IN B.C.
ALL OF JUNE / VIRTUAL MOVING
VIRTUAL COORDINATOR: TERESSA COLOSIMO – VALEMOUNT & NORTHERN RURAL COMMUNITIES

Keep checking SABC's website for detailed info and how you can participate.
A BIG Thank-You to the Event Coordinators! Let's support them and each other by showing up!

Save The Date: SABC's 40th Anniversary Celebration!

This year's AGM & Conference will be a celebratory event. It will be hosted on **Saturday, October 26, 2024** as an **in-person event in beautiful Burnaby** and in addition to the social and informative day you are accustomed to, we are super excited to also be celebrating a special milestone...40 years! We look forward to sharing stories and acknowledging the many good times spent together as an organization devoted specifically to its members.

As per usual, the day will start with the Annual General Meeting, followed by speaker presentations with intermittent 40th anniversary fun. Your SABC events team is working on arrangements and will email more information later. Please keep checking SABC's website often for updates regarding this special day and how to attend.

Make sure to mark your calendars as you won't want to miss out on the fun!

Financial Assistance Available

If the cost of things lately is wreaking havoc on your household budget making attending this year's AGM & Conference feel financially out of reach, please do contact the SABC to inquire about available funds specifically set aside to help scleroderma patients connect with one another and the SABC.

Assistance is available thanks in no small part to the donations made in memory of Joan Kelly, supporting her legacy of patient support, scleroderma awareness and in honour of all she did and continues to do for SABC members.

Good to Know cont'd

With SoloPill™, One push → One pill

The SoloPill, tablet dispenser was developed in the last year and a half with the help of doctors, pharmacists, specialists and real patients.

SoloPill is the first and unique Acetaminophen dispenser on the market that helps those suffering from the loss of fine motor skills, dexterity and motricity such as Arthritis, Parkinson's, Fibromyalgia, Scleroderma and other diseases.

SoloPill's mission is to make the daily lives of people afflicted easier and less painful.

Product highlights:

- Designed in Canada and patented in Canada, USA, Europe and China

- Supported by the Arthritis Society of Canada and the American Arthritis Society

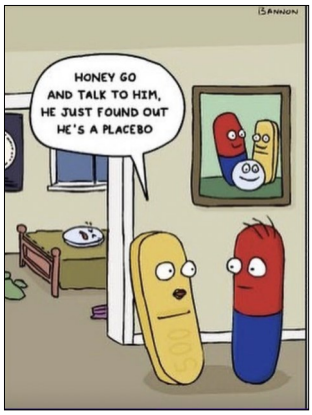
- Certified (child-resistant) and EASE of USE (American certification)

- Available in 3 sizes and compatible with the national brand (Tylenol) and all private labels

• **Red for 500mg round tablets**

• **Orange for 500mg elongated caplets**

• **Yellow for 650mg elongated caplets**



- 2-year product defect warranty

- Hygienic; minimized risk of contamination due to limited handling of pills

- effortless medication intake

- one pill at a time with a lockable mechanism

To know more and order online, visit www.SoloPill.com

Interesting Reading

University of Alberta team uncovers new biological marker for Scleroderma

A simple blood test can predict who will get severe disease and could also point the way to future treatments.

JANUARY 08, 2024 BY GILLIAN RUTHERFORD

A cross-disciplinary University of Alberta research team has uncovered a biological marker for scleroderma that can predict which patients will develop severe disease and could also lead to new treatments.

Scleroderma is a rare condition that affects about 17,000 people in Canada. An overproduction of collagen leads to a hardening of the skin, and in severe cases, blood vessels and internal organs are also affected. Approximately 40 per cent of patients die within five years of diagnosis. Medication, diet and exercise may slow progression and ease symptoms, but there is no cure, and until now there has been no way to predict who will develop the most severe form of the disease.

In recently published research, the team found that polysialic acid is elevated in both the skin and blood of patients with systemic sclerosis and correlates with the level of fibrosis. Polysialic acid is a glycan, or sugar modification, on the surface of cells in the immune, reproductive and nervous systems, and is known to be associated with aggressive cancer cells as well.

“Scleroderma is a terrible disease that starts with debilitating fatigue and then leads to systemic scarring. Imagine basically feeling trapped in your own body,” says co-principal investigator Mo Osman, rheumatologist and immunologist and associate professor in the Faculty of Medicine & Dentistry.

“It’s key to identify those whose disease will progress because we want to be able to treat them early to minimize damage,” Osman says.

Co-principal investigator Lisa Willis, assistant professor in the Faculty of Science and an expert on glycans, developed the blood test for polysialic acid in her lab.

“What you need for a biomarker is something that can be used cheaply in a clinic,” Willis says. “We developed our test to be able to look for our molecule from the vial of blood that was already taken from a patient at diagnosis.”

Although scleroderma is generally considered an inflammatory autoimmune disorder, it often does not respond to treatments that suppress the immune system. About three patients a year in Edmonton receive a stem cell transplant to replace bone marrow that’s not working properly. The treatment costs about $80,000 per patient and requires patients to go to Calgary for three months, Osman says.

The researchers reported that patients who had received a bone marrow transplant showed reduced levels of polysialic acid, an indicator that changes in the glycan are directly related to the disease process.

Interesting Reading cont'd

For the study, blood and tissue samples were taken from five healthy control patients, five patients with skin fibrosis only, 11 patients with more severe fibrosis and four patients who had received transplants.

Willis and Osman had not worked together before, but both were struck by previously observed similarities between scleroderma and cancer.

"This is the most exciting type of science," says Osman. "We thought, 'It's very interesting that immune cells in scleroderma behave very similarly to immune cells in cancer, so what's going on? Maybe there's a connection.'"

Willis says they postulate that the glycan is interfering with the body's ability to deal with scarring.

"Sugars form a really thick layer on the outside of a cell that is responsible for mediating the interactions between the cell and its environment. The sugars are what the immune system uses to say, 'OK, this is self, I don't want to attack this' or, 'This is foreign, I should deal with it.'

"Normally, the immune system should recognize those pathogenic scleroderma cells, but the scleroderma cells make the glycan so they can grow without being killed."

Willis and Osman will continue testing the biomarker as a diagnostic tool by looking at skin and blood samples from a broader cross-section of patients from across Canada and other parts of the world.

They are also working to pinpoint the mechanism involved.

"We've developed some more technology that allows us to find the proteins this glycan is attached to, so we can start to figure out how it is actually causing these changes," explains Willis. "That might hint as to how we could potentially develop new therapeutics to intervene."

Osman hopes the shared work will lead to a brand new avenue of treatment for scleroderma.

"This is a paradigm shift — a potentially very important different way of looking at how to manipulate immune responses. As an immunologist, that's very exciting."

Both researchers credit their trainees for conducting their experiments in close collaboration, including holding joint lab meetings.

"My students will develop a reagent, then walk across campus to give stuff to Mo's lab, and vice versa," Willis says.

Click here to access the Link to University of Alberta's Folio

From our Members

Follow-up to 2023 Annual Conference

Thank you again to all who attended Lauren Wolfe's presentation *Understanding Scleroderma Wounds & Dressing Application Workshop* at last Fall's AGM & Conference. We were able to not only learn about managing our scleroderma-related skin issues but were able to try out some of the products!

And thank you again to Lauren, who, as a follow-up to her workshop, provided the below list of the dressing products we were able to play with during her presentation, reminding us that this list is not inclusive of all recommended wound care dressings.

Also, it is important to again remember that these products should be used in consultation with and as instructed by your wound care clinician/specialist, physician or nurse practitioner.

1. Cover dressings - These can be cut to fit around the finger.
    - A. Optifoam thin non bordered 2 x 3"
    - B. Mepilex border lite 5 x 12.5cm
    - C. Foam lite 5.5 x 12cm
    - D. Adaptic Digit
    - E. Hydrocolloids – although more waterproof, caution as they are occlusive dressings and trap moisture be neath
        - i. Duoderm
        - ii. Exuderm thin or satin
2. Waterproof covers
    - A. Finger cots
3. Finger basic dressings with pad
    - A. Mepore
    - B. Medipore + pad
4. Treatment of open wounds
    - A. Antimicrobials used in combination with above cover dressings.
        - i. Therahoney
        - ii. Silvasorb gel
        - iii. Silver Powder
    - B. Biofilm disruptor
        - i. Plurogel
5. Treatment of fissures or cracks
    - A. Marathon Cyanocrylate
6. Basic moisturizers
    - A. Non fragrant
        - i. Remedy lotion
        - ii. Galaxal based
        - iii. Cerave
    - B. Urea based (for dry heels etc)
        - i. Atractain
        - ii. Uremol

Lauren Wolfe RN, BSN, MClSc (WH), CWOCN works as a certified Wound Ostomy and Continence nurse at Macdonald's prescriptions, Fairmont location and Vancouver General Hospital.

The Co$t of Re$earch

By Basak Sahin, SABC member and determined researcher

Conducting research is expensive. We say this all the time. But so are avocados…Let's put it into context!

Hi, my name is Basak (or Ash/Ashley) Sahin and I am a research technician at the UBC Centre for Heart Lung Innovation's (HLI) Molecular Phenotyping Core Laboratory (MPCL). HLI is in St. Paul's hospital and MPCL is a shared resource lab. Meaning we support the researchers in HLI, UBC, the hospital, and the community at large. We do a lot of biobanking and cell, protein, RNA and DNA work and have an amazing team with varying expertise and a lot of fancy machines that single labs cannot afford so they pool resources and put it in MPCL where we (the extensively experienced manager Beth and myself) take care of the instruments as well as the training for the users from all levels (undergrad, grad, post-doc, technician, even faculty!). It is a cost-recovery based fee-for-service model where the fees we charge for the services cover the cost of reagents to keep things running and the maintenance of the instruments. I have been working on the SABC Research Program with Dr. Dunne since 2016!

How does the SABC Research Program fit into the goings-on at the MPCL? What do we specifically do for the Program? I am here to tell you a little bit about what goes on in the lab and shine some light on the costs of doing this kind of laboratory research.

When research participants donate blood and skin, the cost of collecting and then preparing for further experimentation is approximately **$6000-7000 for 100 blood samples** and **$20,000+ for 100 skin samples**. The processed blood and skin creates the testing samples we then use to extract the genetic material from, and perform the many sequencing techniques (all described below). The cost of extraction to sequencing is upwards of **$190,000 for 50 test samples**. Let's describe what we do that account for these costs.

Collecting your blood and skin

We order the supplies needed to collect your blood and skin and organize the supplies into individual Kits. Different research modules of the SABC Research Program collect and study different types of test samples so they need different kits. These kits are assembled using the following:

- *Red-top serum tubes* – These are vacutainers with no additives. The blood within the tube clots, gets spun and we recover and bank the liquid upper layer, called serum, mainly used for protein and metabolite analysis.
- *Pink-top K2 EDTA tubes* – These vacutainers are coated with an anticoagulant, called EDTA that prevents the blood from clotting. The tube is spun to separate out the red blood cells, the white blood cell layer called the buffy coat, and the plasma. The buffy coat is mainly used for DNA analysis and the plasma for protein and metabolite analysis.
- *Green-top heparin tubes* – Another vacutainer that prevents the blood from clotting, using a different anticoagulant, heparin. These tubes are used to isolate specific white blood cells called peripheral blood mononuclear cells (PBMCs).
- *PAXgene Blood RNA tubes* – These tubes are needed to study the RNA in blood. Blood is naturally full of enzymes that your immune system uses to make sure there are no pathogens in the blood. But these enzymes also cleave (cut up) the RNA, making it harder, if not impossible to analyze. These vacutainers contain reagents that stabilize the RNA.

After preparation, we give the Kits to those who will do the collecting. But before you can give your blood and skin to us for free, Dr. Dunne, Fran or a research coordinator conduct the Program's research participant informed consent process. Once the paperwork is signed and the samples collected, they bring the filled tubes back to us for processing.

There are additional costs, of course, to collecting that are difficult to quantify but nonetheless should be mentioned. There is the cost of needles, butterflies, cotton balls and band-aids, as well as the primary sample transfer bags. And of course, someone needs to perform all the tasks so a research coordinator's, lab technician's, doctor's, nurse's, or phlebotomist's time should be considered as well.

Processing or preparing your blood and skin for experimentation

Supplies are also needed to process the contents of the blood tubes (serum, plasma, etc.); plastic consumables like pipette tips, mixing vials and cryo-storage tubes (about 9-10 per sample) that can withstand -80°C so the test samples can be stored safely. The test samples need labels (that can also withstand -80°C), and cryo-storage boxes to organize them. And of course, the fees for the -80°C freezer that is monitored 24/7 to keep the precious test samples safe for future studies.

Tissue culture or growing (culturing) your cells outside of your body, can be quite expensive. First, we need a *collection media* for the skin biopsy to be placed in to keep it fresh on its way to the lab. Then depending on test sample size and quality as well as disease status; it is either embedded in *OCT reagent* for spatial biology, or it is cut into 2 pieces, where one is stored in *RNA later reagent* to preserve RNA and the other is put into a *digestion media* to facilitate the breakdown of the skin tissue so the individual cells can then grow. And because the cells are no longer getting the nutrients or signals, they need from your blood, they need an appropriate *cell culture media* to help them grow in the plates. The cells 'get fed' new media every 3-4 days! Seeing as we can only have so many test samples at a time, we also need to freeze them, either to be woken up later, in a *freezing media*, or to preserve RNA/DNA integrity in RNA later reagent.

All these 'media' are similar, starting with

- *Dulbecco's Modified Eagle Medium,* ($85/500mL) and have different additives depending on what purpose they serve.

The collection and growth media for example has

- *Fetal Bovine Serum (FBS)* ($748/500mL) that has nutrients to keep cells happy and
- *Penicillin-Streptomycin* ($41/100mL) antibacterial and antifungal agents to avoid contamination.

While the digestion media has (in addition to FBS and Penicillin Streptomycin)

- *Collagenase* ($180/100mg) and
- *DNase* ($160/100mg) to break down the tissue.

Freezing media, on the other hand, has (in addition to FBS)

- *Dimethyl sulfoxide* (DMSO, $126/100mL), a cryoprotectant that prevents crystals from forming in cells during the freezing process.

And again, the costs not easily factored in, are the plastic consumables like tubes, pipettes, cell-culture plates, cryo-vials, cryo-storage boxes, liquid nitrogen etc.

Extracting and Sequencing the RNA, DNA, and proteins from the test samples

And now comes the actual experimentation, where the costs really become substantial and where fundraising (donations) become crucial to support its continuance. We will now experiment with the 'processed' test samples, that originated from your blood and skin but look very different in tiny vials from the freezer.

Scleroderma is a rare disease, as such it is under-studied and we have huge gaps of knowledge meaning we don't know for sure, in detail, what triggers it, what controls it, what determines the prognosis, what makes some people develop one symptom but not the other, and one of the specific aims of this study is can we predict who will have lung involvement so we can start following and treating them early.

Biology is complex, and trying to find biomarkers for diagnosis or therapeutic targets for drug development involves the need to understand the drivers of the disease. Below is a table defining some of the 'omics' buzzwords thrown around, describing which molecules they study, what they look at and how they look at them (the tools used to study them).

Genomics	**DNA**	• DNA Sequencing • Genome Wide Association Studies (GWAS) • DNA methylation • Histone acetylation
While genetics are the study of genes and their roles and inheritance, especially variations in genes that are associated with health conditions; genomics takes into account all DNA, including the non-coding regions and the interplay between different genes, regions and the implications of such interactions like gene expression[1].		
Transcriptomics	**RNA**	• PCR • Microarrays • RNA Sequencing
Transcriptomics is the study of how the information in a genome is expressed through transcription into a variety of RNA species. This includes not only looking at mRNA, which is the intermediary between genes and proteins, but also noncoding RNAs like miRNA, lncRNA, circRNA that perform additional diverse functions like transcriptional regulation[2].		
Proteomics	**Proteins**	• ELISA • Western blot • Microarray • Mass spectrometry • Flow cytometry • IHC / IF
Proteomics investigates how different proteins interact with each other and the roles they play including structural, metabolic, signaling, and regulatory functions among many others[3].		
Metabolomics	**Metabolites**	• Mass spectrometry • Nuclear magnetic resonance spectroscopy
Metabolomics is the large scale study of all metabolites, including lipids, amino acids, sugars and more. Metabolites not only include those directly linked to enzymatic activities encoded by the genome, but also those derived from food, medications, microbiota and the environment[4].		

So, we have a lot of questions! And to answer them, we need to use tools that give us insight while having minimal background information. Sequencing the DNA and RNA within the test samples is one of these tools.

One way to put it would be to imagine the genome like a library of thick instruction **manuals** to make all **parts** of a complex machine. The manuals are the DNA, written in a 4-letter code; A, T, C and G, corresponding to the 4 nucleotide bases DNA is made of. The thing is these manuals cover everything required and you can't take them out of the library. So, to make practical use of them, we need to clean out all the unnecessary or irrelevant parts, and make a condensed copy, like a **quick reference sheet** or guide. This sheet we *can* take out of the library, and we call it your messenger RNA, (mRNA).

Following the abbreviated instructions in the quick reference sheet may be simpler but we need to make sure we don't make too many copies of the machine's part (part = protein). So, we have little **regulators**, going around and making sure everything is in order. These regulators we call the non-coding RNAs like micro RNA (miRNA), long non-coding RNA (lncRNA), circular RNA (circRNA) etc.

What can go wrong, right?

Well, first, the instruction manual might be wrong. Maybe there is a typo, and as we only have 4 letters to work with, this can have no effect, or a substantial one; changing how the protein is made or giving the regulators wrong instructions. To find this typo, we need to read the manual letter by letter and compare it to other manuals. This is what we do when we *sequence* the DNA. We determine the exact sequence of a DNA and compare it to others. The thing is there are approximately 3 billion[5] base pairs in a human genome. And not all typos are created equal. So, we need more samples to compare to identify the typos that are relevant in causing the issues.

Second, we might have made a typo when making the quick reference sheet, or maybe we cut out an important instruction. So, we need to read, or as you may have guessed, sequence the RNA.

Or maybe we made too many or too few copies of a protein, which we can see by RNA sequencing as this would also tell us how many of each one, we made. Or if we know the specific protein that is broken, or at least found a few candidates by sequencing, we can just look at how many of that is circulating around, using the tool, PCR.

Also, remember that we had the little regulators to make sure we had the right amount of the right mRNA at the right place? Well, we need to read, or sequence those too.

At this point, we should also consider how the library is organized. Because some sections may be inaccessible, like shelves clustered too tight to recover a manual, or some sections may be locked. While these sections are necessary to organize and regulate the manuals, too much or too little of this organization can really affect the successful working of the machine. In genomics, we call this 'epigenetics' and one of the main phenomena is DNA methylation, where a portion of DNA is 'methylated' or locked.

At the end of the day, we have a complex machine with many parts. It is not always easy to identify what is working and what is not. And we need to troubleshoot somehow.

We know there are interactions between the genome, transcriptome, proteome and metabolome and to draw a complete picture, we need to understand them all. A lot of the diagnostic tests rely on measuring proteins and metabolites. This is because it is relatively easier to detect them in blood and urine. While this is a great starting point, as we dive deeper and discover more, we are bound to run into more potential descriptors and therapeutic targets. So it is not uncommon to look at the transcriptome and genome and then circle back to look at more proteins and metabolites.

Some of the analysis that has been done for the SABC Research Program include miRNA sequencing, lncRNA and circRNA microarrays, cytokine analysis (small, secreted proteins that are involved in immune response along with others), metabolomics, DNA methylation analysis and still in progress, DNA sequencing.

To sequence DNA and RNA, we first need to extract them and make sure, by measuring the concentration, we have enough, and the quality is good.

Here are 3 of the Extraction Kits we commonly use:

- *PAXgene Blood miRNA Extraction Kit* ($885 for 50 samples*)*
- *miRNeasy Micro Extraction Kit* ($520 for 50 samples*)*
- *DNA Extraction Kit (*$245 for 50 samples*)*

To measure the concentration, we use:

- *Nanodrop* and confirm the quality of RNA using *Agilent Bioanalizer* ($70 for 11-12 samples*)*
- *Quant-iT PicoGreen assay (*$800*)* for DNA

While we have a lot of technology and expertise in MPCL, we can't do everything in-house. Lab techniques like sequencing, microarrays and mass spectrometry require specialized instruments and expertise. For techniques like these (called 'screening' techniques), we send the samples out to be analyzed where we screen many therapeutic targets to come up with a short-list of candidates to pursue. These candidates need to be validated with more targeted techniques like qualitative PCR (qPCR), ELISAs, Western blots etc.

Here are some of the actual 'big ticket' techniques used to date for the SABC Research Program with an idea of how much they've cost:

miRNA sequencing at BC Genome Sciences Centre:
- *300 samples* ($47,000)
- *100 samples* ($16,000)

lncRNA, mRNAs and circRNA microarrays at ArrayStar inc.:
- *lncRNAs and mRNAs in 60 samples* ($34,000 USD)
- *circRNAs in 60 samples* ($27,500 USD)
- *Validation qPCR* ($11,000 USD)

Cytokines and autoantibodies at Mitogen Diagnostics and Eve Technologies, Calgary, Canada:
- *circulating cytokines in 100 samples and auto-antibodies (aAbs) in 340 plasma samples* ($13,000)

Metabolomics at The Metabolomics Innovation Centre, Alberta, Canada:
- *metabolites in 100 serum samples* ($20,000)

DNA Methylation with Kobor Lab, Centre for Molecular Medicine and Therapeutics:
- *100 samples* (Awaiting invoice. Expecting many tens of thousands of dollars!)

DNA Sequencing at BC Genome Sciences Centre:
- *100 samples* ($107,000)

And of course, we are not stopping here!

Armed with the increased knowledge and insight, the new members of the SABC Research Program, Raveen Badyal, a graduate student and Brandon Kohlen, a lab technician, will be doing a lot of tissue culture work including 2D and 3D cultures and organoids. This will not only help validate all that has been done but also apply it to cultures and try some interventional therapies and strategies.

It may have all started in a petri dish, but the biopsies many participants volunteered to provide may one day lead to reversing some of the major symptoms of scleroderma.

References:
[1] Health Education England Genomics Education Programme, https://www.genomicseducation.hee.nhs.uk/education/
[2] Lowe R, Shirley N, Bleackley M, Dolan S, Shafee T. Transcriptomics technologies. PLoS Comput Biol. 2017 May 18;13(5):e1005457. doi: 10.1371/journal.pcbi.1005457. PMID: 28545146; PMCID: PMC5436640.
[3] Cui, M., Cheng, C. & Zhang, L. High-throughput proteomics: a methodological mini-review. Lab Invest 102, 1170–1181 (2022). https://doi.org/10.1038/s41374-022-00830-7
[4] Clish CB. Metabolomics: an emerging but powerful tool for precision medicine. Cold Spring Harb Mol Case Stud. 2015 Oct;1(1):a000588. doi: 10.1101/mcs.a000588. PMID: 27148576; PMCID: PMC4850886.
[5] National Human Genome Research Institute, https://www.genome.gov/

SABC Board of Directors 2022 /2023

President	Rosanne Queen	604-984-9425	sabc.rq@telus.net
Vice President	Michele Gervais	604-761-7782	gordmich17@gmail.com
Secretary	Beth Miller	604-815-8740	sabcbeth@gmail.com
Treasurer	Patrick Livolsi	778-791-7834	treasurer@sclerodermabc.ca
Board member	David Queen	604-984-9425	dq.sabc@telus.net
Board member	Helen Hsiao	778-829-7124	h.hsiao1204@gmail.com
Board member	Amir Pourghadiri	604-349-4986	amirpourghadiri@gmail.com
Board member	Kenny Reid	604-760-8024	kr67.sabc@gmail.com
Board member	Chelsea Fitzpatrick-Lindsay	604-659-4301	chelsea@sclerodermabc.ca
Board member	Amyn Rajan	604-418-7273	amyn@sclerodermabc.ca
Board member	Kelly Grant	604-378-1806	sabckelly@gmail.com

Community Contact Representatives

Campbell River	Jackie Alexander	250-830-7287	jackie.alex97@gmail.com
Chilliwack	Kelly Grant	604-378-1806	sabckelly@gmail.com
Creston	Betty Kuny	250-428-8875	rkuny@telus.net
Kelowna	Angie Reglin	250-860-5700	angiereglin@gmail.com
Kamloops	Jen Beckett	250-574-3151	jenniferbecketts@hotmail.com
Maple Ridge	*Seeking Representative*		
Nanaimo	Linda Allen		llallen.52.14@gmail.com
Nelson	Sylvia Reimer	250-551-0973	reim1syl@gmail.com
New Westminster	*Seeking Representative*		
Prince George	*Seeking Representative*		
Squamish	Beth Miller	604-815-8740	sabcbeth@gmail.com
Valemount & Northern Rural Communities	Teressa Colosimo	250-566-3165	pattess72@hotmail.ca
Vancouver	Suzanne Gavin	604-710-8722	suzannergavin@gmail.com
Victoria	Susan Goss	250-479-8586	susangoss@shaw.ca
Vernon	Lisa VanDyk	250-542-5231	sannicolaswest@icloud.com
Williams Lake	Cecelia Jaeger	250-392-3656	cecejaeger@gmail.com
Yellowknife	Helen White	867-873-5785	hwhite@theedge.ca

SCLERODERMA ASSOCIATION of B.C.
PO Box 16155 Lynn Valley, North Vancouver, BC V7J 3H2
604-371-1005
Email: info@sclerodermabc.ca • Website: sclerodermabc.ca

Sclerodata may still be received in print form but may also be received as an email attachment (just send us your email address if we don't have it yet).