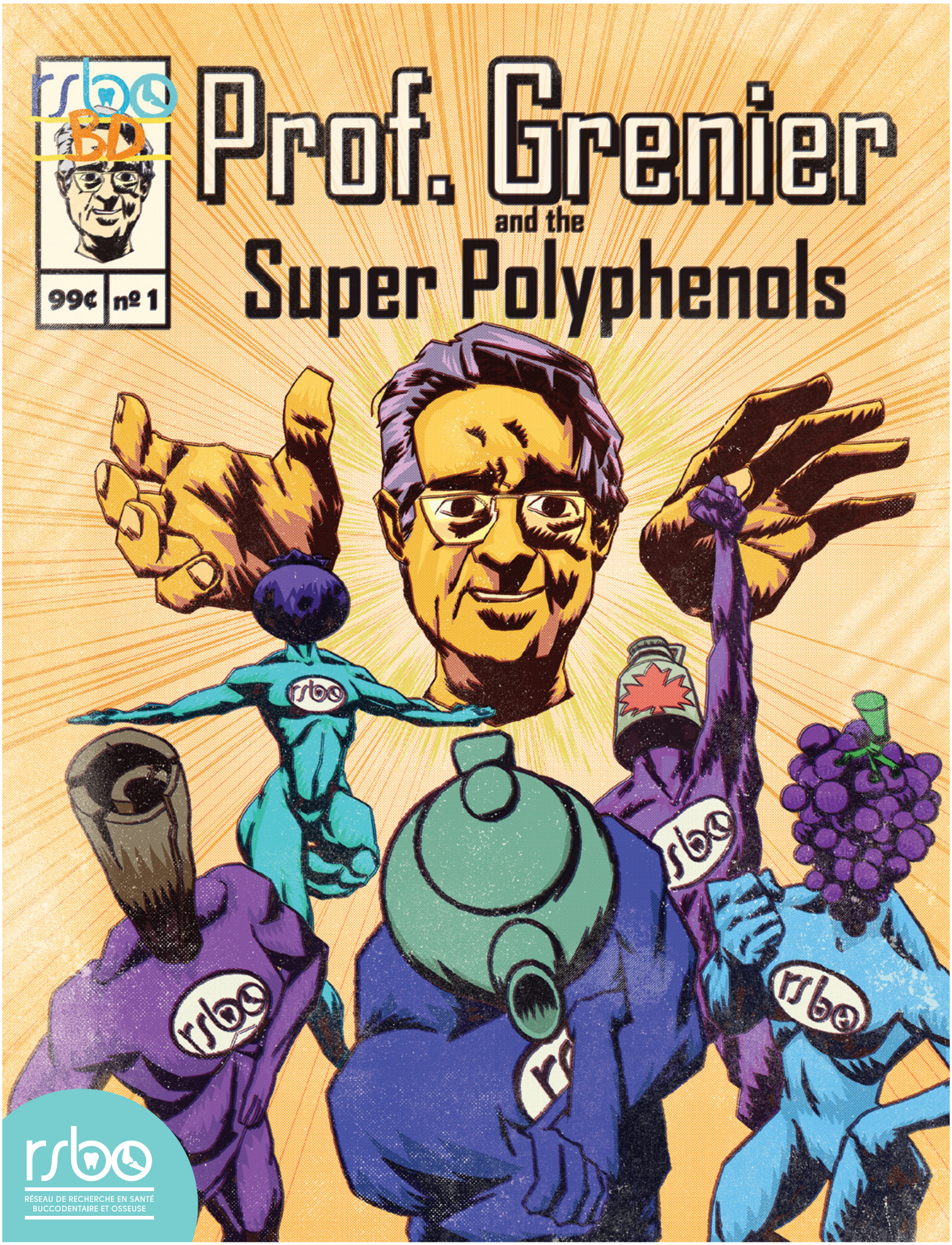
rsbo
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nº 1
Prof. Grenier
and the
Super Polyphenols
rsbo
RÉSEAU DE RECHERCHE EN SANTÉ
BUCCODENTAIRE ET OSSEUSE

FOREWORD

Science is intimidating for the average person. Scientific studies are all too often explained in a clinical manner, the subject matter is advanced and complicated to understand... Consequently, it is easy to believe, wrongly, that researchers are disconnected from the general public. Their projects, therefore, remain generally unrecognized and unappreciated, while false information flourishes and becomes more attractive.

Research into oral and bone health is particularly unpopular. There is a general tendency toward denial: this field of expertise elicits aversion, since it is too often associated with pain (fractures) or even disgust (oral infections, oral cancer, etc.).

This collection has the mission of reversing this tendency by informing you of major advances in the field. We want to show you what health research is and share our passion with you. Research is one of the drivers of humanity, but researchers must better communicate and explain how their work contributes to the welfare of individuals, the environment, and society.

In order to highlight the research and its members in an original way, the Network for Oral and Bone Health Research (RSBO for "Réseau de recherche en santé buccodentaire et osseuse") retained two artists in residence, Daniel Ha and Martin PM. For more than a year, Daniel and Martin met with our researchers across Quebec and visited their labs. In the following pages, you can read and enjoy their comics, and thereby discover along with them, the extraordinary work being done by our researchers.

We hope that these pages will inspire you and allow you to see the scientific research in the field of oral and bone health with new eyes. Perhaps it will elicit among the younger crowd the desire to study the sciences and, who knows, become researchers themselves?

RSBO Art and Science Committee
Dr. Christophe Bedos, RSBO Director
Dr. Argerie Tsimicalis, Researcher and RSBO Member
Dr. Marta Cerruti, Researcher and RSBO Member
Dr. Andrée Lessard, RSBO Manager
Martin Patenaude-Monette, RSBO Artist in Residence
Daniel Ha, RSBO Artist in Residence

WHAT IS IT?

WHAT IS THE RSBO?

For more than 25 years, the Network for Oral and Bone Health Research (RSBO for "Réseau de recherche en santé buccodentaire et osseuse") tirelessly supports Quebec researchers and their students in the pursuit of excellence in fundamental, clinical, and epidemiological research. The Network numbers more than 100 researchers and over 300 students predominantly from McGill University, Université de Montréal and Laval University, as well as their affiliated hospitals (notably CHU Sainte-Justine, Shriners Hospitals for Children-Canada, Montreal General Hospital, Jewish General Hospital and Montreal Sacred Heart Hospital).

The RSBO network is funded primarily by the "Fonds de recherche du Québec – Santé" (FRQS). It also relies on partnerships with associates from different backgrounds, notably professional organizations in the field of oral and bone health as well as associations which represent the most underprivileged people in our society. This is how the RSBO network brings together the stakeholders in our social fabric – scientific community, clinicians, populations and users of healthcare services, as well as administrators, decision makers and industries – with an eye toward producing knowledge on health and oral and bone diseases, but also to take this knowledge and apply it.

The actions of the RSBO network fall within the national strategies for promoting health as well as those set forth by the World Health Organization. The Network aims to promote the health and welfare of the Quebec population, to reduce inequalities in healthcare, but also to contribute to the economic and social vitality of Quebec. Actions taken by the RSBO network can, in fact, stimulate the retention or return to employment of more vulnerable people, develop highly qualified personnel, generate the development of new technologies, or encourage scientific entrepreneurship and the production of patents.

Transmitting knowledge is one of the major goals of the RSBO network. This is why we created the Art and Science Committee, which promotes scientific research and health of the Quebec society through the arts. The RSBO network considers that sciences and the arts, far from being antithetical, can in fact mutually feed each other, combine, and ultimately, benefit the entirety of the population.

This comic collection is a creative and original way to raise awareness in our fellow citizens about research done here, especially on a subject like oral and bone health, which can be quite off-putting for the uninitiated. And yet, the research we are doing is fundamental for all of us.

The idea of doing a collection of comics is exactly right coming from the RSBO Art and Science Committee, and a great approach to demystifying everything that happens in our mouth, from the effect of sugar on our teeth to oral ecology, as well as 3D technology to foster stronger bones, and other activities which take place between our nose and our chin…

Due to its excellence in research, the Network is supported by the "Fonds de recherche du Québec – Santé" (FRQS). It seems so very pertinent and important to me that the general public better understand the research being done since, in the end, it is they who benefit from it, even if they don't realize it.

At a more basic level, it is important to raise awareness concerning science and research in the general population: the methods, approaches, questions, and uncertainly, but also the discoveries, results, and accomplishments! It is important to increase the number of opportunities to present science to the population, young or old, so that scientific expertise becomes the first instinctive source we turn to when we ask questions on any particular subject. Calling on art is definitely a good way to stimulate curiosity.

I commend the Network for its initiative in raising awareness for its expertise and projects, and perhaps generating interest among the new generations of students who are wondering about their future. Who knows? Perhaps, despite a little bit of apprehension, this comic collection might help you better appreciate your next visit to the dentist!

Rémi Quirion,
Chief Scientist of Quebec

PROF. GRENIER AND THE SUPER POLYPHENOLS

DANIEL GRENIER, PH. D.

Tenured Professor, Faculty of Dentistry at Laval University
Oral Ecology Research Group (GREB)

Certain consumer products seem banal, but contain fantastic agents who fight bad breath and oral infections. Where are these superheroes, you ask? The answer will surprise you! Professor Grenier presents these masked heroes which he has been studying for ages now...

DANIEL HA

Daniel Ha, also known as Daniel Vinh Ha Thé or Hà Thế Vinh, turns out to be a type of hermit who is ordinarily found huddled in his cavern. In the wild, he can sometimes be seen in a metro car. He is distinguished by the quality of being a rare Homo sapiens who prefers the pages of a real book (a comic book in his case) to the screen of a cell phone. In order to earn his daily bread, he palpates tongues, uses a powerful blue laser capable of transforming viscous matter into a solid block, and accepts being splashed with saliva and blood on his face, neck and forearms. From time to time, he draws, but receives no financial benefit from it.

www.dvhstudios.com
instagram.com/dvhcomics/

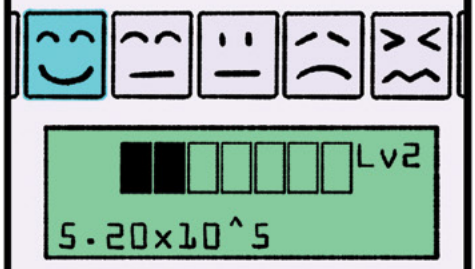
October 2019. Quebec.

In the lab of Dr. Daniel Grenier, Professor of Microbiology at the Faculty of Dentistry at Laval University,

Thanks to a Panasonic machine, we'll be able to determine if my mouth is full of bacteria or not.

5.20x10^5= 520, 000 bacteria in a small sample of my saliva!

However, the machine indicates level 2 with a smiley face. I don't have a lot of bacteria!

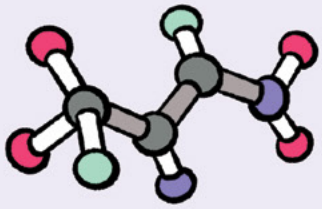


90 minutes earlier.

For a microbiologist like me, the mouth is an ideal model!

Dr. Grenier studies the benefits of polyphenols...

(organic molecules from plant sources) against infections of the mouth.



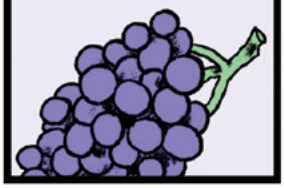
How does a research project start and how does it proceed?

I was looking for a product that can improve oral health in the form of a mouthwash.

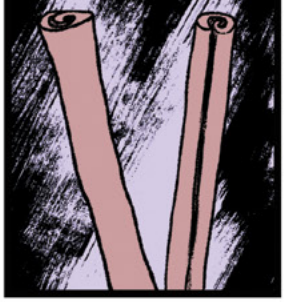
So, while reading about polyphenols in green tea,...

I realized that no one ever looked at the mouth. I also have a colleague, a chemist, who discovered Quebecol, an unique molecule found in maple syrup.

He did tests with resveratrol,



cinnamon,

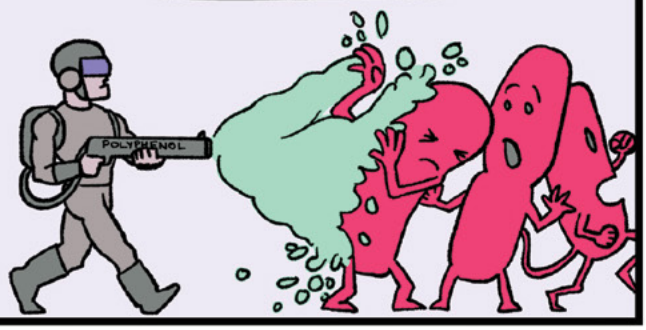


blueberries,

tea and

Quebecol.

The first thing I check is if the molecule has any antibacterial properties. Therefore, I test bacteria that causes cavities, periodontal disease, bad breath, ...



... and I discovered that they work against one of the bacteria that causes bad breath. They could therefore be added to gum, mouthwash, or toothpaste...

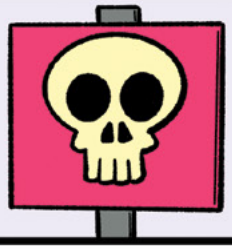
How?

In the first well of a microtitre plate with 96 samples, we add 1mg of the product to be tested; in the second: 0.5mg, ...

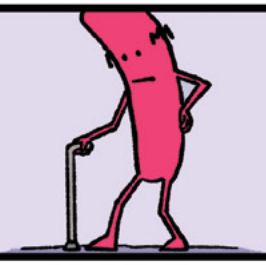
Once that's done, we add bacteria to each one and we incubate.

1ml

If the product inhibits bacterial growth, the bacteria won't grow, ...

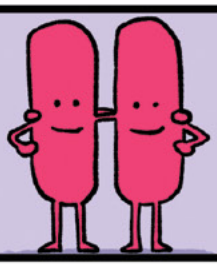


0.5ml



0.25ml

But once a certain well is reached, the product is diluted enough to allow the bacteria to begin multiplying again.



0.125ml

Therefore, if we take the well before the one where bacterial growth has begun, we can determine the *MIC*:

0.0625ml

the minimum inhibitory concentration, or in other words, the lowest quantity of the molecule which can be used to inhibit growth (0.5mL in this example).

Then, we take the contents of the wells before the MIC (where bacteria have not grown) and add them onto a solid culture medium...

Looks like Jell-O

... and if after incubation there are no bacteria, we have found the MBC (minimum bactericidal concentration),

or the smallest concentration that destroys bacterial populations.

In order to test for biocompatibility, I do toxicity tests on epithelial cells.*

I also check other aspects: if it can reinforce the epithelium in the mouth, reduce inflammation, help with healing tissues, ...

*skin-type cells in the mouth

If the epithelium is reinforced, toxins and bacteria won't be able to penetrate it.

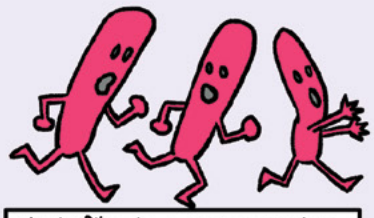
junction between cells

How do we determine if a molecule can reinforce the epithelium in the mouth? By measuring the TER (transepithelial electrical resistance).

This is done with the help of a machine with 2 probes.

An electric current passes from one probe to the other and the machine shows the resistance on the screen.

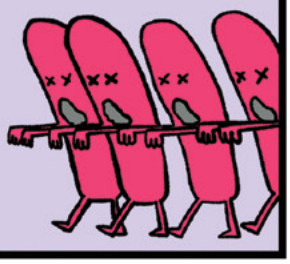
Resveratrol: antibacterial effect, reduces the formation of the biofilm*, protects the junction between epithelial cells, reduces the inflammatory response.



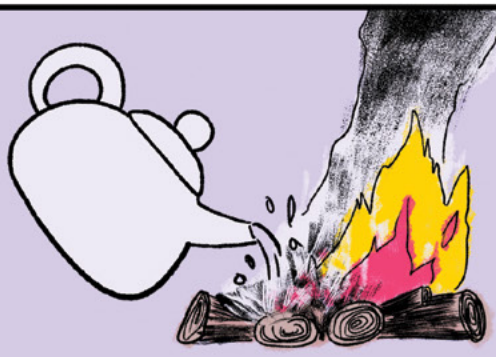
*Biofilm is a community of bacteria.

Cinnamon: inhibitory effect on a specific bacteria that causes bad breath, no negative effect on cells in the mouth after an one-hour exposure... a new mouthwash?!

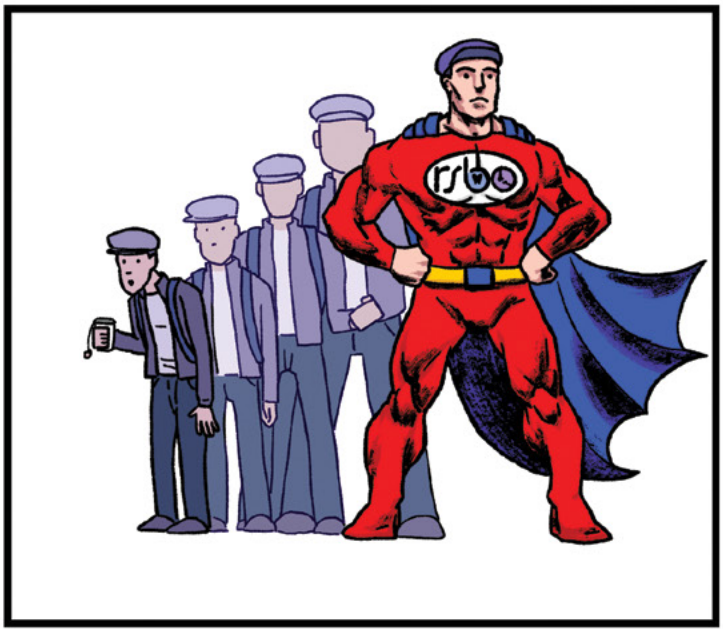
Blueberries: inhibits growth of bacteria that causes periodontal disease, prevents biofilm formation, protects epithelial cells, reduces the inflammatory response.



Green tea: reduces the inflammatory response, inhibits bacteria causing periodontal disease and reinforces the junction of epithelial cells.



Quebecol: reduces the inflammatory response and promotes tissue healing.



For more information on
Dr. Grenier and his work:

https://www.fmd.ulaval.ca/faculte
/nous-joindre/enseignants
/daniel-grenier/

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www.rsbo.ca

ACKNOWLEDGEMENTS

The RSBO network thanks its partners

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Faculté de médecine dentaire Université Laval

McGill Faculty of Dentistry Faculté de médecine dentaire

Université de Montréal

Daniel Ha

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