

# The CARTaGENE voice

VOLUME 13 - DECEMBER 2023

[www.cartagene.qc.ca](http://www.cartagene.qc.ca)

## Happy Holidays and Happy New Year 2024!



The year 2024 will mark an important milestone, the 15th anniversary of CARTaGENE's activities. Thanks to your altruism and renewed commitment, CARTaGENE has 15 years of data and biosample collection. That is 15 years promoting acceleration of health research while lowering the costs. You are valuable partners in the health research ecosystem in Quebec!

Our COVID-19 project, which ended in 2023, allowed the Public Health Agency of Canada to compile data on infection rates in Quebec, understand various aspects of *CARTaGENE for the health of Quebec* vaccines against COVID-19 including the duration of their protective effects, the effectiveness of combination vaccines, and the need for booster doses. These important results will be used to better prepare for the future.



Source image snowflake: Iconfinder.com

The year 2024 will be a year rich in data collection. The goal is to improve and keep CARTaGENE among the leading cohorts in health research. People who have not yet participated in the genealogical study (BALSAC - UQAC) will be offered the chance to do so. Genealogical data is valuable for research, particularly in the field of population genetics. Genealogical data allows for the study of genetic diversity transmission between individuals, a fundamental exercise for medical genetics.

Furthermore, CARTaGENE has formed a partnership that will allow you to take part in an important research project on nutrition and lifestyle habits and subsequently receive a personalized dietary report.

In addition, during the year 2024, you will receive an invitation to complete a new health follow-up questionnaire. This is following our mission of monitoring your health status. Changes (or not) to your health and any new data are of great importance for research.

As an example, your data and biosamples were used by 234 research



groups. These researchers work in public health, epidemiology, molecular biology, genetics and other related fields. To date, they have published 144 scientific articles using your data and samples. Within these research groups, 59 students have written and published theses and dissertations. CARTaGENE is also used by governmental health organizations such as the Institut national de santé publique du Québec (INSPQ) and Health Canada. Your data and samples have helped and will continue to help decision makers in guiding public health policies. Thus, your continued commitment is essential for the future of CARTaGENE and for the health of Quebecers. We thank you for your commitment and trust. CARTaGENE is you!

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## *CARTaGENE in numbers!*

Data used by **234** research groups in Quebec, Canada and around the world!



**15** years of advances in research that will have major impacts on our health!

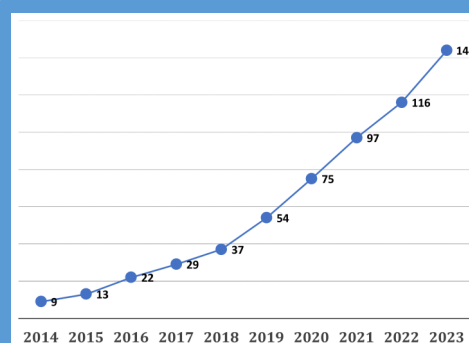


**144** articles published in scientific journals!



**59** graduate theses!

Cumulative number of published articles



# Interview with a researcher



Simon Gravel is a population genetics researcher and professor at McGill University. He is a co-scientific director of CARTaGENE. Last May, an article resulting from research carried out by his doctoral student, Luke Anderson-Trocme, was published in Science magazine ([On the genes, genealogies, and geographies of Quebec](#)). The following interview was recorded on November 8.\*

**CARTaGENE:** Simon Gravel, your research group recently published an article in the prestigious Science magazine. What are the conclusions?

**Simon Gravel:** In this study we were interested in genetic diversity in Quebec and ways of understanding it based on genealogical history. We know of many historical events that have marked the history of the French-Canadian population. We know about the immigration of the first French settlers. We also have documents maintained by the Catholic Church or by the register of civil status, which document marriages, deaths, births, etc. We wondered if we could use these documents to understand the genetic diversity observed in Quebec. Our conclusion is yes, and we have managed to produce a portrait of genetic diversity across the province at a level of detail unique in the world.

**CARTaGENE:** Can you tell us about your research methods? What are you studying?

**Simon Gravel:** I am a population geneticist. This means that I am interested in genetic diversity. Why are we all the same when it comes to certain things? And why does it vary for other traits, for example, eye colour, height, or nose length? Understanding the source of these variations is one of the great questions in genetics. I am interested in discovering how our history, especially the history of population migrations, has shaped this diversity as well as how individuals found partners. How do people decide which partners to choose? How does this influence the appearance or disappearance of genetic diversity over time?

**CARTaGENE:** Do your discoveries in population genetics have applications in health research?

**Simon Gravel:** This is for me what makes this area so interesting, because we ask ourselves really historical questions about who were the first settlers to arrive. Have the ice bridges, formed on the St. Lawrence River, influenced migrations? And how did mutations spread along geographic features? But in the end, what interests us is not only mutations that influence traits like eye colour or nose length, but also diseases. Variations in genetic disease frequencies are found across regions of Quebec. If we want to improve identification of the mutations that cause specific diseases, population genetics can help. For example, following the article we published, I was

contacted by doctors and researchers whose patients carried certain mutations. Their question: is this mutation responsible for my patient's disease or simply the result of chance and migrations. By using our models, and data from CARTaGENE participants, we help them answer these questions. I am excited by some of the results we have. I am not yet ready to announce them publicly, but we believe we have identified some mutations that cause diseases in the Quebec population, thanks to the participants of CARTaGENE.

**CARTaGENE:** How did data from CARTaGENE participants, rather than data from other sources, contribute to the success of your project?

**Simon Gravel:** What is truly unique in CARTaGENE is that we have genealogical data. Some CARTaGENE participants gave their consent to have their family tree reconstructed and connected to civil status records (CARTaGENE note: This work was carried out by the [BALSAC Project](#)). So we have that on one side and on the other we have biological samples from which we extracted DNA and we sequenced DNA, that is to say we read the genome of these individuals. It is truly unique to have access to these two resources: DNA and genealogical history. This combination is rare, maybe unique to Quebec.

**CARTaGENE:** Thank you, Simon, and good luck with your future projects.

## Important collaborations

**Did you know? CARTaGENE collaborates with a significant number of consortia in Quebec, but also in Canada. Your participation in CARTaGENE means you represent Quebec in major national projects. The following are some of the consortia in which CARTaGENE participates.**

**Canadian Partnership for Tomorrow's Health (CanPath):** CanPath is the largest population health cohort in Canada. CanPath is a harmonized research platform facilitating epidemiological research to investigate the causes of chronic diseases including cancer. The consortium brings together six cohorts from different provinces (CARTaGENE for Quebec) for a total of 330,000 participants. Through participating cohorts, CanPath collected data on the health, lifestyle, behaviours, and environments of Canadians. A significant number of participants also provided physical measurements and biological samples, in addition to having consented to the linkage of their data with different administrative health and environmental databases. The size of the cohort and the wealth of its epidemiological, clinical and biological data position Canada among the world leaders in longitudinal research on cancer and other chronic diseases.

**COVID-19 Immunity Task Force (CITF):** The CITF's mandate is to financially support and harmonize knowledge on COVID-19 immunity to assist federal, provincial and territorial decision makers in their efforts to protect Canadians and limit the impacts of the pandemic. The working group also supports laboratory studies that aim to establish the advantages and limitations of immunity tests and associated technologies, with the goal of generating knowledge on the optimal methods and interpretation of these tests. More than 70 cohorts across Canada have contributed to CITF by collecting data throughout the pandemic. From the start of the pandemic in spring 2020 until the end of the global health emergency in 2022, CARTaGENE participants were invited to participate in four data collections, including the collection of blood samples.

**NutriQuébec:** The NutriQuébec team, in partnership with the government of Quebec, is currently conducting a major project on nutrition and health. NutriQuébec evaluates eating habits, lifestyle habits and health. The goal of this project is to improve the health of Quebecers. CARTaGENE collaborates with NutriQuébec to enrich its databases and thus broaden the diversity of research projects that can be carried out.

**BALSAC:** The BALSAC (UQAC) population file is constructed from civil status records in Quebec. These acts were computerized and linked together, allowing the automatic reconstruction of families and genealogical lines over four centuries. Approximately 8,000 CARTaGENE participants participated in the Balsac option during their initial recruitment in CARTaGENE. They agreed to complete a genealogical questionnaire. More genealogical data would make it possible to reconstruct the genome of all the founding settlers, or at least those who contributed the most to the current Quebec genome. According to Dr. Gravel, it would be a valuable tool for research in history and genetics. Researchers could follow mutations over time and thus better understand the distribution of genes and diseases in Quebec. Ultimately, researchers could investigate a wide range of health outcomes. CARTaGENE will shortly send an invitation to participate in the Balsac project to participants who have not already completed the genealogical questionnaire.

# What your data says:

## Medication, an obstacle to healthy eating?



**Jean-Philippe Drouin Chartier is a nutritionist and assistant professor at the Faculty of Pharmacy of Université Laval. He collaborates with CARTaGENE since 2020. His research projects aim to study the relationship between lifestyle habits, medication use and cardiovascular health.**

Healthy eating is one of the lifestyle habits that has the greatest impact on cardiovascular health. However, Professor Drouin-Chartier's research, carried out using CARTaGENE data, highlighted an absence of obvious complementarity between diet quality and the use of medications targeting blood cholesterol, blood pressure or blood sugar. In other words, in Quebec, among people with high levels of cholesterol or blood sugar, or with high blood pressure, those using medication eat less well than those not using medication.

Dr. Drouin-Chartier's team used data from the dietary questionnaire completed by 10,000 CARTaGENE participants. Diet quality was assessed for each respondent based on consumption of whole fruits and vegetables, whole grains, legumes, fish and nuts. The researcher's team also identified different subgroups of individuals for whom more intense medication, in terms of the number of drugs or doses, was associated with a lower quality diet. Notably, this relationship was observed in younger people. These results could indicate that taking medication is an obstacle to improving diet. In addition to individual responsibility, Professor Drouin-Chartier mentions the importance of facilitating access to various health professionals, particularly nutritionists. Finally, it appears crucial to deploy more efforts and resources in disease prevention and health promotion.

These research results are available via three articles published in the scientific journal Canadian Journal of Cardiology Open.



### Reference

L. Leblay, A. Bélanger, C. Desjardins, M. Filiatrault, J.-S. Paquette, et al. Relationship between diet quality and antihypertensive medication intensity among adults with metabolic syndrome-associated high blood pressure. CJC Open.

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**Help us improve CARTaGENE by completing this short survey about your participant experience.**



**Click here to fill out the survey**



### **Thank you for keeping your information updated**

**Have you moved, retired, changed your email address or phone number? Take a moment to send us your new contact information. Even if you move away from Quebec or Canada, you can still stay involved! Keeping in touch with you is essential for the success of this project!**

### **Contact us**



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### **Our partners :**

