



20 Questions with... Guy Sauvageau

Principal Investigator, Institute for Research in Immunology and Cancer (IRIC);
Professor, Faculty of Medicine, Université de Montréal; Hematologist, Department of
Hematology, Maisonneuve-Rosemont Hospital; Scientific Founder and CEO, ExCellThera

20 Questions with 20 Stem Cell Scientists from Across Canada

1. Where did you grow up?

Montreal. I was born and raised in a suburb of Montreal called Laval, in a small township called Fabreville. It was a relatively poor neighbourhood back then.

2. Where did you go to school?

I went to university here in Montreal, to the Université de Montreal. I did my medical school and also a master's degree, specializing in hematology.

I then went to do my PhD at the University of British Columbia in Vancouver.

3. What did you want to be when you grew up?

I think, like many young kids, I wanted to do everything.

I wanted to be a doctor for sure, because I had so much passion for science in general. But I remember I also wanted to be a lawyer.

At one point I said, I'll do both, but then you know, time catches up, maturity kicks in, and you realize that one is plenty.

4. What are you researching right now?

I've always worked on the same thing.

In the clinic, I perform stem cell transplants in patients.

In my lab, I try to understand these stem cells a little bit better to use them more appropriately. In particular, I try to understand how we can multiply these cells, and what are the genes, and the molecules, and the conditions that allow one to multiply these cells, so that we can design better [transplant] grafts for people in need.

My second area of research focus has been mostly on using genetics, and now genomics, to understand the molecular basis of acute myeloid leukemia. I have discovered many genes involved in the disease and have found ways to purify the leukemia stem cells. And my team and I have found a lot of new vulnerabilities of this disease, which we are currently exploring quite heavily.



Guy's first year in his lab at Institut de recherches cliniques de Montréal with Jana Krosil.

5. Why stem cells?

This was back in the days when people like [William French Anderson](#) were starting to do gene therapy for some immunodeficiencies. One very obvious problem with gene therapy in those days – modifying the genome etc – was that when you started to play with stem cells, you would rapidly lose them. I found this challenge quite fascinating.

Basically, it's like a plant that you take out of its environment and put on the table. You have the roots in the air and the plant goes into decline. It's the same thing with stem cells when you extract them from the body, put them in a dish and then try to manipulate them. They are like that plant, dying rapidly.

So, I realized this was a problem and I became very attracted to trying to solve this problem. And that's basically what I've done for my entire life.

6. Who in your opinion, are the top three Canadian stem cell researchers in history?

It's difficult because there's been so many good people in stem cell research.

I trained with one of them, [Keith Humphries](#), when I was in Vancouver.

I would say that [Connie Eaves](#), is certainly another one that I greatly admire, and also [Norman Iscove](#).

All three of them are extremely passionate about what they do and all they are extremely intelligent and insightful as individuals. They are not just there to make more and more observations, instead each of them is working to really get at the root of the issue and solve the problem.

I like people that are insightful and that can really stick to a problem and try to solve it, and these guys have done this. This contrasts with some perhaps higher profile people who may have a nicer publication record, but the work is not as equally integrated and insightful.



Guy with co-researcher in Pierre Chartrand's lab in 1991 before starting his PhD with Keith Humphries.

7. What are your predictions for stem cell advances in the next 5, 10, 20 years?

A couple of things come to mind.

I would say soon, in my area of expertise – we are going to be able to do with adult stem cells what we have already previously done with embryonic stem cells – which is to expand the cells, genetically manipulate them and put them back into people. I believe we are really getting close and I think it has the potential to bring another Nobel prize-level discovery into our field. I believe we will have the understanding of how adult stem cells self-renew and operate and how we can multiply them outside of the body at will, genetically manipulate them, and transplant them back. I see this as happening within five years.

Within 10 years, I think we will start to see some induced pluripotent stem (iPS) cell technology really getting established into clinical trials which will provide real results and lead to the ability to cure some diseases using iPS cell technology.

20 years from today, I think we will be able to build on the knowledge I have mentioned, taking the benefits of *in vivo* activation of adult stem cells and preventing degenerative disease like getting old, and really relieve people of the deep dive of old age. We will be able to provide real solutions to address diseases like Alzheimer's and Parkinson's.

This will require extensive knowledge. If you take, for example, the blood system – which I focus on – the stem cells are very interesting, because they go everywhere [in the body] in contrast to gut or skin stem cells. We have learned that they generate mature cells that are responsible for the proliferation of our epithelial tissue. Your gut regenerates because there is a special type of lymphoid cells from your hematopoietic stem cell that resides literally beside the gut stem cells and feeds it growth factors. If you remove the blood system, your gut will collapse under injury.

What is very interesting, which we have recently learned, is that as we age the cells become less and less capable of maintaining the epithelial cells. So, there's more and more evidence that part of aging is due to the fact that the blood system is not feeding the epithelial cells anymore. With this understanding we can now work to find ways where we could take genetically manipulated cells and transplant them back into someone with the goal of impacting and perhaps reversing the aging of most epithelial tissues in the body.

I believe this will happen. That is where I see the future in 20 years.

8. What would you describe as the most significant moment in your own research career?

It was fairly recent. Working with a colleague Anne Marinier, we identified a small molecule in a phenotypic screen. We optimized it and learned it leads to stem cell expansion. We have now brought this into the clinic with the help of Dr. Sandra Cohen and transplanted it into about 70 patients in Canada and the US and it is working well.

We did not understand how this works until very recently in large part because of the work of Jalila Chagraoui and Simon Girard in my laboratory. We now understand about 90 per cent of how it works, and it is truly fascinating. It is a new mechanism of action that is involved, and it is not just leading to the stem cell expansion in the (petri) dish, but also appears to be what is responsible, in the animal, in vivo, for governing the multiplication of our stem cells.

To me, the discovery of this mechanism of action is the most significant discovery that we have made to date.

9. What are you reading right now? What is the best book you ever read?

I am currently reading a very interesting book called *The Coddling of the American Mind*. It is written by two university professors, and I have been learning a lot and have found it very interesting. For me, this is new and not always easy to completely understand what it is all about: how good intentions and bad ideas are setting the coming generations for failure. I do not understand this and feel left out. Because, as you age, you want to be part of the gang. You don't want to isolate yourself and therefore you need to understand your world.

These are the kinds of books that I like to read – I am not really a novel person. It is not that I don't like them, but I always have something to do on my table and I am a bit hyperactive.

In terms of the best book I have ever read, one that has always fascinated and taught me a lot was called the *Lucifer Principle*, by Howard Bloom. It is a fascinating book, covering the decline of all of the empires – the first and second Chinese empires, the Roman empire, the British and now the American. It is so fascinating to see these patterns reproducing themselves over and over again.

So, the books I enjoy reading are research oriented and about questions that I ask myself.

10. Who is your favourite scientist?

By far, Marie Curie. I wish I had known her.

I read the biography written by her daughter, Eve. I would say, I have read most of the biographies of the people who have forged our world, and in my opinion, Marie Curie was a spectacular person.

She came from this poor family in Poland, moved to England, was passionate about chemistry and met this guy, Pierre Curie and is part of the discovery of radioactivity. She goes on to win a second Nobel Prize, and at the same time, during the war, she uses Cobalt technology to basically create X-ray technology to help soldiers who have broken arms and legs. She does all of this interpretation herself, loses her husband in an accident and continues on to get that second Nobel. She was tireless, travelling the world to raise money so she could extract enough radioactive material to do her research. She was quite frankly, a remarkable individual from what I have read.

11. What in your opinion is the single most important health science or biomedical breakthrough?

It's a tough question because there are so many. I would say vaccines, and not just because of what we are experiencing today, but because of what we had before.

The variola (what we call in English smallpox) discovery by Edward Jenner was really spectacular. And Louis Pasteur with his vaccines for rabies and tuberculosis. And Robert Koch with the hypothesis that it is a germ that causes disease. I would put vaccines at this realm because not just today, but in the past, there have been devastating epidemics. There is a fantastic book about this, describing some of these fascinating diseases and our ability to fight them through vaccines.

There are so many amazing discoveries, but this is up there.

12. What are your hobbies outside of the lab?

I have many. I have also been in love with cycling. I commute by bike and have recently been doing more and more mountain biking. As I grow old, I find that I feel less and less safe on the road, so I enjoy mountain biking.

I enjoy kayaking, particularly where there are whales I can watch. I go up north here in Quebec to do this. I also like camping – I have a 4X4 van which I take out and go camping.

Basically, I enjoy most sports. I also jog and swim – I swim almost every day.



Enjoying the view from Mont-Sainte-Anne, Quebec.

13. What is your favourite country to visit? Why?

Of all the places I have visited, I would say it is Norway and in particular, the Lofoten Islands.

It is extremely pristine there. You can climb up and see these views that are just breathtaking.

I like the Scandinavian way of doing things. They are very generous societies, very oriented toward the wealth of the entire population, not a few individuals. The people themselves are in very good shape, in general. And I like their culture.

It is absolutely a place that one must go, but it is difficult to go there as it is fairly restricted. You can only travel there by boat, and you can camp and there are so many places to hike. It is kept so clean – the people just really know how to do it.

14. It is your night to cook – what is your go-to meal?

I enjoy cooking more and more. I was really a bad cook until about ten years ago. My most recent go-to meal was enchiladas. I mostly cook vegetarian, using things like tofu. I am getting there – I am working at it.

15. What is the best way to start your day?

I always start my day jogging on the mountain with my dog and then head for a swim to cool off. That is the best way to start my day.

On the weekends, when we are out of the city, I start the day with a good latte and then walk the land with the dog.



Guy and his best buddy Pablo.

16. What are the top three songs in your personal playlist? What is the most embarrassing song on your playlist?

They change almost every month. My favourite song at the moment is a fairly new song by Les Cowboys Fringants, called *L'Amérique pleure* (crying America). It talks about how most of [us] run around all day for no reason and we forget about what is really important, like family and friends. It is a very good song.

I also like their song, *Les Étoiles Filantes* (Flying Stars).

The third song that I like by them is, *Sur mon épaule* (On my shoulder) which tells the story of friendship and when people have difficulties.

The most embarrassing one right now on my current playlist is probably *I Quit Drinking*, by Lany. I wouldn't say that is the most embarrassing one ever though. That would be Céline Dion's, *Pour que tu m'aimes encore*.

17. If not a scientist, what would be your dream job?

An opera singer. But I can't sing.

18. What is something you think everyone should do at least once in their lives?

Spending time to really help people in real need. By that I mean people suffering from debilitating illnesses like Alzheimer's, or children who are suffering. And really spend time – like weeks or months – so you really understand. This experience will stay with you and influence you forever. It will help you to better accept challenges as they come.

So many people build mountains on little hills and don't appreciate the really important things. It is often only when we lose things that we really appreciate them. When you work with people who have real challenges, you learn to better appreciate what you have.

19. What is your favourite snack?

I never snack. Just kidding...

I would say a bag of chips in the afternoon. It makes me feel guilty every time, but I love it.

20. Your work is all about discovery and innovation. What is one thing (personally or professionally) that you still like to do the old-fashioned way?

Writing with pen and paper. I need it – think better that way. I write everything still, the good old way in my little books.

