



20 Questions with... Massimiliano Paganelli

Pediatric Transplant Hepatologist, Head of the Liver Tissue Engineering and Cell Therapy Lab at CHU Sainte-Justine; Assistant Professor of Pediatrics, Université de Montréal; Co-Founder and Chief Executive Officer, Morphocell Technologies Inc.

20 Questions with 20 Stem Cell Scientists from Across Canada

1. Where were you born? Where did you grow up?

I was born and raised in Rome, Italy, then moved to Belgium in 2008 and to Canada in 2012.

2. Where did you go to school?

In Rome as well. I completed my medical degree at Sapienza University of Rome, trained in pediatrics in Rome and in pediatric hepatology and transplant in Naples and in Brussels (Belgium). And I completed my PhD in hepatology and cell therapy at the Catholic University of Louvain, also in Brussels.



Downtime from medical school
Italy, 2002

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

I've always wanted to be a doctor, then I had a phase where I was more into engineering. I started my first year of university in engineering then moved back to medicine. I ultimately ended up in tissue engineering, which is a combination of both.

4. What are you researching right now?

I'm using stem cells to try to develop new treatments for liver disease, which is the broad aim of my research overall. We have several different diseases that we are tackling right now, and we are trying to both understand the diseases and developing new cell therapies to treat them.

Among other diseases, we are studying Tyrosinemia type 1 which is a disease that's a very rare but more frequent in Québec (in both children and adults) compared to the rest of the world because of the [founder effect](#). We are also researching other pediatric diseases, mostly congenital forms of liver fibrosis and cirrhosis. We use stem cells to model diseases by growing small livers in the lab to reproduce what happens in the liver of these children, and also to understand how to improve the treatments.

But the most important part of my research is oriented towards the treatment of liver failure, which is the final outcome of most liver diseases for both children and adults. And since the liver has more than 500 functions, liver failure has a big effect on the body, causing major complications affecting several organs and ultimately leading to death. We are developing a new cell therapy to treat liver failure at large. So, without focusing on any specific disease but actually addressing directly what's the hardest and most severe consequence of liver failure. This is the technology that triggered the birth of [Morphocell Technologies](#), the regenerative medicine

start-up company that I founded with Dr. Claudia Raggi.

5. What attracted you to stem cells?

Basically, the fact that they are an unlimited source of cells, so it can have huge potential to generate tissues in the lab without needing to go and get samples from donors. This is a major tool to both model the diseases and to develop new treatments. Since stem cells can become any tissue, in our case the liver, they bring with them the genetic material and information of a patient. So, when we don't know what causes a disease, we can use stem cells from a patient to recreate a "liver-in-a-dish" harboring his/her genetic background and study the disease in the lab or assess new or personalized treatments.

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

When I succeeded in convincing my wife (Dr. Claudia Raggi) to work with me in the lab. It wasn't easy to convince her, but it has been the key to our success. Claudia is a uniquely talented medical doctor and scientist who has been my equal partner in science as in life for the last 14 years. It's been my face on the projects, but for all the results, discoveries and accomplishment it's been the two of us working together. Between the kitchen table discussions and the work in the lab, we managed to develop all the technologies we're using now for cell therapy and on which Morphocell Technologies was created. The most significant moment for the advancement of my research was definitely that one.



Early days in the lab with Dr. Claudia Raggi, 2015

7. What is the most significant stem cell discovery or advancement over the last 20 years? The last 60?

Over the last 60 years, first the discovery of stem cells by Canadians Till & McCulloch, then embryonic stem cells.

And in last 20 years, I would say induced pluripotent stem cells as that discovery has opened new exciting possibilities and is crucial for the kind research we conduct in our lab.

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

I think in five years we will see more clinical trials using stem cells. There are already many that are ongoing, but we will have more clinical trials using cell therapies derived from pluripotent stem cells. And we are on track to have our stem cell-derived encapsulated liver tissue to be in clinical phases by then.

Also, over the next five years I expect significant discoveries in all the fields originating from the use of stem cells and organoids for disease modeling.

In the next 10-20 years, I expect several of these stem cell-derived therapies, ours included, to be approved and routinely used in the clinic to treat actual patients. This is what we are working towards.

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

Sequencing the human genome has been a major breakthrough and goes back to the discovery of DNA. This originated into a cascade of countless discoveries and is driving modern medicine.

Then if you look at my practice, liver transplantation is what has changed my patients lives, most of all. So that's the medical breakthrough that I face every day and has been more impactful for the children I take care of.

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

S.P.Q.R. by Mary Beard, a book about Roman history.

I would say, there are many that are my favourites. An amazing book I read recently is "Beneath a Scarlet Sky" by Mark T. Sullivan. When I was younger, the books I liked the most were George Orwell's 1984 and all the adventures of Sherlock Holmes.

11. What are your hobbies outside the lab?

I have children, so I try to protect my down time.

I have many hobbies but little time, so I prioritize spending time with my kids. I love to spend time with them, we like to go skiing during the winter or cycling and playing any sport during the summer.

12. What city or country would you like to live in?

Rome, I plan to retire not too far from there, when the time is right.

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

I would say that my dream job is being a scientist because my day job is being a physician. I love being a doctor, but I see being a scientist as the passion I have the privilege to pursue.

14. What job would you be terrible at?

I cannot do repetitive jobs, so I would be terrible at an office job where you would do the same thing every day. I cannot do things a in predefined manner all the time. I am used to reacting to emergencies and unexpected situations.



Ready for takeoff! 2019

15. What is the best piece of advice you have ever been given? What advice would you give to a trainee just starting out?

I think the best piece of advice about science that I have been given was to trust the data. That's something that everyone says, and that's nothing new, but it can really change and shape your activities as a scientist. You really have to trust your data, even more when it goes against your beliefs and your hypothesis.

The advice I would give to someone who wants a career as a clinician scientist is to love what you do and be resilient. It's going to be hard; you will have doors close in your face, and that's fine as it takes time and effort. You need to love it so you can be resilient enough to go through all the hurdles, and you'll get there.

16. What skill would you like to master?

I would really like to improve my ability to adapt to Canadian winters... My Italian DNA really struggles below -5°C!

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

Homemade pizza.

18. What website do you visit most often?

New York Times and PubMed.

19. What is your favourite movie?

The Matrix.

20. What do you wish you knew more about?

I would like to know more about astrophysics. Everything concerning space and the universe fascinates me.



Climate March Montreal, 2019