

Paul Frenette: "I am proud that two of my 'students' are now great researchers who are linked to the CNIC"

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Paul Frenette, Albert Einstein College of Medicine, USA

Dr. Paul Frenette is Founding Director and President of the [Ruth L. and David S. Gottesman Institute for Stem Cell and Regenerative Medicine at the Albert Einstein College of Medicine in New York](#) (USA). His research has been focused on the microenvironments of stem cells and their role in health and cancer, and on the vascular biology of sickle cell disease. His laboratory has discovered the critical role of the sympathetic nervous system in the regulation of hematopoietic stem cell (HSC) output from its niches, in the pathogenesis of acute myeloid leukemia, and in the invasion and metastatic spread of prostate cancer. He has also provided valuable information on the circadian clock in the release of stem cells from the bone marrow and has identified cellular components that form niches in the bone marrow, which can affect stem cell therapies. Dr. Frenette is a member of

the [American Society for Clinical Research](#) and the [American Medical Association](#). He has served on the editorial boards of **Blood, JCI, Stem Cell Report, among other scientific journals, and is a member of the Oncogene, Medical Advisory Board of the New York Stem Cell Foundation.**

- ***Your lab is doing research to understand how hematopoietic stem cells circulate in vivo. Can you give us a preview about some of your lines of work?***

One of the lines of research we have in our laboratory is to understand how the niche in which hematopoietic stem cells reside is formed, to know the environment that regulates these stem cells, especially in the bone marrow. **It is known that hematopoietic stem cells continuously circulate from the bone marrow to the blood compartment (and vice versa) under homeostasis. Recent studies have focused on the role of the nervous system in regulating the niche of these cells in the bone marrow.** As we further investigate the mechanisms by which hematopoietic stem cells are mobilized, we find that exposure to constant light significantly reduces the efficiency of mobilization after administration of hematopoietic cytokine G-CSF. G-CSF is the most widely used bone marrow cell mobilizer in the clinic for collecting stem cells for transplantation. This finding led us to evaluate how cells are released from the bone marrow under steady state conditions. We have already described the phenomenon and its mechanisms.

In the same way, we are also working on the mechanisms of sickle cell vasoocclusion. We do this by investigating sickle cell disease, a hematological disease characterized by mutations in the genes that make up blood and produce vascular occlusions. We have already begun to study the mechanisms that mediate in the cause of these vascular occlusions in the disease.

- ***You're also working on cancer, more specifically the role of the nervous system, right?***

Yes, we are exploring the role of the nervous system in cancer formation and metastasis using xenogenic and transgenic models of prostate cancer. These studies have led to the identification of novel functions for the sympathetic (adrenergic) and parasympathetic (cholinergic) nervous system in the initiation and metastasis, respectively, of prostate cancer.

- ***Three areas of research and on aging?***

We have carried out some research in the field of bone marrow, specifically in its microenvironment, and aging. What we are learning is how important it is to have a healthy niche in the bone marrow for healthy aging. But we are still working on it.

- ***You studied medicine, but quickly turned to research. How important is translational research?***

I'm both things: a clinician and a researcher. I'm a hematologist, and that's how I started my career. I came into research later, but I already had all the background of the clinic. For 12 years of my life, my career was medicine. And in my case this knowledge and training has been extremely useful in asking me questions that were clinically relevant. Our work in the laboratory, in fact, is very translational and often oriented towards clinical trials. We work closely with many doctors in clinical trials. You could say I'm a doctor who spends most of his time doing research.

- ***What happened to make you put your medical career on hold and devote yourself fully to research?***

You could say I wanted to have all the options available to me. When I started medical school I was very interested in scientific research, although I had no idea what that was, or if I was going to like it. I did know what medicine was however, and I liked it, or should I say, I like it, but I wanted to know what the human body was like and how it worked, and so I decided to take this path. **But always thinking that if research was not my thing, or I did not like it, I could go back to medicine.** In fact, research was quite rare some years ago, but has now become more common and offers very good results. I have to admit that I have always wanted to do a doctorate, but I haven't yet. I don't have time, and learning to do science takes a lot of time. Although, it is fair to say that I have spent much more time in a laboratory than if I were doing a doctorate.

- ***Do you remember anyone who oriented you at that time?***

Unfortunately, when I decided to give up medicine for science I had no one around to advise me. Actually, my career is linked to my English learning. Despite living in a bilingual country, like Canada, I have always studied in French, as I lived in Quebec. When I had to decide where to do my residency, I chose [McGuill University in Montreal](#), where I could gradually improve my English while doing my welfare work. The next step in perfecting my English was going to the United States, and there, all the programs I was interested in were more science than medicine. That's how I got into science in Boston, at the [Massachusetts Institute of Technology](#) (MIT), and at Tufts and Harvard Universities. There I had two mentors who really helped a lot in changing my way of thinking, more medical than scientific, and guided me in asking the important questions, etc. It was very helpful.

- ***And, now do you consider yourself to be a good mentor?***

I try to; I am proud that two of my 'students' are now great researchers who are linked to the CNIC: **Simón Méndez Ferrer and Andrés Hidalgo.**

- ***What's a normal day like in your lab?***

I'm one of those who can say that most of the time I'm doing science in one way or another. I divide my time between my two projects, the Stem Cell Institute or my own lab. Which is very rewarding for me.

- ***In your opinion, what is the one indispensable quality a scientist should have?***

It depends on the circumstances, but I think the best quality is the ability to adapt to the different situations a researcher will encounter. As you advance in your scientific career you have to adapt to different situations; predoctoral, postdoctoral, group leader, etc. Each moment requires its own skills and abilities.

- ***You already knew the CNIC. How do you think it has evolved over the years?***

I was at the CNIC for the first time 12 years ago. I have been able to see how the centre has grown and evolved and, in a way, I can say that I have contributed to this with my 'students' Andrés [Hidalgo] and Simón [Méndez Ferrer]. And I have seen the impact of the CNIC on science in Spain, but also outside its borders. You can say that it is an institution that is very close to my heart.

Dr. Paul Frenette participated in the CNIC Conference entitled "New concepts in Age-related Cardiovascular Disease".

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