



## **Personalized Medicine Featuring Patrizia Casaccia, MD, PhD, Mount Sinai School of Medicine**

---

So one of the major areas of interest in the lab is to understand how myelin is formed. And in order to do that we can study how myelin develops in young individuals growing up.

And what we can see is that if you think of an analogy of myelin as being a car where myelin production is going to be measured by how much the car can drive

You can envision how in order to allow the car to move, so to allow myelin to form you need to have your foot on the accelerator and not have anything on the brakes.

The way in reality development works is that first these cells that are called “progenitor cells” have the equivalent of “putting the foot on the brake”.

So that there is no myelin when the child is very young, there is no myelin when people get very old in the case of re-myelination failure.

In both cases very young or old or also in cases of multiple sclerosis with re-myelination failure the problem is that there is a lot of emphasis on the break and therefore new myelin cannot be formed.

So what we've been trying to understand is “Why are there so many breaks and how can remove them?”

And this is what we're showing also at these ... this meeting is that we have identified new ... we have developed actually with some chemical engineers new compounds that would act precisely on this mechanism or what allows the progenitor to put a brake so that we can remove it.

And this is where we have really tried to understand whether environmental causes can affect gene expression thereby balancing acceleration versus breaks.

So we have to understand right?.. You can envision that there has been a lot of emphasis and we've been studying actually this for a very long time.

But about the role of environment on genes, right? We heard also during the first lecture that... by doctor Heffler ... the importance of environment-gene interaction.

And while that talk was more focused on the immune system we have been asking the same question in the brain.  
And our question is, "How does exercise, diet, the type of food that you eat - microbiome- affect myelin gene expression?"

And you can envision that environmental influences might have a very deep effect on the life of a patient.

They do not replace the medication. They do not change the genes. But they do affect the ability that the brain has to repair itself.

So we have very interesting data in animal models of the disease that definitely very strongly support the effect of the environment on potentiating brain repair.

Conversely, we also have interesting data suggesting that by diet, or sedentary life could just decrease the repair ability of the brain itself.

And more recently we are ... we also have started this very interesting project in patients in and we're a part of these the consortium that we have created with that Sergio Baranzinni, UCSF and Sarkis Mazmanian and Rob Night,

Where we are trying to address also the effect on the microbiome itself. So there is a lot of interest right now to try to translate those observations into clear indication.

I know that for a patient it's a critical question, - "Can I do something for the disease? Right? And I mean, "I'm taking my medication and sometimes there is some level of frustration." Right?

So my hope is that we can really develop a scientific basis to support this wellness approach with patient.