

## **“Nervous System Repair and Protection”**

**Rick Somers talks with Dr. Peter Calabresi**

**RICK SOMMERS – INTRODUCTION:** As we come face to face with multiple sclerosis, some of the many faces we come into contact with are the researchers and doctors who are on the front lines turning our hope for a cure into action by tackling the mystery of MS from as many different angles as the people it impacts. During MS Awareness Week, the National MS Society is introducing you to six great minds in MS research who are changing the face of MS. Tune in each this week to learn how we are getting closer to the cure – one face at a time.

**RICK SOMMERS:** The phrase “from bench to bedside” describes research that translates findings from the laboratory into improving the daily lives of people with MS. Through his research efforts, Dr. Peter Calabresi, Director of the Johns Hopkins MS Center in Baltimore, is helping to forge this very path. With funding from the Society’s Promise 2010 Campaign, he is leading one of four teams of investigators who have won \$15.6 million in research funding to focus on nervous system protection and repair in MS. Dr. Calabresi will talk with us about some of his fascinating and complex work and why it is important in unraveling the mysteries of multiple sclerosis.

**DR. PETER CALABRESI:** Good to be here.

**RICK SOMMERS:** You heard me mention in the introduction nervous system

repair and protection. Tell us exactly what that means in layman's terms.

**DR. PETER CALABRESI:** Well, these are relatively new terms in the MS research field. In the past we've been very focused on the immune and trying to turn the immune system off from attacking the myelin, but now we're shifting gears, if you will, and what we're trying to do is prevent things from getting worse by protection nerves that have lost their myelin from undergoing damage as well as we're trying to repair things. We're trying to make people who are sick with MS get better. And in the past, that seemed like science fiction. How could we repair brain tissue? But there are some evolving, very promising strategies to help actually remyelinate nerves or get those nerves to function better.

**RICK SOMMERS:** Speaking of science fiction, I'm going to ask you to look into your crystal ball and see what you think the near future holds for a therapy that could repair central nervous system damage.

**DR. PETER CALABRESI:** In the near future I think we're going to look into tapping the resources that are already available within the nervous system and making them more efficient. And so what I mean by that is that we know that there can be partial remyelination within MS brain plaques. It's just that it's never a hundred percent or as efficient as we would like it to be. Through scientific research we've been able to understand how this process is working and why it's not complete, and I think that we're identifying what are called growth factors that can turn the cells on that make myelin and make them better at remyelinating. And it turns out that there is actually a type of stem cell within the brain that if we can turn that on, we can grow new myelin-making cells right from one's own brain tissue. To me, this seems to be

the most directly applicable kind of research.

**RICK SOMMERS:** You're working on a project focused on ways to protect immune system damage, and how exactly does that translate to MS patients?

**DR. PETER CALABRESI:** What we're trying to do basically is stop MS in its tracks. We are hoping that if we can prevent further damage and protect the nerves, that even though folks may still have MS, we can prevent them from getting worse. Now that we understand that one of the major things that causes disability in MS is damage to the underlying nerve fibers that we call axons, if we could protect those axons and prevent them from unraveling, if you will, then we think that we can keep people functioning better for much longer periods of time.

**RICK SOMMERS:** What exactly does that mean to somebody with MS today?

**DR. PETER CALABRESI:** All these therapies take a little while to work and we have to have a way of measuring that. For what we're doing, we're going to need ways of actually measuring the myelin in the axons themselves. And so we've developed new imaging techniques that give us a different kind of information that we think will allow us to determine whether a drug is promising enough to do a large clinical trial with. And then, finally, we're actually going to be doing the clinical trials. And so that there are some drugs out there that are on the market and have approved FDA indications for other diseases that turns out that these drugs actually have some effect on protecting nerves. And we think it's time to move forward and actually just test those drugs. One of the approaches that we're working on is using an old drug called erythropoietin, and erythropoietin or, EPO for short, is a drug that's FDA approved

for the treatment of anemia. And the way it works is that it boosts red blood cell production from the stem cells in the bone marrow. Recently some of the investigators at Hopkins and other places around the world have found that EPO actually is protective for nerves, and so it prevents them from undergoing this dying-back damage that happens after they've lost their myelin. Obviously if we had a drug where we have a known safety and side effect profile that would be easy to give sort of as a one-time injection right at the time of an attack, that we could save tissue and prevent further damage. That would be a major advance and it's something that we think we can do right now.

**RICK SOMMERS:** It's an exciting time.

**DR. PETER CALABRESI:** It is an exciting time and there are a lot of other drugs that we think that are out there like EPO that may be similarly applicable to MS, and so we're also trying to generate screening models. We have culture dishes of nerve cells where we can add these various different drugs and one of the major things that I think we need to do in the MS field is screen lots of compounds, because there are literally tens and thousands of different kinds of drugs out there. And if we can test them in some kind of high throughput system and find the ones that look to be the most promising in the laboratory and then rapidly test them using our new imaging methods, then we can hone down on the ones that we'll bring forward to the clinic and I'm very optimistic that in the next five years that we can identify several different compounds that are worthy of testing and hopefully will show efficacy in MS.

**RICK SOMMERS:** I was curious how patient translates to researcher in a lab. We have this vision of researchers huddled over their microscopes and test tubes and I am

curious how researchers really internalize that and apply it towards MS patients who are affected by what they're doing on a daily basis.

**DR. PETER CALABRESI:** For me, I just want to cure the disease, so whatever it takes. And so patients really are my motivation. When I see the people who we can't help, that makes me want to go back to the lab and work harder. And patients also are the inspiration. So sometimes when you talk to people who are affected by the disease, they give you ideas. And sometimes we take those ideas and test the theories back in the research world. So there's a give and take, and I think that needs to be part of the process.

**RICK SOMMERS:** Dr. Calabresi, I guess this would be the \$64,000 question. From your perspective, how do you think we protect the central nervous system from future immune attacks?

**DR. PETER CALABRESI:** Well, I don't think it's going to be just one way. The nervous system is incredibly complicated. Think about it. It's like a computer where there are multiple different things happening at the same time. And so it's not going to be a simple one-step process, but I think the more we can tease apart the critical factors that are happening, that have gone wrong, and then try to prevent that from happening and repair them, that we'll be successful. And so what we're doing is we're going to be looking at problem combinations of therapies where a patient may take immune-modulating therapy to turn off the immune system, a remyelinating therapy to help make new myelin, and an axon nerve fiber-protecting therapy to prevent those nerves that have lost their myelin from undergoing further damage. And if we can put these pieces together, I think that will be our best chance for making people better. I'm

incredibly optimistic about the future of MS research. We have the tools now to dissect apart all the different aspects of MS.

**RICK SOMMERS:** Well, you've given us some good ideas and, again, we want to thank you for spending some time and sharing some of your insight and thoughts with us, Dr. Peter Calabresi.

**DR. PETER CALABRESI:** Thank you very much.

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**RICK SOMMERS:** The National MS Society is proud to be a source of information for you about multiple sclerosis. Our comments are based on professional advice, published experience, and expert opinion, but do not represent individual therapeutic recommendations or prescription. For specific information and advice, consult a qualified physician. If you have a question that wasn't addressed, please email us at [msawarenessweek@nmss.org](mailto:msawarenessweek@nmss.org). If you would like more information on multiple sclerosis, click on the Resources link on your screen or call your nearest chapter at 1-800-FIGHTMS. That's 1-800-344-4867. Or visit the National MS Society's Web site at [www.nationalmssociety.org](http://www.nationalmssociety.org). Funding for this program was provided as an unrestricted educational grant from Serono.