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### Imaging Biomarkers: MS Progression in Focus

#### Announcer:

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#### Dr. Freedman:

This is CME on ReachMD, and I'm Dr. Mark Freedman from the University of Ottawa in Ottawa, Ontario, Canada. And with me is my colleague, Ahmed Obeidat.

Ahmed, can you tell us about the use of imaging today in detecting and monitoring MS progression or activity?

#### Dr. Obeidat:

Mark, this is a very important question because it's the future. Like, we're looking at technology. And one of the things we have to really distinguish between is, is what is a really clinically useful type of tool that we can have access to at this point, versus what is a research tool to tell us about MS progression? And it's been kind of growing now, bringing some research tools hopefully to the clinic in the future. And I'm going to talk a little bit about some of the research tools that we are going to see and we are seeing utilized to look at monitoring MS progression, but also to, in a way, predict MS progression, too. And we're kind of talking about one of these kind of hot topics now with something called paramagnetic rim lesions, which people think it's a kind of a reflection of maybe microglia lining in the central nervous system, and maybe it's kind of telling us something about the prognosis of progression and it does correlate in some studies. The presence of those lesions correlate with disease progression in some studies. But it's very hard to detect in clinical practice. It's not yet in prime time for us to use it in the clinic, but maybe in the future we'll be able to, especially with the use of some technology like AI-mediated or related, some programs.

The other thing that is really gaining interest is the choroid plexus size or enlargement in multiple sclerosis. And people are looking at this to correlate with disease progression. Some of the other important advanced MRI techniques is volumetrics. And we know the whole brain volume has its own problems, but there are other tools to look at. Gray matter volume, right? Or cortical atrophy itself or following this over time. Thalamus, we keep forgetting about the thalamus. It's the relay station in the brain, right? It tells us about what's happening from the spinal cord up and from the brain down. And that's an area of the brain that deserves more attention and could be actually utilized in clinical practice with the proper software programs.

The other thing that we can think about is – and we forget often about – is the spinal cord. And that's, to me, in my practice in the clinic, is what I actually use to talk to patients. I say people tell me, "Why I'm getting worse? Why I'm progressing and I'm not having any new lesions on MRI and I'm not having relapses?" I say, "Well, let's look at your spinal cord today and let's look at it 5 years, 10 years ago. And you can see this atrophy or loss of volume in certain areas." And I do use this in my clinical practice to explain to patients about progression.

So there are ways to think about it, and there are ways to get or integrate imaging into prognosis in MS.

**Dr. Freedman:**

I think you raise a very important point about the so-called clinical MRI paradox where patients are getting worse and they're not having any new activity that you can see. And maybe it's all in the spinal cord and it's such a small area you're not going to pick up small lesions, but by the time you see atrophy, it's probably already too late. And people have been trying to measure this for a long time and it's just the accuracy is off. Maybe AI will help us in this regard with the volumetrics, but it all comes down not just to the analysis, but the type of scan that you have done. When you do repeated scans on different machines, using different slice thickness and all sorts of things, you cannot do those kinds of volumetric analysis. It really is important, and maybe sometime in the future, AI will allow us to get that positioning of the patient perfect, call up, say, the profile like we do in clinical trials, reposition the patient perfectly, and then those volumetrics will become somewhat useful to the clinician. But in terms of the pearls and, I guess, central vein, does that require a special sequence? Should people be asking for something from their radiologist?

**Dr. Obeidat:**

Yeah, I think it's important to ask radiologists to obtain a susceptibility-weighted imaging for patients and then also flare imaging. And then if you really want to go fancy and ask them to do some overlap between some sequences, you could get some phase imaging and some other imaging that can show you this. I often ask them to get SWI for us on every patient, and then we kind of try to look at this sometimes. But it's going to be coming to practice. I think it's just a matter of adopting the techniques.

**Dr. Freedman:**

Well, this has been a brief but great discussion, Ahmed. I hope everyone found it interesting. And thank you for tuning in and listening to us this afternoon.

**Announcer:**

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