National Multiple Sclerosis Society

MS Learn Online
Feature Presentation
Stress and MS: What We Know
Featuring Fred Foley, Ph.D.

>>**Kate Milliken:** Hello. I'm Kate Milliken and welcome to MS Learn Online. Aside from the stress that arises in daily life for everyone, MS creates its own set of stressful challenges, not the least of which is dealing with the unpredictable course of this disease.

This is the first of two programs on Stress and MS with Dr. Fred Foley, Director of Psychosocial Research at the MS Center at Holy Name Hospital in Teaneck, New Jersey. Welcome to MS Learn Online, Dr. Foley.

>>**Dr. Fred Foley:** Thank you.

>>**Kate Milliken:** So my first question for you is, let's just begin with having you describe the aspects of stress that can affect anyone.

>>**Dr. Fred Foley:** Sure. Stress impacts the body and mind almost instantaneously. You know, we're-- through evolution, our bodies are very attuned to stress. It's very important for survival purposes to have a stress response.

So what happens when you experience stress? Immediately you develop sympathetic nervous system arousal and blood flow changes throughout the body. Adrenalin is released. Stress hormones such as cortisol are released to prepare you to either engage an enemy or to flee the scene. So blood sugar is released and other hormonal activities take place to prepare you for possible injury or to escape injury. So throughout our evolutionary history, our ability to respond to stress has been very important for survival purposes.

>>**Kate Milliken:** There's been some research or some discussion about the whole idea of multiple sclerosis and stress. Can you talk about what's been going on, kind of putting those two things together to see if there's some sort of correlation?

>>**Dr. Fred Foley:** There have been many studies that have been done on looking at the impact of stress on multiple sclerosis to see, does it affect MS? Does it worsen MS? Does it change the course of the illness in any way?

Unfortunately, to put it in a nutshell, none of those studies are definitive at this point. So, although if you ask most people with MS, does stress impact my disease, most will say yes. They feel their symptoms more, very frequently. But that doesn't necessarily correlate with any changes in the underlying disease.

So, there have been many, many studies done on stress in course of disease and stress and exacerbations and many of them have found correlations between a stressful life event and, you know, the risk of exacerbation during the following six-month period. So, is that definite cause and effect? Well, the problem with these studies is that they're small scale and that stress is defined differently in them and people's reactions to stress are also different and that can cloud the interpretability of the data.

>>**Kate Milliken:** One of the things you mentioned at the beginning is cortisol. Can you talk about what that-- how that affects people with MS, specifically?

>>**Dr. Fred Foley:** Well, that's actually a very good research question. I can talk about it in general terms. In terms of its impact on people with MS, well, we're not so sure, scientifically, as of yet.

But cortisol is a stress hormone that is released from the adrenal gland during periods of enhanced stress. And there's a circuit in the central nervous system that talks to the adrenal gland, the hypothalamic pituitary adrenal cortical circuit it's called.

And the-- during moments of stress, the hypothalamus becomes stimulated, which sends a signal to the pituitary gland, signaling that to release corticotrophin-releasing hormone, which will then impact the adrenal gland, having it release cortisol, which is a-- the body's natural steroid to kind of-- which is released during periods of stress.

So this is a natural part of the stress response and what we hypothesize is that in chronic stress the signaling in the HPA axis becomes impaired, that the hypothalamus becomes less responsive to feedback, to the cortisol that is in the brain and in the body, because the body was really only evolutionary conceived and developed to respond to short periods of stress where you have a very heightened arousal for a temporary period of time and the body prepares itself to deal with that and then the stress goes away.

But that's not frequently what happens in modern life. And that's not frequently what happens with a person with MS, where they could have chronic daily stressors or chronic worries or concerns and if they have an elevated sympathetic response, well, there is some evidence that that HPA axis and the cortisol release can become chronic in nature. And the regulation of the stress response in the body can become disregulated.

>>Kate Milliken: There's a study being conducted right now that's examining stress and the effect on lesions. Is there anything you can tell us about that?

>>Dr. Fred Foley: There have been many studies that have been done looking at stress and other physiological markers associated with MS, some markers in the peripheral blood, looking at interferon-gamma, you know, production from stimulated lymphocytes, for example.

Interferon-gamma is a lymphokine. It's a product that is released from T-cells that activates the immune system. And we know that that is not a good thing in MS to have interferon-gamma, because it helps precipitate T-cell-mediated immune response and in the case of MS, that response can then target myelin or myelin products in the central nervous system.

So there have been some studies that have looked at markers of interferon-gamma production in stress and depression, as well, and found that, for example, when depression is heightened there is heightened interferon-gamma production in vitro in T-cells and that when depression is lowered, either through psychotherapy or antidepressant therapy that-- or just naturally that that interferon-gamma production decreases.

>>Kate Milliken: From your own personal experience, it's very hard to-- again, as someone with MS, I think it's hard when someone says, look, if you just scale

back everything, things will get better. From your personal experience with patients that you've seen and worked with, how much have you seen the progression of MS change as a result of making choices that are different regarding stress?

>>**Dr. Fred Foley:** Well, that's an impossible question to answer scientifically, so-- because there- although there have been many, many studies on stress and MS exacerbations or stress and markers of T-cell activation or now that at UCSF stress and probably gadolinium-enhanced T2 lesions in the brain and the central nervous system.

These studies to date have been-- have low numbers of participants in them. The way stress is measured is different in most of these studies. Also, it's important to assess not just stressors, per se, but the person's response to the stress, which can be highly variable depending on their coping approaches. So all of these things complicate the relationship, the knowledge between what we know about stress and how it can impact persons with MS.

Years ago we did a study with mice because in mice we can examine, you know, directly the effects of stress on the nervous system. And there are animal models of MS in mice and we used one of these animal models and found that giving them stress at the time of inducing them with the antigen that would associated with giving them the MS-like illness actually reduced, you know, the onset of the MS-like illness in these mice and reduced the severity of it over the course of their lives. However, when we induced stress in the mice later on in the disease, after the disease was well developed, it seemed to worsen the disease.

So the relationship between stress -- and, again, these were just mice and mice are not human beings and the disease in mice is MS-like, but it is not MS and it's different immunologically in certain key ways. So we can use these animal models to try to develop proxies for understanding what happens in people and what we've learned so far is it's very complicated.

And I know there is the widespread belief that stress is associated with disease worsening. We've published some of those studies ourselves, but from a scientific perspective, we're still in our infancy on making all those connections and looking at the causal threads and the mediating and moderating factors that could potentially influence the relationship between stress and disease worsening.

>>**Kate Milliken:** Wonderful. This has been awesome and very informative, Dr. Foley. I really appreciate it. I'm happy to say that Dr. Foley will be back with us to discuss techniques and strategies on managing stress. We hope to see you then. This is Kate Milliken for MS Learn Online. Thanks for joining us.