"Emotional Rescue: The Heart-Brain Connection" with Michael Miller

Transcript of Cerebrum Podcast

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Bill Glovin: The heart wants what it wants, wrote the poet Emily Dickinson, but what if your mind is telling you that what the heart wants might not be what is best for you in the long run? Is it really your heart planting thoughts in your head? Or is it really your brain? Hi, I am Bill Glovin, Editor of *Cerebrum*, and welcome to The *Cerebrum* Podcast, where we explore topics about brain science.

Today, we are going to see if we can answer the "heart wants what it wants" question and explore other connections between the heart and the brain. Our guest with us on the phone today is Dr. Michael Miller, author of our most recent *Cerebrum* article," Emotional Rescue: The Heart-Brain Connection," and author of *Heal Your Heart: The Positive Emotions Prescription to Prevent and Reverse Heart Disease*. Michael is also a professor of cardiovascular medicine and director of the Center for Preventive Cardiology at The University of Maryland Medical Center. Welcome to the podcast, Michael.

Michael Miller: Thanks, Bill. Great to be here.

Bill Glovin: Tell us about how you first got interested in the heart.

Michael Miller: Well, Bill, I first got interested in the heart based on a family history of heart disease, and if you go back 30, 40 plus years ago, we – that is the medical profession – really did not have a good grasp on the factors that may promote heart disease. We knew, obviously, going back to 1964, that smoking was bad for you. We knew blood pressure and diabetes were bad. One big black hole until recently that we didn't have a good handle on was the effect of stress on the heart. Now we understand better, and it turns out that stress plays a major role in heart disease and we believe it contributes to up to about one out of every three heart attacks.

Bill Glovin: Tell us about the work of the Center for Preventative Cardiology.

Michael Miller: The Center for Preventive Cardiology started back in the early '90s and the real focus is to identify and see people who are coming in, some of whom have got a family history of heart disease, others may have experienced a cardiovascular event. And what we mean by cardiovascular, I am talking about either a heart attack or a stroke or have what we call peripheral disease, where they have pain when they walk also because of some blockage in their blood vessels. And so over the course of time we have expanded not only treating our traditional risk factors (the traditional risk factors are cigarette smoking and high blood pressure, diabetes, and high cholesterol), but also paying more attention to how we might be able to focus in on stress and stress management.

Every once in a while, I will give out a prescription for stress reduction, such as, some of my patients like to receive a prescription where I say laugh at least two or three times a day. So, what are the things that we can do to offset some of the daily stressors that we face?

Bill Glovin: As someone who is always snooping around to find some interesting topics about brain science, I rarely come across articles that link the brain and the heart. Why do you think that is?

Michael Miller: Well, because we live in silos, in the medical communities specifically. So, the heart specialists focus in on heart diseases, the brain specialists focus in on neurologic diseases, and so on and so forth, and so often times we do not have the type of integration that we really need. And, in many cases, and especially many patients will come in and they may have things that may not be specifically physiological, meaning that they come in with a stomach ache and a number of tests are run and it turns out that there is nothing specific, the good thing is there is no specific problem, at least no organic problem and it turns out if they reduce their stress levels, then some of the stomach issues go away. Or if they modify their diet, because when you're stressed, you tend to eat a lot of comfort foods. You may eat foods that are not good for you or may promote stomach achiness and so forth.

I think we live in these silos but now we are more appreciative of the fact that medicine should be more integrative, not only from the standpoint of doing the

natural things, which is treating patients from the standpoint of what we understand from a disease state but also integrating what goes on in the mind.

Bill Glovin: Your article for us began and focused on what you call external stressors. Is there an area of the brain that processes such things as stress, anxiety, and emotion?

Michael Miller: The two main areas that I think are not only physically close together but also mean a lot are the amygdala, which processes emotions, and the hippocampus, which processes memory. And all you need to realize that is think about where you were on 9/11, or if you're older, thinking back where you were during the Kennedy assassination. And what that is, is because of the tight connections between the hippocampus and the amygdala, you step back in time, and you stop and you can remember almost every detail. Or it could be something that happened to you personally. Whether it was a really exciting thing; Santa Claus coming in or a wedding and so forth, being able to really stop the clock, if you will, for these precious or sometimes not so precious moments that really put things together. So, emotion is tightly connected to memory in a lot of cases.

Bill Glovin: So, do people not really have any feelings, or thoughts that can be generated by your heart, yet sometimes if we are responding to fear or sadness, we have this physiological change in our bodies that seems to come from your heart, but it's not really, right?

Michael Miller: Well, there are some instances where you have an outpouring of emotion and that outpouring of emotion and major release of some of these chemicals, such as cortisol and some of the fight or flight chemicals can actually put a major damper on the heart muscle. There is an unusual condition, that I think I talked about in the article, known as Takotsubo's cardiomyopathy, which is just a fancy term for a Japanese octopus trapping pot, and the people that suffer this because undue emotion.

So, somebody very close to them has died or they have generally suffered a catastrophic loss and in these rare cases, there is an outpouring of these chemicals and that changes the architecture of the heart muscle, so that the heart function is reduced by 50 to 80 percent. Fortunately, it is only temporary in many cases, but not always. The bottom line here is that in some cases of uncontrolled emotions, it can have a major effect on the heart.

Bill Glovin: Wow, that is unbelievable. I think most people understand the idea that plaque is something that would block an artery and cause a heart attack. But what would cause a stroke?

Michael Miller: Well, same thing. There are different kinds of strokes. Most strokes are what we call, Thrombo embolic, which means that they are due to a clot or some degree of plaque buildup and then a clot over that, which is the same thing as a heart attack. And, in some cases, you can have what we call a bleeding stroke or

hemorrhagic stroke. This is much less frequent. But what we refer to people that have traditional heart attacks or traditional strokes are usually due to some underlying plaque and then a clot over that plaque.

Bill Glovin: My advisors for *Cerebrum*, which are made up of prominent neuroscientists, were very concerned when they reviewed the article about the role that inflammation plays, especially as it relates to the nervous system and something called “cytokine production.” What role does that play?

Michael Miller: Well, we have over the course of the last two plus decades, have really gotten a better hold on the whole idea of inflammation because we think this is a major player. One of my good friends, Paul Wrecker out of Brigham and Women's at Harvard Medical School's done a lot of research in this area and it has shown that you do need to live in a highly inflammatory state. So, if you look at people that have arthritis, for example, they are living in a highly inflammatory state and they are at risk of a cardiovascular disease. So, studies have demonstrated that living with a chronic condition that promotes inflammation puts you at risk of heart disease and even stroke at a higher level.

But even more importantly, I think some of the newer information that Paul and others have shown is that you do not need a lot of inflammation. Even low-grade inflammation lived with chronically is a problem and can promote plaque formation. We believe that this area of low-grade inflammation now also is shown to occur in people that are living a life of stress that is not properly managed and will raise their risk of cardiovascular disease.

Bill Glovin: How does stress translate into inflammation?

Michael Miller: This is a good question. What we believe is happening now in this process of stress, when you have stress, you are releasing these chemicals that basically have an effect on the blood vessel lining. And, part of that process is that we have these scavenger cells that help to get rid of the excess toxins. Well, if you are under a lot of stress and you are producing some of the chemicals that promote inflammation, then in this inflammatory state, the scavenger cells group together and when they group together they also collect lipids like cholesterol - the bad cholesterol, like LDL - and by doing so, living with stress actually helps to lead to greater development of this kind of macrophage producing inflammatory processes; cytokines that are released from some of these scavenger cells.

Bill Glovin: Does brain plasticity or the ability of the brain to change and develop throughout life play a role in stress?

Michael Miller: I think, stress plays a role in brain plasticity, because I think if you are chronically stressed out – and just think of yourself for an example – when you get stressed out, what happens to your memory, right? You kind of, "Oh my goodness, I can't remember that." Because you’re not making those connections as well. As we

get older, so take somebody who is young versus somebody who is old, somebody who is more chronically stressed, but stress does a lot of things because if you are stressed out, as we have already talked about, you tend to eat a lot more comfort foods, oftentimes you will not get a good night's sleep and this releases stress hormones. So, there is a platform by which things spiral downhill and goes down over time.

When you were younger, and let's say living a bit more freely, less responsibilities before motherhood and childbirth and kids, especially if you have teenage kids, which really drives up in many cases your stress levels. As you might appreciate, Bill. But what that does too, is it perhaps also alters your ability over time to really be fully functional and be able to do many things at once, so called multitasking. The big problem is as we get older, we cannot multitask as efficiently. So, one way of looking at brain plasticity is also the ability to do a lot of different things and do them well. And, as we get older and if we have a lot of stress that has been accumulating over time, perhaps that ability to do many of these things very well at once goes down. And, then of course we get stressed more when we cannot multitask as efficiently.

Bill Glovin: Well, interestingly, the last article and podcasts was with Anthony Wagner, who is the department chair at Stanford in psychology and it was all about multitasking. So, if you have any interest in that subject, you can go to Dana.org and read or hear about that aspect. Let us turn to some of the preventative measures one can take and your article points to five specific ways; meditation, Yoga, laughter, music, and massages and hugging which are included in number five. Yoga is a form of exercise, I guess, but it does not do much to accelerate the heartbeat. Is aerobic exercise important in reducing stress and improving heart health? And did you leave it off the list for any deliberate reason?

Michael Miller: I did leave it off the list for a deliberate reason because I wanted to focus in on things we may not believe to be as relevant and to highlight some of these other perhaps less well-developed options. Yoga is well known in some circles for sure, but I think if you were to look at the population more people would be familiar with exercise because it is always discussed. And exercise does relieve stress in patients that say they need to do their morning run and then they tend to feel so much better, and if they don't get a run in, in say a day or so, then they feel miserable.

And that is because running releases endorphins and you get that so-called runner's high. It does not really matter the exercise, but whatever you enjoy doing, we certainly recommend as part of our three-tier process that is part Heal your Heart; diet, exercise and then some of these mindful related activities to reduce stress. So, yes, exercise does work.

Bill Glovin: Can you do too much exercise?

Michael Miller: You can do too much exercise. And one of the key things that may not be as well appreciated, especially when you enter into your midlife, whether it is 40s, 50s, 60s, and so forth, is if you embark on a training program, you always need to do a warmup and cool down period of at least 5 to 10 minutes because the heart can be a little funky. And so, if you have not exercised and you just start to exercise, you are 45 years old, 50 years old, and you just go out and try to run 5 miles or run with your kids, you may be at risk of having an abnormal heart rhythm, which can be a problem.

So, warm up your heart, cool down your heart. Just like when we're younger, we're physically able to do a lot of things without a recoil. When we get older, we need to do it more slowly and deliberately and get things moving in that manner.

Bill Glovin: Right. You do not hear about it as much today, but it used to be that people who went out and shoveled snow a lot of times, that it would bring on heart attacks because their heart was not used to that kind of vigorous exercise. And suddenly, you got to get it finished.

Michael Miller: Right. Exactly. Just to add to that point is that most of us are using our leg muscles every day. So, when you are shoveling snow, you are putting a lot of work in your arm muscles, and if you are not using them on a regular basis, the arm extracts more oxygen, so it makes the heart work harder. And if you are not used to doing that, then you could run into problems. Same thing as simple as playing baseball. If you have not played baseball in a while and you are a 45-year-old who wants to play baseball with his friends and you swing a bat really hard, you could run into problems. We have had patients who had cardiac arrests in that manner.

Bill Glovin: It seems that a few of the areas on your list such as music and laughter are areas that we associate with happiness or positive emotion. Are there chemicals in the brain that are released when we experience music or laughter we respond to?

Michael Miller: Yeah. And in the article, each of the five has almost a different chemical, even though they may work complimentary or synergistically, if you will. With respect to music it's dopamine, and studies have now shown that even before you hear the music, when you think about your favorite song or one of your favorite songs, and that song comes on, you listen to it, you get the release in dopamine number one with the anticipation. So, knowing that it's coming on, and then when you actually hear the verse, you get a double boost. So, dopamine released in response to music that you enjoy. And similarly, with laughter, it is endorphins. The endorphin release is based upon something that we believe is more emotional laughter. So, laughter that brings tears to your eyes is emotional laughter. And we now know that this has a direct effect on the blood vessels.

Bill Glovin: Does sadness have a negative effect?

Michael Miller: Sadness can be a normal emotion. If you experience loss or some other adverse event and you feel sad for a period of time, it is normal and healthy. It is only if it becomes more prolonged, that you just cannot get out of this and you're entering into a depressive state. Like if I have a patient that loses a sibling or loses a family member, a normal period of grief, even though it is variable among individuals, but a normal period of grief can last up to about six months, and if it is beyond that, then that person probably needs to be counseled.

Bill Glovin: If someone comes into your center and they have had heart problems and they do not translate it into being especially stressed out, yet they don't have the greatest diet, or they eat a lot of meat. Do you evaluate diet all the time? Do you make recommendations in terms of what you alluded before, to comfort foods, are there certain hard and fast rules that you provide?

Michael Miller: Well, I think by and large you want to live and enjoy life. So, our philosophy has always been to have a period to enjoy yourself, if you like to have something that you may know is not healthy. You can have it. It is just a matter of portion size and how often. I was doing a TV thing yesterday with the Max Gomez of CBS and we talked about how he likes ice cream, but he has one spoonful and one of my colleagues says with ice cream for example, you only need two spoonful's, right? Because you only remember the beginning and the end.

So, small amounts are reasonable, not on a daily basis, but eating it once or twice a week, with meats, small amounts again, and try to use lean meats maybe once a week or no more than twice a week. But again, restricting the bad foods, moderating the total amount. I think the big problem in our society is that we overeat. we eat big dishes, we have big utensils, we do not need all of that. And the other key thing with respect to diet is to try not to go to bed on a full stomach because your body chemicals and proteins are breaking things down and you are going to sleep. Why does your body need to be working over time? So, I like to tell my patients better to go to bed a little hungry than too full.

Bill Glovin: How many hours would you suggest before you go to bed that you stop consuming nutrients?

Michael Miller: I recommend about four hours. I think a big problem, is there has been some folks that have recommended to have a carb snack before they go to bed. I think that's bad. So, what I recommend is to have a light dinner. Have more of your food earlier in the day and have a light dinner. After that, take a walk or do something as opposed to just sitting on the couch for the next three to four hours. And if you do sit on the couch and watch TV or whatever, stand up at least twice an hour.

Bill Glovin: But these NBA play-offs they come on, late at night and I have to watch till 1:00 in the morning because I'm addicted.

Michael Miller: Well, you can do that. There is no problem watching the game. But stand up during commercials and just don't drink all that beer and eat all those pretzels.

Bill Glovin: Do some jumping jacks. Yeah.

Michael Miller: That works.

Bill Glovin: Toward the end of the article, you write that, and I quote, "More work needs to be done to pinpoint the impact of many of the practices mentioned." Can you mention the type of research that is currently underway to continue to improve heart disease and neuro disorders?

Michael Miller: I mean there are always going to be bio-marker studies. First, there are always going to be what we call, observational studies. These are the early studies to identify what factors. For example, optimism has come out and shown to be associated. You fill out a questionnaire, there is maybe a couple of questions on the questionnaire. People are followed for X period of time and then you say, well, optimism is associated with reduced risk of a heart attack or stroke. So that is the first step, but we have that information.

The next step is to determine in a clinical trial what that means and then you could look at people, assign them to a certain optimistic pathway versus not optimistic. And then measure some biochemical markers, whether it is markers of inflammation, oxidative stress, and so forth. But the final major study is what we call an outcome study. That is, if you assign X number of people to laugh on top of what they normally do versus not doing that, will you see a change in outcomes, whether it is heart attack, stroke and so forth. That is the study that needs to be done. That is a study that would cost hundreds of millions of dollars and would probably need to be funded by the National Institutes of Health. We are not quite there yet, but that is where we need to be.

Bill Glovin: If someone has a genetic predisposition to heart disease or stroke, is there anything they can do to improve their chances of a long and healthy life?

Michael Miller: Yeah, Bill, here is the good news. The good news is that most people even with a genetic susceptibility to a specific disease can overcome their genes by monitoring and living a good lifestyle. And that specifically applies to cardiovascular disease. So, we know we can prevent most heart attacks and stroke if you, number one, do not smoke. Number two, are active. You do not have to run marathons but just be active. And I think walking about 10,000 steps a day is reasonable.

Number three is just monitor your diet. Again, some of the things we have already spoken about. Monitor the amount of animal fats and simple sugars

that you consume and number four to keep your blood pressure down, which is also managing your stress levels. And obviously a part of that is watching your cholesterol and blood glucose. So, I think if you do all those things, your risk of heart disease and stroke will be reduced.

Bill Glovin: Almost everyone I know over 50 is on some kind of statin. What needs to be improved in the drug development area?

Michael Miller: Well, I think we are getting to the point now of, or I should say over the upcoming years, so called personalized medicine where at probably in the not too distant future, there will be simple blood tests that will pinpoint some of, not only the risks that you already have, but some of the risks that you may develop for certain disease states. So, even though we are not there yet, personalized medicine is an area of heightened research, and so in all likelihood we will have a personalized way to treat patients where some medications may be better, some lifestyles, beyond what I have already spoken about; more specific fine tuning. We will have those kinds of recommendations as well.

Bill Glovin: You kind of partly answered the question about why cancer, heart and brain are generally broken down separately because we live in a silo type of environment. And that that might not be the right approach, but that's how it's evolved. But is there enough funding in the heart brain connection area?

Michael Miller: There is absolutely not sufficient funding. The NIH has allotted a fair amount of money both for cancer diagnosis and treatment advances and the same with heart disease, but in terms of combining them, that is more in the realm of alternative health of National Institute of Mental Health which has funding but the funding levels there are nowhere near what it is for heart disease and stroke.

Bill Glovin: Well I think that is a good note to end on but kind of a sad one too, and I cannot thank you enough for the article and taking the time to do the podcast.

Michael Miller: My pleasure bill.

Bill Glovin: Again, the article is called “Emotional Rescue: The Heart Brain Connection” by Dr. Michael Miller and you can find it in the middle of the homepage at Dana.org if you have any further interest in this subject, I’d also highly suggest Michael's wonderful book, *Heal your Heart: Positive Emotions, Prescription to Prevent and Reverse Heart Disease.* And remember you can always find this podcast and all of our podcasts in transcript form as well. Meanwhile, have a great day and thanks for listening.