Hi there, folks. Over the next few minutes, we'll be taking a look at one of my favorite tools to help teach my own students physiology for some very difficult topics, and that is Interactive Physiology 2.0. Let's take a look at an assignment that I called “Muscle Physiology” with three items from the Interactive Physiology library. There is Neuromuscular Junction, Excitation-Contraction Coupling, and Cross Bridge Cycling. Once my students complete that, I'm pretty confident that they really do understand muscle physiology. We're going to begin with neuromuscular junction.

When the student opens this, there are questions for them to answer, and they really shouldn't try to answer these for a grade until they do the activity. There's some multiple choice of course. Then we have these much more robust critical thinking questions. I like this one. It's a bending activity and it lets students decide what's going on when the neuromuscular junction is at rest and when it's active, which they will learn during the activity. Acetylcholine and vesicles, that's at rest. Calcium channels closed is also at rest. Chemically gated channels open is active. Acetylcholine in the synaptic cleft is active. I'm not going to finish this, but you get the picture. Coming on down the next item for a grade is some terms to drag over to complete definitions. And then maybe one of my favorite is all of the steps at the neuromuscular junction that they have to drag into the proper order. We're not going to do that. We're going to go do the activity. As the activity opens, we see a table of contents. Some things are white, some things are green. White is for learning, green is for doing.

Let's start with learning goals. What are we going to learn when we do this activity? This nice little explanation of what the learning outcomes are going to be. What you need to know, we have some terms here. They can click over those and get a definition. Then we move on and we're likely going to encounter some videos that all include transcripts, so they're wonderfully ADA compliant. Moving on, I'm going to get you some activities going. These commonly start simple and get more complex as they proceed through the activity. So we're going to do a intro to the neuromuscular junction. Students have already watched a video or two at this point. They know kind of what's going on and we're going to see if they can properly label some things. Now these shuffle every time you open them, so we got to be careful. I'll get a few right and let you see how that looks. That's pointing at the synaptic left. Actually, that wasn't. I got that wrong. That's pointing at the Axon terminal. That's pointing at a calcium channel. You already heard me get one wrong, but what the heck, Let's go with synaptic vesicles. That would be the junctional fold. Let's see what happens if I say synaptic cleft there. Yeah, that's still wrong. Junctional fold. All right, I'm not going to complete this. You get the idea. This is basic and it just checks that the students have learned what they saw in the previous videos. I'm not going to do every activity, but I'm going to do 2 more. We're going to do activity 11, which is assembling the neuromuscular junction.

This is a little more robust. We've got a pop up that tells us what we need to do, and we have the parts of a neuromuscular junction. Do we know where they belong? Well, I do. So let me put these in place. That goes there. That calcium channel goes right there on the end of the Axon

terminal. That chemically gated channel goes there on the junctional fold. The sodium channel goes over here outside and the acetylcholinesterase and isolate enzyme goes on the inside. I am now going to push the button, generate an action potential, and I should get a good response because I should have gotten that right. Happy sound. We see it all working. If your students get it wrong, they're going to get some feedback on exactly what was wrong. Let's move on to my last and possibly favorite activity here. Students always like to fiddle around with things and see what happens when weird stuff happens. Now we've learned the role of acetylcholine and acetylcholinesterase of the neuromuscular junction. Let's see what happens when different drugs or toxins affect these molecules. Cool stuff.

So what we're going to get is 3 different drugs: Botulism toxin, curare and neostigmine. You may know Botulism toxin under the trade name Botox that's used cosmetically. These other two have other uses including surgery and we have a pop up since I've drawn up some Botox in my syringes. It’s going to tell me a little bit about that. Preventing wrinkles by paralyzing facial muscles. OK, cool. Now I see the neuromuscular junction. I see my syringe loaded with Botox. And I've got a question I've got to deal with: what's going to happen when I inject the Botox into the Axon terminal? I'm going to say the membrane potential of the folds will remain unchanged and the muscle fiber will not contract. I will hit submit and then inject into the neuromuscular junction. I got it right. And yes, of course your students can get that wrong. That's come out of the feedback. I hope this has helped you come to an understanding of how Interactive Physiology might help your own students. Thanks for your time.