>> Steve Langjahr: It is March 9th, 2016. This is Lecture 9. Yes? In anatomy. And this marks the end of our second unit of study. Recently, we spoke of muscle as a broad category of tissue. We explored more skeletal cardiac and finally smooth muscle. Today, we're going to focus our attention just on the skeletal muscle because that's where we're going at least in the lab. You know, once we're done with the skeleton, it's obviously important to discuss how that moves in relationship to joints and the muscles that act on those joints. So today, Characteristics of Skeletal Muscle. Is the skeletal muscle pretty abundant? It should make up about 40% of your body weight. And naturally, it's responsible for the movement but also stability, that means posture. It's also responsible for very subtle things like speaking, winking, kissing, breathing. So there are a lots of less than obvious functions through skeletal muscle. But by definition, skeletal muscle attaches to the skeleton and acts on that skeleton in some way. So here's a typical close-up view of an ordinary muscle attached to an ordinary bone. And let's talk about some of the things that we can see with our naked eye. So we're speaking naturally of gross anatomy. The gross anatomy would begin, I suppose, with the attachment, the connection really between the muscle itself and the bone. And, you know, that's afforded by a piece of connective tissue called tendon. You can feel tendons as they cross into your wrist. You can feel them behind your knee. As a rule, they intend to be cord-like or tubular and in a general comment, naturally they're made up of dense regular connective tissue. Are they pretty strong? Yes. Are they flexible? Yes. Are they elastic? No. They're mainly reinforced by the collagen fibers. Tendons then, made of dense regular connective tissue which, of course, is the identical composition of ligaments. But the ligaments, you know, connect what? Bone-to-bone. So that's the difference. Now not all tendons are tubular or cord-like. Some of them are quite wide and flat which mimics the muscles that they attached to. For instance, here along the back with the skin removed, you can see these areas in white and these are actually tendons, too. But they're called not tendons. They're called aponeuroses. Aponeurosis is singular. And the definition is simply a wide, flat tendon associated with a wide, flat muscle. And very often these connect muscle to other muscle which you might not have thought about, but indeed that's occurring in these locations. So these wide, flat tendons seen along the back are classic examples of aponeuroses. Also and interestingly, especially as we look closely under the skin, at the wrist, and again at the ankle, we find tendons which are reaching rather distal structures in the hand or foot. And notice that these tendons, number 4 here, are passing deep to what looks like a transverse band of connective tissue, number 12, which is referred to as a retinaculum. A retinaculum is a ligamentous band made of dense regular connective tissue, which intends to hold the tendons in place, keep them from rubbing against the skin, for instance. And also it provide a point of leverage or change of direction for the force generated by the muscle. Now this might be abstract. So I created a simple more or less example here. And I'm using my watch band as it should be to represent a what? A retinaculum. So, certainly there are muscles in your forearm, your anterior forearm which actually lead to movement of your fingers. In fact, when you make a fist, you feel these muscles active. And probably you didn't know this but most of the strength that you have in your hand is not in your hand. It's muscles that are actually in your forearm. So, when these muscles contract, they will bring about activity, movement of, let's say, the phalanges but the tendon which reaches these distill bones passes through these transverse connective tissue, this ligamentous band called the what? Retinaculum. So of course I'm just sort of, you know, imitating this. But if I pull on this string, you know, my finger will be flexed. So in a sense, the retinaculum is kind of a pulley because it helps direct or redirect the force generated by the muscles. So in summary, it holds the tendons in place and provides a point of leverage. Quite naturally, this is the posterior side of the hand. So this is a retinaculum called the extensor retinaculum, as we'll understand later. And the one on the anterior sides called the flexor retinaculum. So here's of course the hand seen both posteriorly and anteriorly. This is the palm. This is the dorsal. So this would be the extensor retinaculum and that is the flexor retinaculum. Where else do you find this? Not just here, also down there at the ankle where they do essentially the same thing. So let's be clear, a retinaculum is not a muscle. It's not a tendon. But it's basically a ligamentous strap or band which helps to provide leverage and also it holds the tendons in place. Now if we redirect our attention to the muscle itself, we know that the muscle is made of hundreds of individual muscle fibers. And these are bound up in more or less, well, bundles. So as we look to the tendon, we see that it transitions to connective tissue which surrounds the entire muscle bundle. And here, incidentally is a section through somebody's leg. We see the skin. We see the femur. But bundling or surrounding the outside of these large massive muscles is connective tissue which we've given a name to already. We called it-- We called at Monday, we called it superficial fascia. Now we're going to give it a new name or at least alternative name. It's going to be called the epimysium. And that makes better sense. Epi meaning upon or around. And, well, what do you think mysium means? Muscle. So this is densem irregular connective tissue which really serves to holds all of these individual cells together. In a familiar sense, it's like the tortilla around a burrito. In other words, keeping everything from just flying away. So, it's the outer connective tissue sheath which surrounds, encloses, and holds together all of the internal bundles. Deep to that, we see that there are membranes that is partitions within this large bundle. And these are also

connective tissue which basically provide or represent internal fascia which binds together groups of similar directions, forming internal bundles. And the word for bundle is a fasciculus, Latin. Fasciculus means bundle. So what's fasciculi? More than one. So the perimysium is essentially internal fascia which subdivides, compartmentalizes the muscle into these bundles called fasciculi. And then if we looked within a fasciculus, we find that the individual cells are surrounded by a looser kind of connective tissue. Actually, it's reticular connective tissue which is kind of the filler, known as the endomysium. Now, this might seen complicated, but it's really not. And it's easy enough to diagram. So, let's just show a bundle that's been cut, looking a bit like an Easter ham here. And just to reiterate, the outer sheath which encloses everything, that would be the epimysium. And then that tends to internalize and form lots of space or bundles within. So that internal fascia is the perimysium. It's here where the individual muscle cells reside and even though, of course, they're microscopic, we could bring one out in sort of exaggerated. So let's exaggerate others. These are individual cells which of course they're not nearly that big. But what is the filler? What is the white stuff which fills the voids around these individual fibers? That's the endomysium. So to repeat, the outer things called what? Epimysium. Inside we have the? Perimysium. And then the individual cells are surrounded by a looser connective tissue which is called the endomysium. Now to some of you this might look like a steak that you might see shrink wrap at Costco. But what is a steak? I mean, let's be real. A steak is a transverse cut through some cow's skeletal muscle. And what you might call marbling that white material that's going through is actually the perimysium. So the next time you look at the steak, maybe you look at it a little differently, more anatomically. Here's an even closer view inside a given fasciculus, showing individual cells and the material around it, which is the endomysium. Needlessly to say is skeletal muscle vascular. It is. I mean, what makes the red meat red is the high degree of vascularity. So here is an even closer view of the skeletal muscle which resembles naturally what we come to expect, fibers that are running parallel. I ever taken roast beef? I'm getting off the topic. But take roast beef and sort of tease it apart. In the restaurant world, that's called shredded beef, right? But actually, if you look at it, that your shredding just like this, the individual cells that are being cut transversely, the individual skeletal muscles. Very tasty with barbecue sauce or teriyaki or whatever. OK. So now, let's talk about skeletal muscles generically again before we get specific. And actually most of our specific work will be done in lab where we're going to give names to muscles and talk about how they bring about the movement. But even though there are maybe 640 skeletal muscles in your body, they tend to be organized or classified or distinguished on the basis of their morphology, their shape which really boils down to the direction and arrangement of the fibers. So in short, the arrangement of the fasciculi, how the bundles are oriented, has a lot to do with the ability of that muscle and the kind of activity that it will bring about. That is, it determines the power of that muscle and the degree of shortening. So to make it simple, skeletal muscles move the joints. Yes? But some don't. Some just hold the things in place. Those muscles that hold things in place are more there for stability and antigravitational effect. Those that actually moved joints, of course, are quite of a different in design and outcome. So we're going to give you three designs, there basic kinds of skeletal muscle design which have very different capacities based upon the arrangement of the fasciculi. The first group, the first category are those that are called longitudinal, which is easy, one of the first four letters of that word. Long. So guess what? These muscles tend to be long. And not only that, the fibers, the cells tend to be long and tend to be oriented end-to-end. End-to-end. So I've sketch this diagrammatically and this represents a longitudinal muscle. And, obviously, there are tendons at both ends. And I've tried to make it, well, long. So with that all said, what is the claim to fame? What are these muscles really designed best to do? We find them designed for maximum shortening. That is moving things over great or wide distances. They're not necessarily strong. But they are capable of swinging bones, moving joints over a wide range. So they're designed for what? Maximum shortening but not so much-- not so much power. And these, the fasciculi then are parallel to the long axis. Let's be clear. Does this muscle have two axises? Yeah. This axis and that axis. Which is the long axis. And so these fibers are parallel to the long axis. And they tend to be, again, associated with moving joints over wide ranges. Some of the subtypes here are called parallel. Some are called convergent. Perhaps one of the most famous parallel longitudinal muscles are those that run right down your abdomen and packer up into these attractive little squares that everybody goes gaga over. What are those? What do we call that when it's well-developed and nicely tend out? Ooh! The six pack. Yeah. All right. Let's not get too excited, but a classic example of longitudinal. Compare that to a very different design. These are called pennate. Once again, the first three letters, what's that? Pen. And actually when you think of the word pen, you think of a big pen or something like that. But at least from antiquity, pens originally were what? Come on, you've seen Thomas Jefferson, the declaration of independence, blah, blah, blah. OK. They're used to be made out of quills, out of feathers. The word pen really refers to feather-like. So the design here is quite different. These muscles are not long and slender. They intend to be more compact. The fibers themselves are not long. That is the cells are shorter and they tend not to be arranged end-to-end but side-by-side. So I know the sketch is unlabeled. But I know you can handle it. This must be as we said a what? And this represents feather-like. That must be a pennate. Pennate, the fasciculi are not longitudinal or end-to-end.

They intend to be diagonal as are the elements of a feather. And they tend to be oblique. The word oblique means diagonal, diagonal to or along the long axis. These are designed for something different. They don't move things very far or very much. But they tend to be a more powerful. They tend to hold things in place. So maximum what? The maximum power, less movement. These come in various subforms, unipennate. What does that mean, unipennate? Actually what I drew here was unipennate then we can go bipennate or multipennate, in other words, depending on the number of these oblique fiber elements. And then finally, number 3, totally different in all respects. These are skeletal muscles that have no identifiable tendon, but instead are designed in a circular pattern. That is a spiral if you want. And I think everybody has heard the term. But if not, it's, well, a sphincter. A sphincter is a group of skeletal muscles that are arranged in a circular pattern with a lumen, L-U-M-E-N, in the middle. And these are found near the bodily openings. And these don't move any bones and, therefore, not responsible for movements per se. But they are responsible for contraction, which obviously does what to this empty space in the center? If the muscle around it contracts, that is going to shrink. And when the muscle relaxes, it will widen. So these kinds of muscles are designed as a kind of valve or shutter because they open and close. And of course, sphincters are found, it says here, near bodily openings. Incidentally, not all sphincters are skeletal muscle but the ones that will show now are. Here's somebody's head with their skin removed. And, of course, we see the eyes and you see some circular fibers that define or surround the orbit here. So, what kind of muscles would that be? Let's guess. Sphincter and what would that do? You might think they would open the lids or close the lids, but no. What they do is they cause squinting or help to open. In other words, remember, they are near bodily openings, helping to clamp down or not. When do you use that muscle? Step in front of a bright light, what would you do? You do that. And if you don't like that one, I know you like this one. It's number 13. It surrounds the lips, surrounds the mouth. When that contracts, what's going to happen? Kiss, yeah. Packer up. Play the trumpet, whatever you want to do. Doesn't open the mouth. Doesn't close the mouth. It does cause what? A narrowing or constriction of that area. Now here's a muscle. Maybe you can read it from back there. There's muscle 21. There's muscle 11. There's muscle 12. Which are the-- Which of the three categories would those all seemed to be? These are very long and skinny, wouldn't you say? They're not so much for power but they do bring about a lot of movements. So those are classic, what, longitudinal. And just guessing, what would they do? Remember, muscles only do one thing. They don't expand they? So, if any or all of these were to contract, what would happen to the corners of your mouth? All right. So there you are. Smile. You're on candy camera. And there's another one here and you can't see. But it's 23. And many of you know perhaps it's called the masseter. But it too is a classic longitudinal muscle. So there are many others, of course, by name that we'll get to in lab. But let's move on because our attention to skeletal muscle is really all about what it achieves for us. And that means articular movement. The study of movement whether it's dense or whether it's athletics, the study of movement is a science called-- there it is-- kinesiology. In fact, we used to have a department on campus, it was called physical education. Oh no, we can't call it that anymore. So now we call it what? Kinesiology, much better. It's all about the PC stuff these days. All right. But it is kinesiology and we love it. Because really what we care about is not the beauty of the skeletal muscle but it can do for us in terms of athletics or artistry of one kind or another. So when we get down to the lab, yeah, we're going to be throwing a lot of names at you. But more importantly, we want you to appreciate and actually perform what these muscles are doing, that is to understand how movements are achieved individually and collectively by these muscles. And as we said, skeletal muscles attached, obviously, to the skeleton. And they do so usually at least at two points, sometimes more than two points. So let's take a simple case of a muscle we know indeed respect and admire, although mine is not really respectable or admirable. But this one right here which everybody knows is called the biceps. And does it have attachments? Well yes, it does. It has two attachments up here at the shoulder, mark it as A. And it has a singular-- maybe two attachments distally at B. Yeah, the name of the muscle is the biceps and that's because it has two bellies or two heads. But that's not our attention right now. In any example that we choose, we find those two points. And of those two, one is going to be more moveable than the other just because. And that part which is not terribly moveable is going to be called what? The origin. And the one part that is very movable, often because it's just distilled to a diarthrotic joint, that point is going to be called the insertion. And that's-- well, that's about as simple as we can make it. So let's take this longitudinal muscle here and let's drive a nail in there. That now is the origin or insertion? Origin because that's not going to what? Move. Is this free to move? Apparently. So that would be the insertion. When the muscle contract, of course, they get shorter. So as a general statement, does the origin move toward the insertion or does the insertion move toward the origin? Well, of course, the insertion moves toward the origin. Because by definition, the origin is what? Stationary. So that fundamentally is the mechanical, kinesthetic idea in skeletal muscle contraction. Now let's look at this biceps. We got A and B. So what do you think? Is A the origin or the insertion? Origin. B is the what? And what's going to move, is A going to go toward B or is B going to go toward A? And what's going to happen to the arm? What kind of movement? It's going to be that. And, yes, it's called inflection. For now, we'll just call it bending. But, you know, we'll get rid of that later. All right. The name of that muscle, the biceps, but the insertion always moves toward the origin. Now, it's all too often stated and we've tried to eradicate this notion that muscles contract and expand. They only do one thing, what's that? Contract, then they relax. So if we bent your arm, how do we straighten that arm? Is this muscle going to be involved or able to do the opposite? No. No way. So there must be and there always is a muscle or group of muscles which will work against a given muscle or muscles. So we now talk about these relationships and in any given scenario, the muscle that does most of the work, whatever that motion might be, that muscle is called the prime mover, because it is the prime mover. It's the main muscle. And occasionally, in fact always, there'll be other muscles that are often smaller or weaker. But they assist. And what do you call something that assist or helps. It's a generic word. Something that assists or helps is called a synergist. So these other very often lesser muscles are called synergist. In other words, they assist the action of the prime mover. And always naturally, there is the muscle or muscles that oppose the prime mover. That is, do the opposite of the prime mover and that also is a generic word. Haven't you heard it? Antagonist. When someone says, you're awfully antagonistic. You know, that's not a compliment. And so antagonist does the opposite. Now this might make it seem that any muscle we identify or point to could be classified as a prime mover, a synergist, or an antagonist. And so if we point to the biceps, you might be tempted to say it's the prime mover because it, of course, accomplishes bending of the forearm. But actually here's the reality. Any muscle in the body, every muscle in the body is at times a what? And at other times, it's a? So if I bend my arms, the prime mover that's responsible is indeed the biceps. And the muscle that antagonizes that is the triceps. But if I straighten my arm, then the prime mover is the triceps and the antagonist is the biceps. So the point is, any muscle, every muscle is at times, what? Is at times a prime mover and other times it's antagonist and at other times it's just a synergist depending, upon what you're performing or what's going on. So naturally in lab, we'll be identifying muscles by name. We'll be discussing what they do. And we'll expect you to know the muscles that antagonize or synergize that particular muscle. And when it comes to movement, which is what we really care about, the name of movement that's accomplished is called simply the action. Now when it comes to action, we're not going to use, you know, really lossey-goosey meaningless words. In other words, some might say, "He rose his arm. He wiggled his finger." Well, no, we don't use stuff like that, because we don't know wiggle means. We don't know what raise means. So we're going to have very precise terms. All of these descriptions are going to be verbs. And you learn that, you know, verbs are actions words, right? So when it comes to an action, we're always going to reduce it to two words, a verb followed by a noun. And so here we go with a whole bunch of words used to describe action. And these were all placed, these meaningless expressions like raising your arm, wiggling your toe, that kind of thing. So these are-- Well, these are verbs which we're going to group together in antagonistic sets. And some of them are obvious, some are not, some are easy confused with others. So actually I've been working up an act that is I've been performing this in my office to make sure I'm going to do a good job for you here. And you can perform this for your pets or friends just to, you know, demonstrate your skill. So the first set, flexion and extension. Almost familiar that is pretty widely understood. Flexion is decreasing the angle between two bones. Extension is the opposite. That means increasing the angle between two bones, presumably across the diarthrotic joint. So as I stand here and do this, that is what? Flexion. This is what? Extension. In fact, as I stand in anatomical position here, what's this? Someone say, you're raising your arms. Well, no, we don't-- this is not raising, because this angle is what? This is angle is decreasing. So what's this? Flexion. What's this? What's this? What's this? What is all of these? What is all of that? Yeah, you got it. So I'll do it in slo-mo in case you missed it. That's what? This is all what? What's this? Hyperextension. Good. So we don't bend fingers. We what? Flex them. We don't straighten fingers. We what? We don't-- You know, I don't know what you call that. But that's flexion and that's extension. So practice this. In fact, when we get down to the lab level, when you're visualizing this, you want to visualize and perform them. Because if you can't perform them, then you don't know what the heck you're talking about. So demonstrate. All right. Next. Abduction and adduction. Now here's where spelling really matters. This is only one letter difference here. When you're reading a paper, this child was abducted. Does that mean they brought him home? No. Abducted means to take away. Adduction is self-explanatory. The first three letters, add, add means to bring together. So I'm ready. I'm pumped. What was that? That was abduction. This is what? Adduction. Great. What's that? Not spreading the fingers. I'm what? Abducting here. I'm what? Adducting. Abduct, adduct, isn't that great? Cool. And, of course, I could do this to a degree, couldn't I? What's this? Abduction. This is? Adduction. All right. You get it. Move on. Number 3, rotation and circumduction. Now these are not actually opposites. But I grouped them here because they very often confused or thought to be the same thing, which they're not. Rotation is pretty intuitive. That is something is turning on something else, revolving around a central axis. So here's this cap, says the Beatles. That's a band. And now it's what? The cap is what? Rotating. OK. Great. That's easy. But now, what's that? That's circumduction. So if I do this which some might be saying, twirling your finger. No, no, no. That's what? Circumduction. Can you rotate your finger? Imposible. If somebody can rotate their finger, I definitely want to see that and get a little video. That would have to revolve the nail somehow going around and around, no es posible. So this is what? Circumduction. So example, I'm ready. Are you? What's that? Rotation. What's this? Circumduction. All right. And what's this? Oh you can't see it? OK. I want to be seen. Oh boy. It's difficult. What's this? All right. I get to try to get everything go in here. Yeah. I need a platter and some wheels here. But that's not rotation. It's what? Circumduction. Rotation is rather limited, that is aren't many cases and especially not possible with hinge joint. Can you rotate your humerus? And let's get down to that. We said this is a ball and socket. We said it had three axises. So this is what? Yes, one of them, all right. But that's what? Flexion and extension. This one is abduction. And this third one is rotation, medial rotation, lateral rotation. So start to use these things. As you're walking, you know, to your car, why not be thinking about this rather than, you know, the Kardashians or, you know, what you're going to get at subway or something. All right. Number 4, supination and pronation. This applies strictly to the hand, although some would use it with the feet, but we don't. And when you're in anatomical position, your palms are facing anteriorly. So moving the palms from the anterior to the posterior position, I'll do for you now. In case you missed it I'll do it again. In case you missed it, I'll do it in slo-mo. And I can do it up here, too. It's the same thing. So that would be not supination, that would be pronation, the opposite is? Supination. You might say it's rotation. But nothing is really rotating them. Actually, if you study the bones and you have a chance, the radius is flapping over the ulna and therefore producing that. Now technically, there is rotation up here at the radial head. But in terms of what the hands doing, it's not rotating. And so to repeat, this is? Pronation. This is supination. So as an example, as you go to reach for change at subway or whatever, you're first going to have to get your hand out there, right? What's that? Getting it out there. Well, maybe, but I'm talking about right here. That's extension. And then if you're going to accept change, you're going to have to what? Supinate. You don't say, "Hey, put it right there." So what? You what? Supinate. And then of course you're going to flex and do all sort of fun things to get it in your pocket or wherever you go. So supination and pronation. As an example, starting your engine, if you have one of those, the key goes in and you turn it clockwise, turning your key clockwise. That's supination. Turning it off, pronation. All right. Think of these things in terms of everything, everyday actions that you do. Number 5, protraction and retraction. Retraction, you heard the term. You say, "Oh, he retracts that statement," meaning he take it back. Retraction, horizontal, posterior. Protraction is moving something forward horizontally, anteriorly. Not easy. That is-- aren't-- There aren't many examples of that. But certainly it's possible to take your chin, your mandible, and move it forward horizontally, right. Look at that. So if you move it forward horizontally, that must be? And when you put it back? Can you stick out your tongue? We don't call it that. From now we call it what? And when you stick it back? There you go. Next. The opposite, orientation of number 5, is number 6. This is elevation and depression. Elevation is just what it sounds like, something is moving vertically up. Depression is something moving vertically down. And you might say, "OK, well, this is elevation." No. What was that? That's flexion. This is what? You cannot elevate your leg unless it somehow telescopes into your torso and if that's the case, I want to see it. So what can you elevate? You have this bone back here. It's scapula. Can that be brought up? And so when you do that, that's what? Elevation. When you do the opposite? Depression. Good. Finally number 7, plantar flexion as opposed to dorsiflexion. Plantar flexion, two words. Dorsiflexion, one word. This is limited to and designed to describe what goes on here at the ankle. You know, the bones calcaneus, et cetera. So when you stand on your toes, your heel goes off the ground, right? And this angle, this forward angle here, is increased or decreased? And so that is indeed you would think extension. But this angle is at the same time being decreased. So that's called? What do you think? What's this surface here? This surface that you stand on, P word, plantar. So, OK. I'll do it again. That's what? Plantar flexion. This is dorsiflexion. Dorsiflexion, plantar flexion. And so you need to practice that. When you stand on your toes? You're what? And when you stand on your heels, that would be dorsiflexion. There're plenty of examples. And in fact, on the exam, we're not going to ask you to define these words, that would be stupid. What we want is to have you use these words. So if I go over here to that machine, that's called a pencil sharpener. And turn that crank, what's that? Do I have to do it? That's circumduction. All right. And I'm giving you plenty of other examples. So on the exam, we're going to be -- two categories, we're going to give you everyday actions which you translates into anatomical language and then we'll have anatomical language which you translate into everyday language. So example, flipping a pan cake with a spatula. Flipping a pan cake with a spatula. I'm sorry, I don't have one. I don't have a pan cake or spatula but imagine it. Now do you flip your pan cakes that way? I don't think so. You do it that way. What's that? That's pronation. OK. So think about these things. One exam, I asked people to describe what walking is in anatomical language, I regret that. What I got was protraction and retraction of the feet. So I'm now going to walk in that style. I guess this is the way you do it, huh? Protraction and retraction. No, you don't. You do this, flexion and what? Extension. OK. Then I asked, what is maximal bilateral abduction of the legs? In other words, what's the everyday description of maximal bilateral abduction of the legs? Maximal bilateral abduction of the legs, what was I searching for or hoping to get? The splits. Yeah. And this one answer I'll never forget is that, amputation. I guess that's the wish bone effect or something. I put a big happy face on there and said, good enough. Not really. So anyway, practice it. It's fun. Now I know, I'm running over. But muscles are name for logical reasons, we call this nomenclature. And luckily, there's no muscle in the body called the Donald J. Trump memorial muscle. Thank God. Maybe sometime in the future, yes. In other words, we don't give muscles silly names. OK. Well, maybe some of them are silly. But most of them are fairly good, that is logical, useful. And here we go. Some are based upon the action that's performed by that muscle. Cases in point, abductor or adductor, longest. Flexor digitorum. Let's guess, what is flexor digitorum do? All right. Lovely name. Some are based on shape or size. Words that come to mind deltoid, trapezius, gluteus. So here are little geometry helps. That's a square, right? That's a-- Actually, that's a trapezoid and that's triangle, isn't it? So that's a delta, square, rhombus, trapezoid. Anyway those are shapes, aren't they? Useful, logical. Some are based on size, gluteus maximus. Gluteus means butt, maximus means big. What a great name, big butt, muscle. I love it. Origin or insertion. Actually this is my favorite. I wish we could abolish all the rest and name muscles by origin and insertion because this would really help. There's one in your neck that runs from your sternum and your clavicle up to your mastoid process. You can grab it. You can see it. And the name of that muscle is the sternocleidomastoid, obviously, a reference to its origin and insertion. And what is the origin? You say, I have no idea. Of course you do. What is origin? Is origin the stationary or the movable? So what's stationary here, the sternum or the mastoid? All right. So the sternum and the clavicle are the origin. The mastoid is the insertion. And why this is a great way to go because if you know origin and insertion, then you can figure out what's going to happen because always the insertion moves toward the origin. So I'm just doing it for you there. What is that motion? I'll do it again. Slo-mo. Rotation of the head, right. Number of divisions. Triceps brachial, biceps brachial, obviously a reference to three heads, two heads. Number 5, direction of fibers. Transversus abdominus, let's guess. Probably in the abdomen, probably running transversely. Great name. So these are some of those. In lab of course we're going to do-- working with cats. Do cats have a sternum? Do they have a clavicle? Do they have a mastoid? Do they have a sternocleidomastoid? Yeah. All right. We'll also use body builders vicariously anyway. I know you already subscribed to Muscle Fitness, so you're getting this every week, every month. And of course when I saw that cover, I said, "That's for me." So I immediately got online started ordering steroids and then I started going to the gym and, you know, before I know, it's practically overnight, I was also on the cover of Muscle Magazine. Yes, that was back when I had hair. But you can see at steroids and exercise do a great thing. In fact, that's my wife there who is also a body builder for a time, for the two minutes, it took us to do this photo. OK. So anyway, we'll use cadavers and we'll use body builders. And in fact if you know a body builder who wants to work pro bono, that is coming for free, and, you know, disrobe and oil up, that would be great, because, well, could, you know, have some interactive touchy-feely kind of stuff and learn a lot about muscles. Sorry to keep you, but let's wrap this. Muscles are not without impacts, that is, they can be subjected to disease and injuries. Fibromyositises, sometimes called rheumatism, is actually not a muscle disease so much it is a soft tissue or connective tissue disease. So it's inflammation of the muscle or at least the fascia. This causes pain and tenderness. We've all have that. We have a viral infection. You say, "Oh, my muscles are just so sore, so achy." All right. Well, there you go, fibromyositises. Get over it. And you will. Then there's muscular dystrophy, which you won't get over and it's certainly nothing to laugh about. Muscular dystrophy is a genetic disorder, affects boys more than girls. It leads to gradual degeneration of the muscle cells, therefore, weakness, ultimately death, and so certainly nothing funny about it. Then myasthenia gravis, great name. Gravis means grave or serious. And myasthenia means weakness, muscle weakness. So this is a grave muscle weakness. And it impacts actually not the muscle but the neuromuscular junction. But it leads to weakness. And the reason we care, is your diaphragm a skeletal muscle? Yes. And if that starts-- if that stops working for any reason, you're what? You're not breathing. You're dead. So anyway, see you next time. We'll see you on Monday. Have a great weekend.