>> Deb Feickert: I'm going to take myself out of your screen. Because yeah, we don't need that. And it seems when I do this presenter mode every time now. And here we go our topic today articulations, another fancy word for joints. So we're looking at joints in lecture, and in lab this week. So, as always, let's start an intro. And the intro starts with definition. So joints articulations are where two bones connect with each other, or where our teeth join with our bones. And we usually think of joints articulations as allowing movement but that is not actually the definition of a joint. Most joints do allow for some amount of movement, but there are some joints where there's no movement. And so we'll talk about each of these, the primary thing we're talking about the joint is where two bones meet or where bones and the teeth meet. So here we go. We've mentioned this, I kind of mentioned this before, but I really want you to highlight and start noticing these two words functionally, and structurally. And so what we are going to be talking about pretty much for the rest of this semester, is that we can classify that is organize the structures that we're going to look at either by what do they do, their function or what are they made of, how do they look, what is their composition that is their structure. So when we say that we can classify joints functionally and structurally, that means that we'll be looking at how much movement is there in terms of function, and what is the material between the bones – and bones or teeth structurally. So I'm going to define that in just a second. But the important thing here is that we start to see these words functional, and structural, as we move through the semester. So with that in mind, let's classify those joints first, functionally. And so as I mentioned just a moment ago, when we classify a joint, functionally, we are telling how much movement is allowed at that joint, functional, what's its job, what does it do. So how much movement is involved. So I have three categories of classifying joints functionally. And so all joints fall into one of these three categories. They're either what we call synarthrotic, OK, or I've said that differently than it had spelled there. So synarthrotic joints is another way to say synarthroses. So synarthroses and that's a plural with an E-S at the end is – I can just say that by itself, those are immovable joints, or I can say synarthrotic, T-I-C at the end, joints. So that is an adjective followed by the noun joint. In synarthroses there is no movement between the two bones. The next category is amphiarthrotic or ampiarthroses and these allow for some amount of movement, not a lot but slightly movable. And the last category functionally are diarthroses, diarthrotic joints, freely movable joints. So as we move through and look at all the joints today, we are not going to categorize all of the joints by their function. We are actually going to categorize joints by their structure with one exception, and that is this one diarthrotic joints. When we count the joints, that are freely movable, I will mention them again and ask that you remember that that particular structural classification is also diarthrotic functionally, so we'll talk about that in a second. So, I can classify categorize joints again structurally and structurally in the case of joints means what is the material that I'm going to find that joins the bones together or that is in between the two bones. So the – What is the structure meaning, what is the material. And in many of these, this is going to be a tissue, we're going to be

talking about histology, not in all of them but in many of them. So again, three general types, I want you to highlight that word general, because within these general types, we're going to name some. Of course, we are specific types of each of these general. So the first general category are called fibrous joints. And they're called fibrous, because the material that connects the two bones is what we call fibrous connective tissue. When I see a little side note, when I see this word fibrous throughout the rest of the semester, or fibrous connective tissue, or a structure that has the word fibrous in it, I'm either talking about a dense or regular connective tissue, or dense irregular with an i connective tissue. Those are both considered fibrous connective tissues. So in this case, we're talking about DRCT, dense regular connective tissue is the material, is the structure that joins the two bones together. This is the general category. So within a general category, I have three specific types of fibrous joints. It when up when I asked you about joints on next week's exam, exam number two is next Thursday, then you will be answering if you're asked the name of a joint with specific, not general categories or names. So sutures we've already seen, and we talked about them in the lab. And we said suture is a specific type of joint. And now we're going to be even more specific about what we want to say about sutures. And so here where bones connect, again, by dense regular connective tissues. And what is an example of this, the bones of the skull. So we've seen it, we can picture this right now, the sutures, which connect to the skull. The other thing we would say, though, about sutures is that in the adult, that dense regular connective tissue is replaced when the bones actually fused together. And so I could actually say two different things about the histology of sutures, and either would be correct, I could say that sutures are formed with dense regular connective tissue or bone connective tissue. My next category specific type of joint are called syndesmoses. And notice again, that E-S that is plural. And now these are bones that are going to be connected by ligaments. And these ligaments that are part of joints that are called syndesmoses have a very specific name. These ligaments are called interosseous membranes. So let's break that word down. Inter, inter, inter always means in between, osseous means bone. So in between the bone membrane, now ligament, a little side note right we already know, we'll know forever, forevermore, forevermore, that a ligament is composed of dense regular connective tissue. All of these joints, fibrous joints, are – the bones are joined together by dense regular connective tissue, or in the case of the suture, maybe bone connective tissue. But when we say that the bones in a syndesmotic joint are connected by a ligament, then we should know that the histology is dense regular connective tissue. In particular, in a syndesmotic joint, that ligament has a name. It's called an interosseous membrane. OK, this was a very good question that came up in office hours today. The question was, right, if I'm asked to give the structure or the histology of a – of the bones that can, or the structure that connects the bones in a syndesmoses. Do I say ligament? Or do I say tense regular connective tissue? So here, let's be clear. A ligament is a structure, dense regular connective tissue is a tissue. And if you're asked to name histology or a tissue, you're naming histology, you are not naming the structure that's made from that histology. Excellent question for everybody.

What are some examples in the body of syndesmoses? OK, in between we've seen these bones now. Picture the radius and ulna the bones in your forearm. In between the shafts, there's a space and that space is filled by this ligament called an interosseous membrane. It's a syndesmotic joint, same thing at the tibia and fibula in between the shafts, there's this space. And that space is filled with this ligament called an interosseous membrane. This is a syndesmotic joint. What is the histology? Dense regular connective tissue. So as we're moving through all of these joints, and I'll point this out a couple of times, here are the types of things you might be asked. You might be asked, what is the histology of a suture? What – Where are examples in the body of sutures. On the flip side, the bones, I might asked instead, what type of joint forms the joint between the bones of the skull and then you would have to say suture, so I can ask that question in either direction. The last one particular specific category of fibrous joints are called gomphoses. And this is where the teeth connect to the bone. The teeth connect to the bone again, they're all dense regular connective tissue. And this again, these are connected by little ligaments that surround the tooth, attaching the tooth to bone, gomphoses. So let's look at them. So right here's a tooth, here's the bone of the mandible. And all of these little connections, all of these little ligaments, dense regular connective tissue. A suture we've seen it in lab can be either dense regular connective or bone. And here's my radius and ulna, radius and ulna and I have dense regular connective tissue connecting them, this is called interosseous membrane, this is a syndesmotic joint. Suture, I'm not sure what you mean by that, but sutures are formed between the bones of the skull and all of these fibrous joints are connected by dense or regular connective tissue. And in the case of sutures, it could also be bone connected tissue, your examples are here. Thank you Vilma. So our next large category, general category cartilaginous and it has the word cartilage in it. So in cartilaginous joints, the two bones are going to be held together by either hyaline cartilage connective or fibrocartilage connective. So depending on which type of tissue it's going to be a different specific category of the joint. So my first category synchondroses or synchondrotic joint and the synchondroses are the joints where the bones are held together with hyaline cartilage connective tissue. And examples in your body. We've seen these lab where the ribs attached to the sternum. That's hyaline cartilage connective tissue, those are called costal cartilages and the type of joint that's formed, synchondroses. Those of you that asked about this in office hours say that this is what I was talking to you about in terms of look for that. Then the other place that we've seen this are at the epiphyseal growth plates. So epiphyseal growth plates where the ends of the epiphysis are meeting the diaphysis before full growth that is hyaline cartilage connective, and that is going to be a synchondroses joint. The other [inaudible] example is fibrocartilage connective tissue and fibrocartilage connective tissue in between two bones is called a symphyses. So symphyses is plural, symphyses is singular. And remember, whenever we see fibrocartilage connective, thank you Yvonne. Whenever we see fibrocartilage connective that is going to be in some sort of little disc or a little pad. And so we've seen this in lab as well, examples in our body, the pubic symphysis. So remember, we talked about

this, we looked at the pubic symphysis for those two pubic bones together, that little pad of fibrocartilage connective. The reason that's called the pubic symphysis is because that's the name of the type of joint. We also pointed this out lab that also in between the bodies of the vertebrae, those they're called intervertebral joints where one body meets the next body, there's a little pad, the fibrocartilage connective tissue. And so in between the bodies, so the vertebrae, those joints are called symphysis. So again, what would I have to know, I'd have to know if I said to you, what is the specific name of the joint where hyaline cartilage connective is in between the bones you would say synchondroses. If I said, what type of joint is where the ribs meet the sternum, you would say synchondroses. If instead I said, what is the histology of the joint where ribs meet the sternum you would say hyaline cartilage connective, different ways to ask the same question. Cartilaginous joints here are examples. So synchondroses hyaline cartilage connective, so we talked about this epiphyseal growth plate or epiphyseal cartilage plate. So where we have that epiphyseal growth plate that is called a synchondroses. Where the ribs meet the sternum this is hyaline cartilage connective that is also synchondroses. In between the bodies of the vertebrae, a pad of fibrocartilage connective that's called symphysis. Where the two pubic meet – bones meet, a fibrocartilage pad that is called a symphysis. Our last general category in terms of if when we're talking structurally, are synovial joints, and we're going to spend most of our time with synovial joints. So where do we typically – it's not the only place, but typically, we're going to find the synovial joints, at the ends of the long bones in the limbs, in the upper and lower limbs. So the other thing I mentioned at the beginning we have not been categorizing our other joints, our fibrous joints and our cartilaginous joints, in terms of their functional category, but we are going to categorize synovial joints, because synovial joints are all diarthrotic, meaning they have movement free movement. So the other thing I want you to note the reason I'm saying this to you is that when you look in your lab book at joints, the page that discusses joints, which I think is page 33 it's going to say at the top diarthrotic joints, and we're going to know that that diarthrotic functionally synovial structurally. So yes, here we go this is what we're going to look at in the lab this week. All synovial joints have six basic characteristics that we need to know. There is that word fibrous. There is a joint or fibrous capsule, and I can use either of those terms, joint capsule or fibrous capsule interchangeably. And this particular fibrous capsule is composed of dense regular connective tissue, and its jobs are to enclose the joint. We'll look at this in lab and to bring about structural support for the joint. So I'm going to completely enclose the joint with this capsule, and that then provides structural support for the joint, two jobs. Lining, inside lining the joint capsule, I'm going to show you some diagrams in a second. The inside lining of joint capsule is another structure called the synovial membrane. And so the synovial membrane composition is a specialized loose connective tissue. And specialized because the fibroblasts that make up this loose connective tissue secrete a very particular chemical substance that along with some interstitial fluid from our blood vessels produce the fluid that we're going to find in the joints. So we're going to say specialized loose

connective tissue. That is the histology of this membrane. Also, remember, last week, I was saying to you, you don't have to just suggestion. As we're starting to identify tissues, every time we talk, I mentioned that you might want to choose the same highlighter for tissues every time, so that every time you see a tissue in your notes, you know that that is a tissue. And the job of the synovial membrane is to secrete as we mentioned a moment ago by way of these specialized fibroblasts and the capillaries that we find surrounding the joint, a fluid called synovial fluid, we like that same word, so synovial membrane secretes synovial fluid. And the synovial membrane in terms of its location, this is important, I'll show this to you in the lab, and on our diagram in a second. This synovial membrane connects to the edges of another structure we're going to talk about in just a moment called the articular cartilage. So I'm just going to mention it to you here. And we'll define it in a second. The articular cartilage is that thin layer of hyaline cartilage connective at the ends of long bones, and the synovial membrane attaches to this articular cartilage on the bones involved. So there is a space, almost always, not always right sutures, there is no space between the bones. But in almost every type of joint, there's going to be some amount of space between the bones. And the space between the bones in a synovial joint is called the joint cavity, cavity is a space. So this joint cavity, the space between the bones is going to be filled with that fluid that we just mentioned that's been secreted by the synovial membrane called the synovial fluid. So that space has this fluid called synovial fluid in between the bones. Again, it's secreted by the synovial membrane, and its composition, right? This is now not cellular. This is not a living tissue. This is a fluid that's composed of primarily water and proteins, right? Anything that we're going to see in the body that's fluid, its primary composition is going to be water, water and in this case, proteins. So three primary functions of that fluid that we find in between the bones. Why is there fluid in between those bones? That fluid lubricates, and lubricates means reduces friction. So what is it lubricating? Remember, we said that that synovial membrane is attached to those articular cartilages. And so it's going to lubricate the surfaces reduce the friction between those articular cartilages. The articular cartilages are where they don't touch but where the two bones meet. And so it makes sense that there's fluid in between those structures. We don't want just like we don't want it anywhere else in our body, heat building up in our joints. It also nourishes the chondrocytes, and this remember when we talk about cartilage, cartilage does not have its own blood supply. And so this synovial fluid, because it is – also part of it is coming from the blood supply it is bringing nourishment to chondrocytes. And lastly, some shock absorption. If you face any sort of fluid in between two structures, and try to slam one of the structures on top of the other, they aren't not going to touch each other because the fluid absorbs the shock and we want there to be shock absorption in between the bones of our freely movable synovial joints. Next we have those – here they are, the articular cartilages. Now let's define them. That very thin layer of hyaline cartilage connective on the ends of the bones provides a smooth gliding surface, when we look at the bones, and not on the epiphysis but on the diaphysis they're very pitted and they have a lot of

structure, right, they have a lot of external surface anatomy structures, we don't want there to be bumps and indentations on the ends of the bones, where we have movement occurring, we want a nice smooth surface, so that the movement is gliding. We're going to find sensory nerves and blood vessels, this is all living tissue. So we're going to have sensory nerves and blood vessels. And we're going to see different accessory structures, depending on which synovial joint we're looking at. So, with that in mind, let's look at what we've seen so far. So the first thing that we see, so to just whatever bones, that's what these – these are just this is just a typical synovial joint. And so what we see is the fibrous capsule that has been cut away, right, so this is the fibrous capsule here, here it is in gray on the other side here, and it would actually be completely covering this frontal cut. So we're looking at half of the structure, if we have entire structure, this fibrous joint capsule would be completely surrounding the joint. The other thing dense with our regular connective tissue. So dense regular, I'll get to in just a second, Amber. Dense regular connective tissue is meaning that the collagen fibers are all running in the same direction. And we can actually see that here, these parallel collagen fibers that look like lines in the joint capsule. You – There will be – The average question is about diagramming, charting. I'm assuming on the next exam, there will be diagrams on the next exam, I am not going to share with you what they will be. So what that means is anything that we have looked at, that I have referenced for you, in your outline, anything that we're looking at in our lectures could be a diagram that you see on your next exam. So why is that important? That's important because we're looking at anatomy, which is the study of structure. And we should be looking at these diagrams when we're studying. And so the diagram, we should feel confident with any structures we're talking about in a visual representation, that is the diagram and be able to either name structures on a diagram, give the histology of structures on the diagram, or give the functions of the structures on a diagram. Thank you, Amber. Good question. So here we go, I give a study guide for every exam. Study Guide will be out on Thursday, which is one week before the exam. Thank you Junei [assumed spelling]. Good question. So this again, dense regular connective tissue fibrous capsule, and here is the synovial membrane. So this is what we mean by internal lining. So right on the inside of the fibrous capsule in this kind of lavender color here, that is the synovial membrane, and look where it's attaching. This is the articular cartilage, it's attaching as we talked about to the ends of the articular cartilage. This is the space called the joint cavity. And the space is going to be filled with synovial fluid. So these are structures that we've been mentioning in the last couple of slides. Ask away great questions everyone as away. So this is just some – these are just some of the in the upper appendage places where you would have particular joints. So going back to Maya you asked this, I'm thinking lab last week, that this idea of what are we going to name a joint, a joint is going to be basically named by the category that it's in and then what structures are touching each other would be the way that we would name a joint. So we're going to be talking about some specific examples about different categories of synovial joints, and we'll look at that again. Here are some of the accessory structures. So we won't find these

in every synovial joint, we'll find these in some synovial joints. And most of these, in fact, all of these can be found in the knee joint, which is what we are going to be looking at in lab. So some, not all, some synovial joints have we call this menisci or labrum, this is plural meniscus with us would be singular. What would we say about it histologically, it's fibrocartilage connective tissue, they're always in discs, this is how we always find fibrocartilage connective, and the shape is described as semilunar kind of C shaped would be semilunar. The menisci, the labrum, menisci or in the knee, labrum is in the shoulder contain nerves or sensory reception. So one of the jobs that we would talk about with meniscus is that it provides sensory reception, OK, this came up – the labrum is in the shoulder menisci or in the knee. Thank you, Gabby. So and we're looking at this idea of function, writing down functions on the test, this also came up in, in office hours today, make sure that you don't use one word for a function. We've talked about it, let's keep talking about it. So you don't lose points. You can't just say reception. That's not a full function. If you're talking about the idea of sensory input or output, you need to say sensory reception. Or if you're talking about sensory reception, and many of you did a great job on the sensory reception of touch, temperature, pain, pressure, that's a great functional answer. But just writing the word reception is not complete. So make sure that with those very few exceptions like thermoregulation, because that means it regulates temperature, that you aren't using one word to answer function questions. So nerves for sensory reception, happen at the meniscus or the meniscus of the knee, labrum of the shoulder. They're providing, as all fibrocartilage connective tissue just do, shock absorption, cushioning. So shock absorption and cushioning are the same thing. Right? They're going to cushion shock to the joint. And lastly, joint stability. That is and we'll see this in lab, the menisci have the exact same – I don't want to say exact same, the exact same shape in terms of a mirror image shape to the bones of the knee. So whereas the bones of the knee let's talk about the femur, we've seen the femur just on the femur there are condyles they are convex, the menisci then are concave. That is they fit perfectly into that shape. So that like a puzzle piece so that it provides the joint with stability. We have what are called either capsular or collateral ligaments. Ligaments, ligaments, ligaments bone to bone attachments, always just like tendons dense within our regular connective tissue. This word extra-articular is important please highlight it. That means that it – that these ligaments like outside of the fibrous capsule. And the definition of a ligament is that it's a bone to bone connection of dense regular connective tissue. And the job of a ligament is to prevent dislocation that is prevent the bones from moving – their surfaces from moving away from each other. It's called dislocation. Next we have what are called bursae. Again extra-articular. So outside of the fibrous capsule sac of synovial fluid. So whenever we talk about synovial fluid in the joint capsule that is lubricating between the bones, reducing friction providing some shock absorption. So now we have these little sacs of – that are filled with synovial fluid that are outside of the joint. And they're going to be found between the bones and the joint and the ligaments of the joint or they are going to be found between the bones and the tendons

of the joint, or they're going to be found between the bones and the muscles of the joint to do the same thing that all synovial fluid does, and that's reduces friction. So in the synovial joint the diarthrotic joint, lots of movement. And so we have oftentimes areas that would rub against each other, structures that rub against each other, that have these little sacs of synovial fluid that helps reduce friction called bursae. Again plural, without the e would be singular. There are going to be muscles and tendons at a joint, right, across the joints. So muscles, and they're attached to tendons, right. A tendon attaches a muscle to a bone, they move across the joint, so that when the muscle shortens the joint moves, muscles and tendons. The other thing that muscles and tendons do, especially in freely movable joints, like the shoulder ball and socket joint, the hip or socket joint is that the muscles and tendons also help to hold the joint together. Joint stability. That's what that means. So different view this is now a sagittal view of the knee joint in particular. So here's what I want to point out the structures that we've been discussing. So here's the femur, here's the tibia. Again, there's that articular cartilage, more articular cartilage in the kind of purple color again, the attachment of the synovial membrane to the surfaces of the articular cartilage, then on the outside of that is going to be the fibrous capsule. So we're seeing it, it goes around the whole joint, we're just seeing it back here in this cut. And because this is the fibrous capsule, these sacs of synovial fluid on the outside of the joint capsule are called bursae, bursa. This is a muscle and its tendon. And then a bone to bone attachment is a ligament in here are the menisci. Those fibrocartilage pads. This is the knee joint. So, with our other – with our fibrous joints, we have three specific types. With our cartilaginous joints we had two specific types. With synovial joints there are six and synovial joints are classified based on the amount of movement they allow. So this is one type of classification. I will not ask you about this on a test. But I want to give this information for my future physical therapist and kinesiologist in the room. So here's what we've got, we have what are called uniaxial movements or the bone – the movable bone in a joint moves in just one plane, one of the body planes, right we have three body planes. So if you look at your elbow right now, and flex and extend your elbow, that's a uniaxial movement that occurs in one plane. Biaxial movement, the bone moves in two planes. So take your hand right now. Put your fingers together, then spread them apart, put them together, spread them apart. Now bend your fingers back and forth, right at the palm. That's a biaxial movement, two planes. Multi or triaxial the bone moves in every possible body plane. And that would be your ball and socket joints, your hip and shoulder move in any conceivable possible action or movement. Well, we are going to classify synovial joints by the shape of their articulating surfaces. And so that this is – we're going to give names to these joints. And again, Maya this is what we were talking about last time. This classification is how we're going to name joints. So with that in mind, we have six. We have what are called plane or gliding joints, either of those is correct. A plane or a gliding joint allows for side to side movement. So where am I have that in the body? Right? Now I want you to think about these words mean, intercarpal in between the carpals, so the carpals are bones in my wrist.

Intertarsal, tarsal are the bones in my ankle, those bones have flat sides, and when they move against each other, it's just kind of a side to side movement against each other. Plane or gliding, where else is there a plane joint where the clavicle meets the manubrium again two flat surfaces that have a little side to side movement. Where the ribs meet the vertebrae, right. Flat surfaces, side to side movement. Hinge joints, so hinge joint allows for flexion and extension, this is what we just did with our elbow. So examples of hinge joints in your body are the knee joint, the elbow joint, and here it is. Again, inter in between phalanges. So all of those joints in between each of my proximal middle and distal phalanges act like a hinge like a door hinge. Pivot joints, pivot joints we've talked about as well allow for a movement called rotation. Where are the pivot joints in my body? Where are the first and second cervical vertebrae meet? Which ones are those? Atlas and axis. And we demonstrated this rotation where the atlas meets the axis. And often it's important where the radius meets the ulna proximally. So that means where the head of the radius articulates with the ulna. And we've demonstrated this as well we said that that's a special movement that when I move my palm from anterior to posterior, that particular type of joint is called a pivot joint. Number four ellipsoidal. Two movements allowed here, biaxial flexion, extension, abduction, adduction. That's the one that we just demonstrated with our fingers where we move them apart from each other, put them together, and then bent them at the palm. So where's that happening? Where the metacarpals meet the phalanges, and where the metatarsal meet the phalanges. Where the hand meets the fingers, where the – where the foot meets the toes. A saddle joint, number five, allows for flexion and extension and something called circumduction. I will demonstrate this for you in lab. And our example in the body we have one saddle joint where the first metacarpal, right the first number one out of the hand that that one that's over the thumb meets the carpal, saddle joint. And lastly, we've mentioned them a couple of times, ball and socket joints. Ball and socket joints are occurring at the hip and the shoulder. Those are my two ball and socket joints in my body. I need to know the name. I need to know examples in the body. And I need to know what kind of movements are allowed. Now, we haven't defined all of these movements. We're going to be doing that when we talk about muscles. So we'll put that all together. So here's my atlas and axis. That's a pivot joint allows for that rotation movement looking right and left. Got my hinge joint example at the elbow. We did that one today like a door hinge. We've got our ball and socket, large ball and socket also at the shoulder. And then the last few, you know, these flat surfaces in between the carpals are called plane joints or gliding joints, where the first metacarpal meets this carpal called the trapezium, which we don't have to know. But that's what it's called. That's a saddle joint. And it where the metacarpals meet the phalanges that's called a condyloid joint. So lastly today, what are some disorders of joints? You have heard of all of these before. Arthritis, arthritis by itself, inflammation of joints that can cause pain, stiffness, and swelling. When we talk about inflammation, we're talking about the process by which the white blood cells in our body produce and secrete substances that protects us from infection, such as bacteria

and viruses. And so that can cause redness and tenderness, maybe swelling, that is inflammation. There are three types of arthritis we'll discuss there's what's called degenerative also called osteoarthritis, degenerative arthritis is brought about because we're old or because we've over abused a particular joint or we are obese. So degenerative arthritis, osteoarthritis, old age, joint abuse, obesity. What is the joint structure involved? The joint structure involved in degenerative arthritis is the articular cartilage, that thin layer of hyaline cartilage connected at the ends of bones, because of old age, because of abuse, because of obesity, that starts to erode, break down. And if that's not there, I don't have a smooth gliding surface, my bones start to try to repair themselves, they build bone that can lead into the joint, and now my bones may touch each other. Cracking any of your joints causes no arthritis that is a complete fallacy. It does nothing to cause arthritis. That popping, the main – the main explanation for that popping is that there are air bubbles in the synovial fluid. And we're doing that cracking those bubbles are popping. It can also be the little tendons and ligaments that surround the joint could be moving over the bone causing that popping. Rheumatoid arthritis is not caused by old age, joint abuse or obesity. And they were wrong Alejandra the – this is an autoimmune disease. And an autoimmune disease, we'll talk about that more later, means that my own body's immune system cells attack my own tissues. And so what are – what is my immune system attacking? The synovial membrane. The synovial membrane, oh, good, I'm glad I could help you, Jessica. The synovial membrane. So the – my own immune system cells attack the synovial membrane of the joint. And so what's happening now the synovial membrane is not going to produce as much synovial fluid that causes friction that causes bones eventually touching each other. And again, stiffness, swelling pain. Gouty arthritis, also called gout. It's not caused – is not auto immune. It's not old age, joint abuse or obesity. It's a metabolic disorder. That is when my cells undergo metabolism, they are producing more uric acid that ends up in my blood and that – it leads to crystallization in the what, joint structure the fibrous capsule. So now I get these little sharp crystals in my fibrous capsule. Same thing. I have these sharp crystal sticking into my joint every time I move extreme pain. Three to four times more prevalent in males than females. And again, it can be caused by many things. It could be genetic, it might be brought on by obesity, increased alcohol consumption, increased blood pressure, joint injury, dehydration, lots of ways that you can get gout. So here's a normal hand, normal joints. This is rheumatoid arthritis. This is rheumatoid arthritis where the synovial membrane is being attacked, and then the bones start to fuse. This is what it looks like. This has crystals built up in the joint cavity in gouty arthritis, extremely painful, extremely painful. Last couple, I can get those little synovial sacs that are filled with synovial fluid might become inflamed that's called bursitis. And so why is that? Why is that happening? That prolonged stress or injury pressure to joint, particularly in people that do a same motion over and over and over again. So if I play tennis a lot, or pickleball, or I'm a baseball pitcher, the same motion over and over and over again it can cause bursitis. With a p, make sure you say it correctly a sprain is stretched or torn ligaments. What is a

ligament? A ligament is where a bone connects to another bone. This can lead of course, if my ligaments are stretched or torn, the job of my ligaments is to prevent dislocation, it can lead to dislocation. And lastly, torn cartilage. When someone talks about torn cartilage in a joint, it's probably the meniscus in the knee, labrum in the shoulder, torn cartilage. Cartilage again, difficult to repair. The good news about the meniscus is it actually has two parts. The red zone is the lateral edge of a meniscus or labrum. And that has a blood supply, if the tear, however, happens in the medial portion, no blood supply that is difficult to no healing on a meniscus or labrum. All right, sorry, a couple minutes over. I apologize. I will see some of you shortly in lab the rest of you I'll see tomorrow. You're welcome. You're welcome. You're welcome.

>> Thank you.

>> Deb Feickert: You're so welcome.

>> Thank you Have a good day.