## Unit 1: Building Blocks

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Unit 1: Building Blocks

Narrator: Welcome to YogaAnatomy.net Fundamentals. This is Unit One, Building Blocks. In this unit, Amy and Leslie are setting up the essential concepts you’ll need in order to apply what you learned throughout the rest of this course and throughout your training. First, Amy will lead us through a somatization to get us thinking about ourselves as cells, tissues, organs, and systems. Then we will learn some common Sanskrit terms and how we can use them as a lens to look at the study of anatomy, as well as our yoga practice. Next we’ll examine the vast subject of anatomy and get specific about how we'll approach it in this course. After that we'll get into some nuts and bolts. Before we can start looking at things like movement and flexibility, we need to understand the tissues that we're actually asking to move and hold us up. We’ll zoom in and take a closer look at connective tissue, bones, and at muscles. We'll introduce some vocabulary, show images and then lead you through some movement experiences so we can start to embody the material right from the beginning. Finally, we’ll look at how you can already start applying what you have learned to an asana, either in your own practice or with students. But first, let's join Leslie for a look at one of his favorite sutras.

Module 1.1
Sthiram Sukham Asanam

Leslie Kaminoff: I'd like to introduce you to one of my favorite sutras from the Yoga Sutra of Patanjali. It's from the second chapter, the chapter on practice, and it's the 46th Sutra. It's quite famous. You probably heard it. It goes like this. Sthira Sukham Asanam. It's very short, very terse, as many of the sutras are. But very, very important. Sthira means stable. We get our English words stand, stay, establish, steady, all of those words come from that same root. It means to be stable, to be in one place, to be steady. Sukha is the complimentary principle which, actually, when you break the word into its components means good space. “Su” means good and “kha” means space. And it has the association of pleasant, open, free, or easy. It also has a very interesting translation of the good axle hole, which implies that, in order for something to be functional, it needs a space at the center of it. But in conjunction with the term sthira, it provides this lens through which we can look at just about every structure of the body.

What Desikachar says in his commentary is, “Asana practice involves body exercises. When they are properly practiced, there must be alertness without tension and relaxation without dullness or heaviness.” Another way to look at this principle is that we are certainly looking to develop some strength and steadiness in our asana practice. But without the quality of sukha to balance that sthira, it's very easy for strength to turn into tension and tightness and rigidity. So steadiness without rigidity is a good way to understand sthira in relation to asana practice. On the sukha side of the equation, we're all looking for more range of motion, more flexibility, more freedom of movement, easier breathing and all of that. But if we pursue that path too much without the balancing principle of sthira, or steadiness, then our pursuit of flexibility can too easily turn into instability. So another way to understand this sutra is that sthira is strength without rigidity and sukha is flexibility without instability.

So these principles always must be present in just the right amount for anything to work. When we look at any part of the body we can see that principle. For example, the knee. The knee has to be very stable and strong, and these bones have to relate to each other in a stable way in certain positions in order for us to be able to stand and walk. But we need a lot of mobility also. We need to have not just this motion here that we think of as hinging, but rotation and gliding as well as the rolling and what is usually called hinging. So when the forces of sthira and sukha go out of whack in a knee joint, then we're gonna have problems, especially in a joint like this, cause it's the largest joint of your body. It's the relationship between the two longest levers of your body.
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So when we look at the spine, the same thing applies. Here in the spine—actually, what's very interesting is that when you look at it from the side we can see that it's actually comprised of two columns. The column of vertebral bodies and discs and this posterior column of arches and processes, these bony projections that stick out. The stable, or the sthira, part of the spine, is the front part, the anterior part, where the bodies and the discs are. That's where we do our weight bearing. That's where compression loads are accepted by the spine and actually decompressed by the discs. The movement forces the spine is subject to actually get absorbed in the posterior column, the more sukha, movement oriented part of the spine. Cause every time you move you're stretching apart some of these bony projections and the ligaments, the soft tissue between them is being stretched in some direction, and they want to pull back. So it's a very interesting way of looking at just about any part of the body from this standpoint or through this lens of sthira and sukha, and we'll be doing that over and over again as we progress through the material.

Module 1.2
What We're Doing & What We're Not Doing

Amy Matthews: In this course we are gonna cover some of a huge body of material. That material is described as anatomy, kinesiology, and physiology. Anatomy is actually the naming of things, where kinesiology is the description of the movement, and physiology is more how it works. So we're gonna approach this huge body of knowledge about the human experience, the human body, the way we are in the world through these lenses of anatomy and kinesiology, physiology, and yoga. I'd like to point out that this is one way of looking at this experience that we have in our bodies. There's an idea that the map is not the territory, and that's important when we're coming into this kind of exploration. The idea that the map is not the territory includes the concept of our experience not necessarily matching up with the words for something. So as we are teaching you this language of anatomy and kinesiology and physiology, it may not match up with your experience. It may not be how you understand your own movements. That's all right. It's useful language. It's common language. It's valuable to learn. But it may not match how you understand the world. Leslie and I understand things differently as well, and we use this common language, but we have very different takes on how we bring it to our exploration of yoga. I love learning from him. He loves learning from me. So we hope to share that—also, it's not necessary to use the material the same way. With that in mind, we have created glossaries where the vocabulary is laid out for you in the names of bones, the names of joints, what the joint actions are, and we're not going to spend a ton of time on what all of those words mean. You'll have a way to look those up. What we really want to spend our time on is sharing with you how we use these ideas, this vocabulary, these principles, to get into each person's experience doing asana.

Module 1.3
Somatization: Cell, Tissue, Organ, System

Amy: Go ahead and lie down on any surface of your body that you'd like. If you haven't done this kind of experience with me before, what I'm gonna do is invite you to settle into your body and ask you to inquire about different things, maybe try out a little movement. The idea of a somatization is an inquiry into your soma, which is the Greek word for body. If I say something that doesn't make any sense at all, the invitation is to hang out in that confusion, or let it go and think about something else, or latch onto the little part that does make sense. If you find yourself really confused and frustrated, that is interesting in
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and of itself. If I ask you to feel something that you can't imagine being able to sense, that's okay. Sometimes the things I ask you to do or feel or imagine seem impossible, and that's part of the question is how to imagine doing something impossible. So I said to lie down on any surface of your body. You all choose to lie down on your back. If, as we continue, you decide you’d be more comfortable on another surface or in another position, feel free to change your position. And as you settle, see what it is to settle into your body. Are you comfortable?

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What do you notice about your body at the moment? What do you notice about the different parts of your body? So what are the different kinds of information you're getting about yourself? About your body? About your experience? How do you experience the floor underneath you? How do you experience the space around you? What kind of movements do you feel in your body? What are the different kinds of sensations that come together to give you a sense of yourself? See what you notice now of your skin. What does your skin tell you about temperature? About pressure? About movement? What kind of information do you get from your muscles? What do your muscles tell you about how you are in this moment? Do they tell you anything? Do you notice anything? Are they talking? Are you listening? Maybe you are hearing more from your digestive system. What does your digestive system have to tell you about how you are in this moment? Or your circulatory system, can you feel your blood moving? Or imagine your blood moving. What if, instead of feeling a whole system, you settled into feeling an organ? A more specific collection of tissues. Maybe your heart or your brain. What do you imagine you might hear if you listened to your bladder or your liver, or a single bone as an organ? Each organ in our body is made up of different kinds of tissue. So if you were to choose an organ, like your liver or your heart, what different kinds of tissue might be a part of that? What part is connective tissue? What part is nerve? What part might be muscle? Each of those tissues, as different as the tissues are, they’re all made up of cells. So if you were to let go of the differences between tissues and organs and systems, and to feel or listen to, or imagine, the sensation of your cells, how do you know your cells? Luckily you don't have to talk to your cells for them to be active, for them to be alive. Your cells are amazingly busy, amazingly involved in metabolizing and communicating, responding to their environment. Can you imagine or conceive of, or feel yourself as, a community of cells that come together to form what we call tissues? Tissues that come together to form what we call organs. Organs that come together to make what we call systems. All of our systems talking to each other, communicating with each other, adapting and responding to make you, you. You don't have to do anything to make that happen, but to simply be.

Module 1.4
It All Starts With a Cell...

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Leslie: Now we're going to look at the cell, the basic unit of life. We can derive some of the most important, fundamental principles of yoga from looking at this basic unit of life. What we can assume is that if we understand how the cell functions on a basic level, we can understand what the entire organism is doing on a basic level because, well, we're made out of cells. So let's just look at a cell, okay? What's the most basic thing that a cells does in terms of its function? Well, it takes in what it needs from its external environment into its internal environment. It brings in nutrients. We can call that prana. In fact, prana can mean two things. It can mean the nutrition that's being brought in, as in, well, I need some prana. It's out here. I need to get the prana into me. But it also can refer to the force inside the cell, or inside the organism, that draws the nutrition to itself. If you just exhale completely and wait, and keep waiting, how long does it take for something to happen? What makes it happen is a force. We can call that the life force. There is a force inside of you that literally makes you take that breath. So we can call that
prana as well. The life force inside of you needs the life force that's outside of you. So prana refers to all of that.

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On the level of the cell, it's quite simply the nutrition that needs to be brought in and what brings it in. Now, once the cell has brought in what it needs, it utilizes it. It metabolizes it. It breaks it down, okay? In the process of doing that it generates some waste. So that's when the complimentary force, called apana, comes in. Apana literally means to move out, to remove. So it's referring to that which is being removed and the force that is getting rid of it. So just from looking at the most basic thing that a cell does, we can get this idea of prana and apana. Now, if we look a little more closely at how the cell manages to do this, we have to look at the membrane. And so here we see there's sort of an expanded view of view of what's happening at the level of the membrane. This is where sthira and sukha comes into the picture. If prana and apana are sort of the functional terms for what the cell is doing, sthira and sukha is more of a structural description of how it gets that done. If we look here we'll see that this is a semi-permeable structure. It is not a complete barrier and it's not completely open. It's selectively permeable. Semi-permeable. In other words, the membrane knows what to let in, but what not to let in. It also knows what to keep in, but what to get rid of. This is sthira and sukha embodied at the level of cellular function.

Now, I often tell people that if our entire organism were as smart about doing this as any one cell in our body, we would have a lot fewer problems in life. We would know what to let in and what not to let in. We would know what to keep to ourselves and what to get rid of. We would not spend so much time and energy and money going to psychoanalysis complaining about our boundary issues, okay? This is what boundary is. It's not something that's a complete barrier. But it's not something that's completely open as well. So we can get some very profound lessons for life in general from looking at how a cell does this dance of prana, apana, sthira, sukha, but we can also use this lens, as we have been talking about, of sthira, sukha, prana, apana, to look at all of the details of anatomy that we're going to be covering so that we can sort of organize the way we experience the different ways in which our body works, whether it's on a structural level or the level of the breath, or on an emotional level. Even on a conceptual level, all of these principles really are consistent through every level and every dimension of our being and everything we can possibly experience as living things.

So that's yoga lessons from a cell, and we will be coming back to these ideas again and again as we look at how cells build themselves into tissues, which build themselves into organs, which build themselves into systems, which build themselves into organisms, which is what we are, and then we as an organism functions in our environment, whether it's internal or external. So yoga lessons from a cell.

Module 1.5
Systems & Homeostasis

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Amy: Leslie mentioned that cells, which are the smallest living unit, come together to make tissues. Tissues, different kinds of tissues work together to make organs and different organs work together to make systems. Several systems working together makes an organism. So this is a model of life that comes from the study of biology. We could certainly make other definitions of what life is besides a cell, but we're working with the idea that a cell is the smallest living thing. When we go to the tissues coming together into organs and organs coming together into systems, then, we get different properties working together. So each kind of tissue plays a different role in the body. Each organ plays a different role in the body. It's not that simple, though, because each organ plays several roles in the body and participates in
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many different systems. When we look at the different systems that have been named in the body, we
have one possible list of them. [That] would be the skeletal system, the connective tissue system,
neuroendocrine system, which would be subdivided into two systems. Often is the nervous system and the
endocrine system. We have the muscular system. We have the digestive system. The eliminatory,
respiratory, reproductive, circulatory and immune.

You may read in another book a different set of systems. You may hear that one thing is a system and
something is not. There are lots of different ideas about what makes a system, and here we're back again
to, this is our attempt to understand and map out how the body works. When we look at the different
systems, it's a way of kind of pulling out a group of organs that work together to serve a particular
purpose. Looking at how these all interact with each other brings out something about balance that we
want to highlight. Each system has to work with every other system, and none of these systems by
themselves is sufficient for life to happen. For example, the skeletal system, which we think of as a
support system in our bones and joints, is also actually necessary for the circulatory system because it's
where we make our blood cells.

The circulatory system and the respiratory system are deeply intertwined, because the respiratory system
is how we get oxygen into our lungs. But the circulatory system has to pick it up there and get it to the
cells. The circulatory system in the muscles have to work together, and the muscles and the digestive
system work together, and the digestive system and the neuroendocrine system are deeply intertwined.
Connective tissue is a part of all of these systems. Immune system relates to eliminatory, circulatory—I
think you get the idea. All of these systems work together to create what is called homeostasis, which can
be defined in many ways. But I'm gonna say is the state of dynamic balance, where all of the different
parts need to be in relationship to each other. And if they are not relating and responding and adapting to
each other, that balance doesn't exist. So balance is not a fixed state. Balance is not necessarily everything
being equal or symmetrical. Balance, in the body, for life to happen, is dynamic.

Module 1.6
Anatomy is a Story

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Leslie: Anatomy. You'd get the sense from reading books and doing research, as we've done, that it's a
fairly well understood, well catalogued, a laid out field of study. In many ways it is. The advances that we
have made as a civilization through our study of anatomy in the field of medicine and health and biology
are just astounding, considering the increases in lifespan we have experienced over the last 100 years or
so, and there's no doubt that this field has proved enormously beneficial to mankind. But what we'd like to
do is look a little deeper into, what exactly is anatomy? The word itself is interesting. Anatomy literally
means to cut into. A tom is a sharp instrument. So, in a way, anatomy is a story that's told with a sharp
instrument. For me, this has been a very powerful realization that you have to choose which instrument
you're using, for one thing. How you hold it, how you use it, and that really will determine the kind of
story you get. It's not like some stories are true and some stories are false, necessarily. It's that some
stories are more useful for certain purposes than others. So if we look at anatomy from a historical
perspective, in the Western world it's 400, 500 years old, really. Since we started systematically cutting
into dead bodies and looking inside and seeing what's there and labeling and categorizing, and learning
how to do things like surgeries. The original anatomist really didn't have an easy time of it. They were
working under terrible conditions, number one, in terms of procuring the bodies. Ambrose Bierce used to
call the graveyard the place where the dead would go to await the medical student. So the preservation
techniques were almost nonexistent in the beginning as well, so the conditions are really quite horrid for
the early anatomists. And yet, some of them were able to produce amazingly beautiful images,
which, to this day, inspire us. Two of them here are shown from Vesalius and Albinus.

Now, a scalpel is not the only sharp instrument that you can use to study anatomy. Because for thousands of years, anatomy has been studied and catalogued and categorized using a different kind of sharp instrument. The sharp instrument of the mind, of consciousness. So the anatomies that we get, the models that we get, the stories that are told in the Eastern world from India, from China, from Tibet, from places where they weren't necessarily cutting into their ancestors to learn what was inside of them, but were sending their consciousness and awareness and observational skills into their own bodies and the bodies of others. There’s these amazing stories have come out of that way of doing anatomy. Stories represented by images that we're familiar with, images of chakras and nadis and all of these rivers of life. Nadi means river. For example, here's a model that some ancient Ayurvedic people came up with. Now, a modern doctor or an anatomist would look at this and go, "What the Hell is that?" You don't open up a cadaver in the lab and find that in there. It's completely fanciful and wrong, from a certain perspective. But from the perspective of the observations that were being made and the treatments that were being given, the model, the story that was being generated by the early Ayurvedic physicians, this was a useful model. So this is an anatomy as well. It has been created with a sharp instrument just as much as you would create an anatomy with the scalpel. But the sharp instrument, in this case, is the consciousness.

I would suggest that yoga is a way of bringing together these two models, the model of our modern understanding of anatomy, which was created with scalpels, and of this ancient way of looking at things that was created with the use of our consciousness. Here’s some more modern takes on the yoga story. We find these images beautiful. We find them inspirational, and we can find them useful as well so long as we understand that it's a story. It's no less of a story than Western anatomy. This is actually Rembrandt's first major commission. It's a very famous painting called The Anatomy Lesson. This shows anatomy as a spectator sport. This was something that was done in a theater with spectators. This is a form of anatomy that's still done today called regional anatomy, wherein you would take this scalpel and you would hold it this way, with the sharp edge down. Because let's say, for example, I want to study this nerve plexus here. Well, what's in the way? The skin's in the way. Cut that away. That goes in the bucket or it goes off to the side. Then there's some superficial fascia and fat under that. I don't want to see that, so that goes in the bucket. Then there's some deep fascia under that. That's not what I want to see. So when you're cutting down through the layers, okay, you're removing the things you don't want to see so you can get to the thing you want to see. So you go through the deep fascia, the muscles in the way—ah, there's that structure that I want to see. That's called regional anatomy. You take your sharp instrument and you penetrate this way. But that's not the only way to do it. We'll go back to this slide. So Vesalius and Albinus clearly were interested in layers, okay. So they would hold their scalpel on edge and you would go through the skin and see what's under the skin. Then, when they got to the layers of the muscles, for example, Albinus found what he called four orders of muscle, or four layers of muscle, this one being the deepest. We'll be coming back to this image later on in the course. This is a very interesting story to tell about this deepest layer of muscle in the body. Okay? So just because you're using a scalpel doesn't mean you're getting the same story. It depends how you use it, how you hold it and what you want to see.

Some modern anatomists, who happen to be friends of ours, also dissect that way. We have here Gil Hedley and Tom Myers, author of *Anatomy Trains*. Gil Hedley runs the six day cadaver dissection labs that we go to to study anatomy, and they also dissect that way. For example, in Tom's lab, he played an homage to these early anatomists by doing the same dissection. This is what Tom calls the deep front line. Again, this is a story that's told by running your scalpel this way and seeing the connection between all of these structures, which usually are given individual names. The only way to get a part is to take your scalpel and go, "Okay, this begins here and ends here, and this now has a name because it's a part." But another way to look at the body is to say, "Well, what if we're not interested in parts? What if we're
interested in lines of connection? Continuities? How would we use our sharp instrument to tell that story?" So this is all one thing created with a scalpel. It's still a story. In fact, Gil, my friend Gil, will often say, "Look. If you want to define the Eiffel tower in a human body and you had enough time and skill, with this you could probably find the Eiffel tower. All you have to do is carve away everything that doesn't look like the Eiffel Tower," right?

So I don't know how useful finding the Eiffel Tower is in the body, but this story could be particularly useful. Because it talks about the connection between what's happening in the sole of your foot and the domes of your diaphragm. So it's not so much, is this story correct or not. It's, is it useful? Does it have a purpose? Does it enliven our experience of being alive and walking around in these bodies? There’s so many stories we can tell. For example, we talked about the skin. What if it's not the thing that's in the way and you throw it in the bucket? What if that's the thing you want to study? What if you want to see the skin as a whole layer? Well, Gil asked that question in the lab and decided to do it. The question was, can we take the skin off all in one piece? All right. This is cadaver footage, by the way. You have already seen a little bit of it. Some of it is a little intense. Just giving you a warning here. But here's what Gil did with the skin. That's the entire surface of a person's body. Now you can see it as a layer. How heavy is it? Where is it thick? Where is it thin? Where is it rough? Where is it smooth? And where, for example, doesn't it come off in a layer? This area here around the perineum is folded in on itself and anchored in such an intense way that you can't just peel it like you can with the rest of the body. So you can learn a lot about the skin by treating it as a layer. But, again, this is a story told with a sharp instrument. Does it transmit light? That's a good question. Well, all you have to do is put a bright light source behind it to find out, and indeed it does. So what does this story tell you about your skin when you're out in the sun? The fact that that sunlight and all that radiation is penetrating the skin and getting into the layers beneath. The layer beneath the skin is a fat layer that's embedded in the superficial fascia, and it stores energy and it has important immune functions. So what does that tell you about how important it is to be in the sunlight from time to time? So we can learn about ourselves by holding our sharp instruments in all sorts of different ways. What about that layer, that fat layer? Well, the same cadaver Gil was working with here, we have seen the skin of this cadaver. He decided, "Well, what if we try to take the entire superficial fascia, with the fat, as a layer? Can we do that?" Turns out yes, you can. Here we see... This is the same cadaver. This is the deep fascia. You would have to go through this to get to the muscle. You haven't seen any muscle yet, really. But here, as if having taken off a wetsuit, we see that superficial fascia layer with the fat embedded in it, and the breasts, just lying next to her. That's a very compelling story too when we think about how we tend to almost demonize that layer in our society, and we want to get rid of it. It's a warm, comfy wetsuit layer that is enveloping us and has such important function. We need to honor it. So these are examples of anatomy as a story. With such a vast number of nearly infinite potential details of anatomy, and so many stories that could be told,

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how do we select the stories to tell that are most useful for us as yoga people? This is where we come back to these fundamental concepts, these lenses. The right concept can function as a lens to show you which details are important and which details are less important. These lenses are ideas like sthira, sukha, prana, apana, sukha, duka, and some of the key sutras that we find in the teachings, which I believe are true and compelling not because they are ancient, not because they were transmitted from some mystical other dimension, but because they relate to fundamental, biological principles that bring us back into ourselves. And we can verify the truth of these principles by going into ourselves in an embodied way.

So this is anatomy as a story. We hope to tell you some useful stories. We also hope to empower you and give you enough confidence and curiosity to learn your stories, to start telling your stories. Coming back to Gil Hedley, I spent some time with him in the lab this year doing some special work. He had an extra long lab where he was photographing and videoing things for his upcoming atlas on integral anatomy. He
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said something very interesting one of the mornings about anatomy books. He said, "The books you look at that have drawings and paintings, these are art." They are meant to represent an average of humanity when they are depicting these structures. So that's really nobody. Other anatomy books have photographs of cadaver prosections. Those were a particular somebody that has been photographed. But, in reality, you'll never find yourself in a book because, whether it's a drawing or a photograph, it's not you. The book for you is you, it's here. And being able to turn that sharp instrument of your consciousness, your attention, into it, to read that book, that, perhaps, is the most compelling story of all.

Module 1.7

Geek Out: Connective Tissue

Amy: Sometimes Leslie and I joke about how differently we approach the same material. He's the forest and I'm the trees. So far we have looked from the perspective of the forest at overarching concepts about anatomy and ways we can use that through the rest of the course. Next we're gonna take a look at things in more detail. I like to think there's value in looking not just at the trees, but at the wing on the bug, on the leaf, on the branch of the tree. Looking at these tiny details can give us some understanding of fundamental concepts about how cells and tissues and organs come together that underlie a lot of the things we hear said about bones, muscles, and joints. In the next section we will look at three kinds of tissue. Connective tissue, bones, and muscles. All of our tissues in all of our body systems are involved in movement, but these three tissues are the ones that you might hear the most said about in a movement class. We'll start with a detailed look at the physiology, the cells and the environment that they create—what you might learn in a biology class. Then I'll lead you through a movement experience that will give you the chance to feel it in your own body. There's no right way to feel it. There's no right experience to have. Just asking the question, "How would it be if I could feel this?" is of value and might give you a chance at a new experience. Keep your notebook handy and your yoga mat or practice area nearby.

First up, connective tissue. So we go in depth into looking at the physiology of these tissues and how they work. We need to look at two things. In all of these systems we're gonna look at what the extracellular matrix is and then the cells that make that up that tissue. Extracellular matrix is all of the stuff outside of the cells. Extracellular means outside the cells. So the things that are the environment around the cells that the cells engage with to get what they need, to let go of what they don't need. The things that the cells make themselves and extrude also are the extracellular matrix. So when we look at connective tissue, which is both a tissue and a whole system, the extracellular matrix is called the ground substance. So that ground substance is a fluid gel-like thing, stuff, that has the property of getting more fluid under pressure or heat, which, as a word, the word for that quality is thixotropic, which is just a great—thixotropic—great word. Which means that it gets less viscous. It gets less thick, less sticky, more runny when there's pressure or friction or heat. Ketchup is also a thixotropic structure. I mean, substance. So when you shake ketchup up it gets runnier. The ground substance, then, the stuff outside the cells in the connective tissue, is thixotropic. When there's pressure on the tissue, when there's heat or friction, it gets more fluid, more runny. Also in this extracellular matrix are all kinds of fibers. The most common one in connective tissue is collagen. We also have something called reticulin and elastin. There are tons of other things that get included in extracellular matrix as well. So this is not an exclusive list. This is high points in the story, in the map. Collagen fibers are the most common fibers in the body. They are not cells. They are things made by cells. They are a kind of protein molecule. What collagen fibers have the ability to do is resist tension. So if you pull on a collagen fiber it doesn't stretch, it doesn't get longer. Just like a yoga strap. Pull on it and it resists being pulled apart. It is not elastic. Elastin fibers are elastic, and some extracellular matrix, some connective tissue, has lots of elastin in it. But all connective tissue has collagen fibers in it.
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The cells, then, in connective tissue are, and there are also many different kinds of lists of these. So this is one map that we can look at. Fibroblasts, fibrocytes, and myofibroblasts.

This might be a point, a moment to make a point about research and new information. As Leslie pointed out, this is not a fixed body of knowledge. In the connective field in particular there's constantly new information coming out. So you might not, if you go research you might not find everywhere people talking about myofibroblasts, or they might have a slightly different name. As new information comes out, things get different names, and there isn't necessarily consensus on what to call all these things yet. But the cells that then are in the extracellular matrix and that create the extracellular matrix are fibroblasts. These are the most common ones. Fibroblasts, what they do is they make ground substance and they make collagen fibers, reticulan fibers and elastin fibers. So fibroblasts are generating the extracellular matrix. Fibrocytes. One of the jobs that they do, and they probably do other things that we don't know yet, but one of the things that fibrocytes do is they just maintain. Not 'just' maintain. They maintain, they track, they pay attention to what's going on and they respond to stresses in the tissue. A stress in the tissue in this case is not a bad thing. But if there's pulling or pressure then, along with the ground substance changing when there's tension on connective tissue, the fibrocytes respond by—one of the things they do is they consolidate. So they secrete a molecule that will bind collagen fibers together that will make it stronger. The fibroblasts respond to tension, 

[to being pulled on, by creating more fibers. The fibrocytes and fibroblasts, together they do a kind of organizing. That when there's tension in the tissue they organize the fibers of the collagen so that the fibers of the tissue organize along the line of pull. So that when there's pull on the tissue over time, gradually the fibers in that ground substance, they'll orient themselves to resist that pull. So if the pull is going, if this strap were a collagen fiber, if the pull is going this way on the tissue, gradually the strap will orient itself so it resists the pull this way. That kind of pull that creates tension that would reorganize or consolidate the fibers might be something like a habitual movement pattern or sitting in the same kind of position, or standing, or hanging out in some shape where, say, the pull of gravity makes this connective tissue always have to resist me falling over. Muscles participate in that, but connective tissue does too. So our connective tissue is constantly responding to the positions we find ourselves in and the movements we are doing. The myofibroblasts also then respond. There are little muscle fibers, smooth muscle fibers, that come from the fibroblasts. They respond to things in the environment, in the extracellular matrix, to signaling molecules that come from the bloodstream and other fluids in the body. Things like hormones effect the tone of the connective tissue. So the cells respond to signals in the body by proliferating the fibers, by consolidating and by organizing, which makes connective tissue, which is all over the body. We're gonna see bone as a kind of connective tissue. Our tendons, our ligaments, there’s sheets of connective tissue around tendons, around ligaments, around muscles, around nerves, around blood vessels, around organs, around, around, around everything. There are sheets of connective tissue creating relationship, maintain containment, and responding to the forces in our body.

Module 1.8
Physical Exploration: Connective Tissue

Amy: Stand up, please. Take a few steps forward and a few steps back. Then just stop somewhere. See if you can stand without doing too much fixing. So wherever you land on your two feet, stand. You can have your eyes open or closed. You do not have to look at me. Turn your attention inward and see what you notice about your connective tissue, about where there's any sense of pulling in your body. So one of the
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things that connective tissue responds to is pull. To tension. Connective tissue is so many different things in our body. It's our tendons. It's our ligaments. It's the general web of connective tissue between different layers of our body. It's part of our skin. It could be our bones, but we're gonna leave that for later. So where, in a general sense in your body, do you feel the connections between things? Where do you feel a pull? Where do you not feel tension or pulling, but might you also feel connected? As you continue to stand you may notice different things come up. You certainly might notice the movement of your breath. You might notice muscles firing up. You might notice your heartbeat. You might notice your joints. Let those other body systems, let those other tissues, talk to you, but keep inviting your intention back to what you imagine your connective tissue might feel like in this moment. Then, at some point, bring your arms out to the side and up overhead. Then bring your arms back down to your sides. Do this a few times. You can do it as quickly as you like. You can do it as slowly as you like. And in doing this movement, then, where do you feel your connective tissue? Where might you feel your connective tissue if it were talking to you? And again, other things may come into your awareness. You may be used to paying attention to a different kind of tissue or a different body system. How does your experience change if you were thinking about your connective tissue?

As you continue, and you can pause any time you want. You can pause with your arms overhead. You can pause with your arms down by your side. Again, you can go any speed you want. But as you continue, can you entertain the idea of initiating from your connective tissue? What if it were your awareness of your connective tissue, or the cells in your connective tissue that were initiating the movement? Does that change your experience to start from a different consciousness? The next time you have brought your arms down to your side, leave them there. Stand. See what you notice in relative stillness on the outside of your body. Then pause the tape and take a few minutes to write down what that experience was like. What kinds of adjectives might come up about your experience of connective tissue?

Module 1.9
Geek Out: Bones

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Amy: We’re gonna look now in particular at the skeletal system. Bones are actually also considered a kind of connective tissue. So bones, tendons, ligaments, all of which are connective tissue. Ligaments are the connective tissue that connects bones to bones. Tendon are the connective tissue that connects muscle to bone, and bone itself all has this extracellular matrix and cell kind of composition. When we look at what it is in bones, though, it's a little differently organized or named. So the extracellular matrix in bone has, among other things, collagen fibers that have crystalized cell salts on them. Crystalized minerals that attach to them. So the calcium, magnesium, those things we hear about needing to make our bones strong, what they do is they attach to the collagen fibers and they make the collagen fibers transform from being able to resist tension. So if the strap is a collagen fiber and we say, "Ah, it resists tension," but it doesn't resist compression very well. So I can pull on it. It won't let me tear it. But if I push on it, bloop, it collapses. Whereas a bone, then, is unique in our connective tissue in its ability to resist compression. So the crystalized minerals that wrap around the collagen fibers then make the bones able to resist being crushed. What that means, then, is that they can transfer weight so that if I put some force into one end of this structure, it's transmitted to the other end without giving way or folding up or crumpling or bending.

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The cells, then, that maintain that are called osteoblasts, osteoclasts, and osteosites. Now, like any of the stories we tell, you might read up on four or five different kinds of bone cells. You might read that there are two. I'm gonna suggest that there are three, and that what osteoblasts do is they build bone. What
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Osteoclasts do is they break down bone, and what osteocytes do is they maintain the bone. So we have something that creates, we have something that destroys, and we have something that maintains. When we look at how all of that gets organized into different layers, then, we can see in this detailed picture, which I also have a model of here—this is a hugely blown up model of bone that shows on the outside the outermost layer, which is called the periosteum. So this layer out here is the periosteum, and it has little fibers that connect it into this thicker, denser part. All of these are blood vessels that go through this thicker part, which is called the compact bone. It's very well organized. The collagen fibers with their mineral salts around them are organized into these columns, and those columns, like in the connective tissue, are organized now in response to pressure. So we can see, for example, in this longer bone that the compact bone, which is this dense part here, the fibers of this are going to be organized along the lines of force. When we get to either end of the bone you can kind of see these fibers are going many different directions because there are many forces coming in. So the collagen fibers in the compact bone are organized in response to the force traveling through it. When we get into the deeper part of the bone, then, we see what's called spongy bone, or trabecular bone. And inside of those spaces and then in the very center of the bone there might be a cavity, which has bone marrow. That marrow is where we make our red blood cells. So all of our bones are permeated by blood vessels communicating from the marrow with the rest of the body. So the bone as a whole, is a part of our structural system and an essential part of our circulatory system.

Module 1.10
Physical Exploration: Bones

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Amy: Stand up. Again, take a few steps forward, take a few steps back, with the idea of just not spending a lot of time fussing around where your feet are. Or, if not fussing, adjusting. See where your feet land. Then let your attention settle inwards again. Bring your attention now to your bones, which are a kind of connective tissue that have developed to resist compression. So where do you feel weight? Where do you feel pressure? Can you invite that question into your bones? So you certainly might feel weight or pressure in other tissues in your body. But can you use that question of weight traveling through your bones to bring your attention to your skeleton? It may be that your attention is drawn to your muscles. It may be that your attention is drawn to your connective tissue or to something else altogether. We have all kinds of sensations all the time in our body. If you were to tune your awareness to your bones, what kind of experience arises? Sometimes the bones are quiet. Sometimes other things talk to us more loudly, or are more noticeable. How is it to settle into a sense of how the weight travels through your skeleton? You might feel, as you settle into this sense of weight, that you are not standing up as much as you usually do, or you're not as straight or as tall or any of those ideas that you might cultivate. That's okay for right now. See if you can not fall down, but not pull up, either. How little effort can you exert to feel the weight of your head travel through your spine? To feel the weight of your spine travel through your legs? To feel the weight of your shoulders, the bones of your arms, your hands, and then how would it be, from the bones of your fingers, to lift your arms up? Can you now do this movement of bringing the arms out and up, keeping your attention in your bones? You can lift and lower at any speed you like. How is it to initiate this movement from an awareness of your bones? Is it a different experience than initiating from your connective tissue was? Is it the same? Certainly, to lift our arms up we need other tissues. We need muscle. We need connective tissue. We need blood. We need all kinds of things to lift our arms. But if you initiate this movement from an awareness of your bones, does your experience change? The next time you lower your arms down, let them stay down. Feel the pull of gravity. The presence of your bones. Then pause the tape and take a few minutes to write down your experience with bones.
Module 1.11
Geek Out: Muscles

Amy: Now we're gonna look at muscles. When we look at the organization of muscles we're gonna take a slightly different look at it, and when we talk about the extracellular matrix now we're gonna look at the layers of connective tissue that wrap around the muscle cells. So a muscle cell is called a myocyte, or a muscle fiber. That can be confusing because we talk about collagen fibers and they're not cells. Muscle fibers are muscle cells. And they're called fibers because they are organized in these long strands. So a muscle cell is many, many premature cells that have come together. So they have many nucleuses in them and they organize themselves into these long strings. Then they bundle together. They get bundled together and wrapped up with extracellular matrix. In this case, with connective tissue. At their deepest layer they are wrapped in something called endomysium and then those bundles will wrap together perimysium, those bundles will wrap together epimysium. Those bundles will wrap together to make a tendon, which ends up looking something like this. If the cells are red, say, and the connective tissue around them is green, and here's a muscle cell because it has many little nucleuses in it and these are the fibers inside of the cell, then these all get bundled together. These would all be muscle cells. Da, da, da, da, da, da, wrapped in endomysium, in this case. All of those are gonna get bundled together and wrapped in connective tissue, wrapping between. So connective tissue does this separating and connecting action. So it wraps these muscle cells together into something that are called fascicles. A bundle of muscle cells. Then all of those fascicles are gonna get bundled together. So many of them. This is not nearly as many as there would be in an actual muscle. And they get bundled together by perimysium, and then the whole thing gets wrapped in epimysium, the outermost layer. Wrapped up also in this connective tissue layer are blood vessels and nerves. So to actually make a muscle, what we think of as a functional muscle, it's an organ in the sense that it has muscle fibers in it, it has connective tissue in it, it has blood vessels in it and it has nerves. So when we take that and we take that connective tissue and connect it into the bone, then we get something that might look like this. Where all of these wrapped bundles of muscle, where the muscle cells stop, these connective tissue fibers come together to make the tendon, which connects into the periosteum of the bone, the outermost layer of connective tissue that wraps the bone. Muscle cells are unique in their ability to respond to the signals from the nervous system and contract and slide shorter. When they do that, when they contract and slide shorter, they pull on the tendon, which then pulls on the bone. In that way muscle cells are able to create movement, which is their role they play in the body.

Module 1.12
Physical Exploration: Muscles

Amy: Come to standing once again. Take a few steps forward. A few steps back. Find a place to settle into where you're standing on both feet and once again turn your attention inwards. Your eyes can be open or closed. See, as you stand now, what information you get in your body about your bones, about your connective tissue, and then see what your muscles are telling you. What are your muscles telling you about movement? What are your muscles telling you about moving your bones, about moving your fluids? What are your muscles telling you about the little tiny movements that you are making to keep your balance? What are your muscles telling you about the movement of your breath and the other movements in your body that are adjusting to the movement of your breath? Any of these might be
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familiar. They might be unfamiliar. We all have all of these tissues, but which ones we pay attention to vary from person to person. So when you pay attention, when you listen or feel for what your muscles have to say, what kind of experience arises? If you're getting a lot of information about the muscles in one area, can you spread that question around? Then how do those tiny movements that may feel large on the inside, the movement of your breath, the adjustments of your balance, can those spread into moving your arms to bring your arms out to the side and up overhead once again? Then back down at any speed you like, as many times as you'd like, until I say to stop. When you lift and lower your arms, what is your experience of your muscles? Then how is your experience if you initiate from your muscles? Which may or may not be the same. So you may have already thought about initiating from the muscles. If the muscles initiate the movement, is the experience different than if you think about initiating from the bones or connective tissue? The next time you have lowered your arms down to the sides, leave them there. See how do you experience all of your systems together in this moment? Then pause the tape and take a few moments to write down your thoughts about muscles.

Module 1.13
The Story in Sanskrit

Leslie: So what I'd like to review for you now is a bunch of terminology. I have already mentioned that we're using these terms, these yogic terms, as kind of a lens. A lens through which we can view a topic as complex as anatomy and yoga, for that matter, in a way that allows us to focus on the details that are most important to us. I found in my experience that using these concepts as a lens has made me a lot less confused when I'm approaching something like anatomy. You open any anatomy book, even the one that has my name on it, frankly, it's, like, "Ahh! There's a lot of detail here." It's easy to get overwhelmed. The question is, okay, which of these details really are important for me to focus on? Which are the ones that hook into my interests and my experience as someone that is either practicing or teaching yoga? So there's really just a handful of these, and they are usually coupled terms, which is not surprising because when we look at the biology of how life happens we are looking at, as I've mentioned, this balance between sthira and sukha. Between the stability and the mobility. Between space and boundaries. Between the permeability that the cell membrane has to exhibit to let stuff in and let stuff out, but the stability it also has to have to do its job of containing the cell and protecting it. Because we're all built of cells, knowing how the individual works lets us know how the system works and the tissues and the organs and all of that, because they are made of cells. So the terms we'll be looking at, prana apana,

sthira sukha, and then sukha takes part in another paired term of sukha dukha. Brahma-langhana is interesting. These are terms that were actually brought into this field of breath centered yoga by Krishnamacharya. These are terms that are usually associated with Ayurveda. The tapas svadhyaya ishvara pranidhana, which is a triple term, which I'll be going into in depth later on, that actually gives us a definition of yoga practice that we find quite useful. So prana and apana is something that has to do with the cell. It has to do with how energy, nutrition comes in and waste goes out. That's the most fundamental thing you can say about what a cell does. About what any living thing does, for that matter. The important context here is that the way that I relate to any teaching that I encounter or receive, regardless of whether it's expressed in English or in Sanskrit or whether it's new or old or very, very old, I'm not judging these things, their value, basically, on how old they are or how many sacred texts mention them. If these terms can be verified through my experience of going into my embodiment, my breath, looking into the way nature works, looking into the way biology works, that's what makes them powerful for me. And as it happens, some of the more ancient terms—in fact, the older they get the more elemental they tend to
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become. When we look back into some of the oldest texts that we have, the Vedas, for example, we find a lot of elemental sorts of ideas. Fire being very important in the Vedas, for example. The first word of the Rigveda is agnim, which is fire. It also is the same root as our English word ignite. So it's likely that yoga actually started with people sitting around in front of a fire. If you think about it, that makes a lot of sense because prior to humans using fire, my guess is we just didn't have enough free time to do something like yoga. We were too busy avoiding being eaten, or too busy finding things to eat. So, essentially, fire, which we started using about 400,000 years ago, by best estimate, is what got us off of the food chain. That's when something like yoga is possible. That's when you can spend some of your life energy inquiring about your nature and about the connection between this element, like fire, that you see in front of you and its connection with the fire you see in the heavens or coming down from the heavens, and maybe the fire that's inside of you. So agni, even though it's not explicitly here in words, but is represented visually by the red dot that we see in the center of this diagram, which we'll be explaining later on, is a really central idea. So agni, worshipped as a deity in ancient times, utilized by mankind to really have enough of a mastery over our environment that we can do something like sleep well at night without worrying about being eaten. I don't think yoga is possible if that's your main concern. So the idea of yoga practice being a kind of an offering, and an offering to fire in particular, is a very potent idea. It's a very elemental idea. It's something that actually is deeply entwined with the breath centered approach of this tradition of yoga.

We will see later on when we talk about breathing how the very definition of pranayama is conceived as a kind of an offering of the in breath to the out breath and the out breath to the in breath, and both breaths to the fire, to agni. So prana and apana conceptualized not just as nutrition in and waste out, but as a flow of breath in our system, which can have a relationship to each other, is a central theme not just in understanding breath, but understanding how the forces that generate breath can be coordinated in a way that helps us to support our spine, support movement, to create safety for the way we move into and out of poses. All of this will be covered in due time.

Sthira sukha, we mentioned, has to do also if you look at the cell with what the membrane is doing, the membrane of the cell. It has to allow nutrition in. It has to allow waste out. It also has to be selective in how it does that. It doesn't allow everything in. Only what it needs. It rejects the rest and it doesn't allow everything out, only what it doesn't need. So there's a certain intelligence implied in this lens of sthira sukha. An intelligence in the way nature puts living systems together, but also an intelligence in the way we can understand living systems and see how these different forces can be balanced, or maybe brought more into balance. So understanding sthira, sukha, for example, lets us understand a phrase like we want to create strength without rigidity. We want to create flexibility without instability. So all of these discussions around what we're really up to in asana do center around sthira sukha. This is reflected, of course, in that fundamental definition of asana, which is given by Patanjali in the Yoga Sutra. From a certain tradition sense, asana, the word itself, just means seat, which makes sense. Because if yoga started with people sitting around fires, then how does sit comfortably for as long as you could have been a prime concern of theirs. So the original asanas, really, if you look at the older texts, really were all seated postures. They didn't get into more complex descriptions of poses until later on.

Now, sukha dukha. This is one of my favorite bits of Sanskrit here. Sukha literally means good space. Su means good. Kha means space. The opposite of good space, of course, would be bad space, which would be dukha. Dus means bad. When you are reading a text that has been translated from the Sanskrit and the English word you are reading is suffering, generally speaking, the Sanskrit word that's being translated, whether it's a Hindu text or a Buddhist text, is dukha. So this idea of bad space being the root of suffering or being identical to suffering is very interesting. If we think about this idea that we have this life force, we have this prana, and it has these pathways through which it flows in our system, whether we're looking at a biological model of how it flows through our cells, our tissues, our organs, our systems, through our entire organism, or if you want to tell the story of the nadis, the rivers of prana that flow through our body, the chakras or the centers through which the prana can flow, or the fundamental channels of the ida,
the pingala, the sushumna. All of these, really, are talking about flow and the ability of prana to move freely through these passageways. When we're in a state of suffering, or dukha, the implication is that there's an obstruction to the flow. Something that wants to flow can't flow. So seeing this as the root cause of suffering is a very interesting model, because it also, implied in that model is what to do about it. Well, unblock the system. Deal with the obstructions, right? If you remove what's undesirable, what's left is what you want—prana. Which is what is responsible for healing. So this sukha dukha couplet, this term, is very interesting. When you look up sukha in a Sanskrit dictionary you don't just get good space. Also, there's this other meaning for kha other than just space. We can understand that a little bit better if we look at this and ask ourselves, is that a wheel? I would say it has potential as a wheel. It's round, all right. But right now it's not a wheel. It's just a round flat thing. Maybe you can roll it down the hill a little bit and see how far it goes, or use it as a table. Or, if it's small enough, a frisbee. But it's not really a wheel. It's missing, obviously, a space at the center. So kha also means a good axle hole.

Sukha means a good axle hole. Su, good. Kha, axle hole. Sukha. The good axle hole. The implication here is that no matter how beautifully formed this round thing is, it's pretty much useless as a wheel unless it has a space at the center. And it's of course, it's the space at the center that allows it to join. So that brings us to a pretty fundamental word, yoga, to join or to bind together. So what we can say is that without a space at the center joining isn't possible. We can say that people are like wheels, and if we don't have enough space in our center we don't function very well because we can't join. We can't join very effectively with what's around us, or the connections and the relationships with the people around us if we're all tied up in knots in our center.

But what's also part of these teachings is that the forces within us can't join with each other. They can't have a meeting place in our center unless there's some space there, a good space, a sukha, a good axle hole. So, of course, once you have a wheel with a good space in the center and an axle joining the wheels, you can then join them to a cart and now you have a useful vehicle. The ancient people didn't have cars. I tend to use automotive imagery when I'm teaching about certain anatomical principles, but when you look at the ancient texts, since they didn't have cars they used carts and chariots and horses and things like that. This was a very advanced vehicle way back then, and how to make it work properly would have been of great concern to the ancient people, of having a wheel with a good axle hole. So that's sukha and dukha. Incidentally, in this visual model here, which represents the joining of prana and apana in the center of the body, of course, the necessary conditions for that joining would be a space at the center. A sense of space, a sense of openness, an ability to communicate.

Brahmana and langhana. Brah means to expand. We get our word bright from the same root, the same Sanskrit root. In Ayurveda, brahmana practices are nutritive, building up. If someone is deficient or weak or in some way lacking, the practices that are brought to bear for healing would be brahmana type practices. Langhana means to reduce. It's the opposite. If someone is, say, toxic or in some way obstructed, then the practices, the langhana practices, would be things like fasting, things like purging, things like detoxifying. So what Krishnamacharya did was he brought these ideas into the field of yoga and in particular the effects of breath on asana and the effects of asana on breath. To use the most obvious examples, if you are upright and in a standing kind of practice, you have to engage your musculature in a certain way to keep your body stabilized in gravity. Because of the way you are using those muscles, it will effect the way that you are breathing. For example, taking a nice, deep, low belly breath would be asking you to disengage your abdominal wall in a way that may be counterproductive to what that abdominal wall needs to do to hold your spine up, right? So if you are holding yourself up and you are engaging here, then you are actually moving your respiratory action a little bit higher up in the system a little more towards the chest. So brahmana breathing is said to be more focused around the chest. It's more focused on prana. It's more focused on heat. It's more focused on support and all of those things that...
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we associate with the verticality of that part of what we do in yoga. It's also associated with more back bending kind of practice. Langhana, by contrast, would be whatever the opposite is of all those words I just said. So let's say your horizontal, okay, in savasana, to use the extreme example. You are not supporting. You are being supported. You are not really engaging. You are releasing. You are not heating. It's more cooling. The breath could center a little bit more around the belly because you're not using your abdominal wall to hold yourself up. The floor is holding you up, right? So it's more centered around the belly. It's more focused on apana, as opposed to prana. Prana is said to live in the chest. Apana in the belly.

So these are just general, almost common sense ways of looking at the effects of breath on posture and posture on breath. But it goes deeper because you can bring these qualities of brahmana and langhana to certain situations where they are either appropriate and useful or maybe not appropriate. For example, if you have someone in savasana and you want them to relax and release, you're not gonna go, "Okay! Lay down! Relax!" That's too brahmana. But if you're trying to motivate someone and they're having trouble standing it's, like, "Okay, come on!" You encourage them. It's, like, "You can do it!" So if you have a really cold room, right, and you had planned this really nice somatic practice where you're lying down and getting into your tissues and cells, but the room is freezing, right? That may not be a good match for the environment, to have people just lying still. They will start shivering. All they will be able to focus on is the fact that they're freezing. By the same token, if a room is very hot and steamy and you had planned to do some really hot, steamy practice and you're not teaching hot yoga, right, then you may need to do things to help people cool down to balance things out. So it's not just posture and breathing. It's the qualities we bring to what we're doing and how we understand what we're doing, and how we use our voice and how we use our body language. These are not etched in stone rules. For example, some people don't find back bending to be energizing. Some people find it to be calming. Some people don't find lying on the floor to be very calming. In fact, probably the people who need to do it the most are the ones who are going to be made most anxious by lying on the floor. If you have ever taught a restorative class to someone who is really anxious, they probably have friend that told them, "You really need yoga, and by the way, restorative is the thing for you because it will calm your nervous system." Sometimes that's the last thing they need, at least right away, because they lie down and all of a sudden their anxiety goes off the charts, right? So the brahmana langhana conversation is just a way of organizing our thinking around these sorts of issues in a way that we can use them appropriately in appropriate situations.

Last, tapas svadhyaya ishvara pranidhana. We'll be covering that in detail in a future section, but let's just say that it's sort of an all encompassing view that we can take to all of this information and all of what we do in yoga. Because in the end, what's really in front of us as students and as teachers is trying to become more intelligent about the things that we can change and the things that are not likely to change, or not changeable, and thus to which we must surrender. So you've got a little hint of where I'm going with that because I just also said the serenity prayer. So these ideas are universal. They are human. They are also based in our biology. We have some neat, efficient ways of expressing them in the Sanskrit language. So that's why I wanted to go over these terms with you before we get any further in the course. Okay? Thank you.
words or many of the different words that you came up with to describe your experiences. One of the things that I love about doing this kind of thing is to see how many different terms can come up and how, even in one system like bones, we can have experiences that are both sinuous and meaty and strong and reliable. What an incredible assortment of experiences we can have. In connective tissue, in muscles, in any of our body systems. So we're gonna look now at playing with a little series of asana, a little vinyasa here,

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cat cow, down dog, coming back to table and then into child's pose. A couple of these different ideas that I'll offer and then Leslie will offer the same kind of exploration using the ideas that he talked about, with the idea that they will be about a physical experience, but not necessarily about talking about what muscle to use or what bone to use. A lot of the tools that we think we need to have or know as yoga teachers about using anatomy are not necessary to invite people into an experience.

So find your way to your hands and knees. As you come to your hands and knees now, feel the pull of gravity. How do you feel the weight traveling through your bones? From your spine to your hands, through your upper limbs. From your spine to your knees and your lower legs. Where do you feel tension? Where do you feel effort or muscular activity? How little can you do in your muscles, but still feel the relationship between the bones feeding your weight into the floor? Then, starting from the very bottom tip of your spine, starting from your tailbone, begin to curl through the bones of your spine into flexion, into cow, and then into—sorry, into flexion into cat into extension into cow. How is this experience if you initiate it from a sense of your bones? Where do you notice your muscles calling for your attention? What do you notice about the connective tissue between your bones, between your muscles or connecting your muscles to your bones? How might they all talk to each other? So is there a place where you hear your muscles more loudly than your bones? Is that necessary? Maybe it is. Maybe your muscles are what you want to listen to. But if your muscles are what you seem to always notice, can you listen to something else? Can you do the same movement, but have a different experience inside of it? How is it if you notice what seems familiar and then if you explore what's unfamiliar? You can certainly stay either in flexion or in extension and breathe a few times. Then, in the next few breaths, come back to what feels like a neutral spine. In the neutrality of your spine, can that be a balance between bone and connective tissue and muscle? Coming into balance in those three systems might mean bringing up one that is less familiar. It might actually mean that you pay a lot of attention to one of the systems, or that one just jumps right into your awareness, and so you don't spend any extra energy on noticing that.

Then tuck your toes under. Now, can you pour the weight of your spine through the bones of your legs in such a way that your knees lift up and your heels can shift towards the floor so that you come into what we know as downward dog? Now, as you make that transition, see, did your idea about what downward dog is supposed to feel like affect where your attention went? You can come out of it and come back into it, is it possible, or you can stay in downward dog. Is it possible to have a different experience in this pose that might be so familiar to you? If you're moving into and out of downward dog, or if you are in it, can you balance your attention on your bones, in your connective tissue, in your muscles? Can they all participate? They are all participating. But where does your attention go? And does it change your experience to change where your attention is?

Then pour your weight forward into your hands in such a way that shifts you forward over your hands. Let your knees come down to the floor. Then pour your weight back over your legs to come into child's pose. As you fold into child's pose, see what kind of experience are you looking for. What system are you inviting into your awareness? So in your child's pose, would you like to settle into your bones or your muscles? Your connective tissue? Or maybe you want to inquire about how they each talk to each other. Okay. We're gonna pause there.
Leslie: Okay. Let's begin in child's pose. Here's a position we generally associate with a fairly langhana energy of release, of surrender, of rest. But from the standpoint of the breathing and paying attention to the forces of prana and apana, we may be able to notice some interesting things. For example, is there some compression in the region of the lower belly, the region of apana, being exerted by the weight of your body pressing against your thighs? Do you instinctively arrange your thighs in a somewhat wider position to avoid that compression? To feel like you have a freer movement of your breath. What if the pose was about creating that pressure, so as to drive the movement of breath somewhere else? What if the pose was about feeling a little bit more of a brahmana breath arise, which would be related to movements in the thoracic region, in the back of the body, the back of the ribcage.

Notice what your experience is if you allow your positioning here to create that pressure in the lower belly. This is one way of opening what's commonly referred to as the back body, but from the standpoint of brahmana and langhana and prana apana, we can describe it using those terms. Contrast that now to opening your thighs a bit. Let some space for your belly open up now so that it's sort of hanging in that space between your thighs. See what your experience is in this shape, in this position, where you're permitting the free movement of the breath in the lower belly. If we were to come onto our hands and knees from this position as a starting point, from this way of breathing as a starting point, which breath would take you forward? If you had your hands in front of you and were coming into a neutral spine position onto your hands and knees, which breath feels like it wants to propel you forward? Is it your in breath? Is it your out breath? Then come back onto your heels with your breath. I'm not saying whether to inhale forward or exhale back. Just to ask the question, “What's my experience as I let my breath initiate a movement forward and initiate a movement back?” Feel free to experiment with a pattern that you may be unfamiliar with.

If you felt that breath energy in your back body earlier, what if the inhale was directed more toward that region? Would that change how you feel the relationship between your hands and arms and spine? So it's not just whether you are inhaling forward or exhaling back, or vice versa. Maybe it's something to do with how you're inhaling as you come forward, how are you exhaling as you move back. Then stay in the hands and knees position for a few breaths. Notice how the forces of inhale and exhale, of prana apana, are able to organize, in some cases, your experience here, or disorganize. How could you breathe in a way that actually removes some support from this position, and where would that support need to come from to replace it? These are just questions. If your intention were to move from here into a downward facing dog position, which breath, does it seem, would work best for that? You are lifting weight away from the floor and transferring it from your knees to your feet, and then, after a breath or two, try transferring it back onto your knees from your feet. How does that effect the weight that's in the arms and hands? Are there some ways of moving with your breath that produce a feeling of less weight in the hands as you transfer from your knees to your feet? Is there a way of activating or exhale or your inhale that changes your experience of where the weight is being moved, where it's being absorbed? Is there something like more of a brahmana effect or a langhana effect as you move into this position? A brahmana effect would feel it's more energetic, more heating, more expansive. A langhana effect would be maybe more released, less effortful, calming. Take a moment or two to breathe in the hands and knees position. Is there a place where, no matter how you breathe or move, you always feel a restriction or an obstruction or an obstacle to assuming that shape we call downward facing dog, and where might that be? What might it be like to not push against it, or try to change it, just to accept it and know in advance it's going to be there? How would you move then if that were your starting point? Give that a try. Just with that in your mind. Perhaps there's something in your body that isn't necessarily going to ever change, no matter how hard you push or pull or try to change it. What if we took that attitude of ishvara pranidhana and just surrendered to that and didn't try to change it? What would your experience be then? How would you adjust your position? How would your breathing change?
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Come back down to your hands and knees. From here we'll do some cat cow with the breath. Again, not necessarily saying how to breathe or which movement to do on the inhale, which movement to do on the exhale. But notice that no matter how slowly or consciously or tentatively you move, there's a stopping point. There's a limit. You cannot do infinite cat. You cannot do infinite cow. No matter how flexible you are, in this position it is unlikely that the back of your head will reach your tailbone, or that your forehead will reach your pubic bone. There is always a stopping point. But in between those limits there's movement, there's space, there's possibility. That's sort of a sthira, suhka and an ishvara pranidhana conversation. So after you've done a bit of that, take yourself back to rest in pose of the child. Notice what there is to notice about your experience here compared to when you were in this pose just a few minutes ago. There's also before and after. There's a referencing for our experience that we can have when we return to something familiar after having done some exploration. So the change will register against the backdrop of what hasn't changed. The familiar. That, after all, is how we store information. By registering similarities and differences in our experience. And thank you.

Module 1.15
Apanasana: It's the Little Things...

Leslie: My teacher Desikachar has some really wonderful sayings that I'm fond of quoting. One of them is that yoga therapy is about 90% waste removal. The meaning behind that is really quite profound, as it is simple. That is that, if you remove what's undesirable, what you're left with is what you want. In the case of the body that's prana. That's flow. It's life force. It's the innate ability that we have to heal ourselves, which is expressed as our organism's desire to always maintain homeostasis whenever it can. So the way we express that in yogic terminology is that we have prana present, but it may not be able to go everywhere because there's obstruction or blockage. So this idea that yoga therapy is 90% waste removal is actually referring to this rather profound insight that if you remove what's undesirable, what you are left with is an increased state of health and wellbeing and potential for healing. It's my desire to study this healing potential of yoga that brought me to Madras to study with Desikachar years ago at the Krishnamacharya Yoga Mandiram,

which is the facility that he founded in his father's name to promote this idea of yoga as a healing methodology and to train teachers to do it. I was granted the privilege of sitting in on some of the private sessions. All the yoga there is taught one on one, one teacher, one student, and it's all highly individualized. It was this individualization that I was interested in. How different asana sequences and breathing techniques were used to treat and heal various conditions. On the day that I went to observe I had my little clipboard, I had my pen and I had my notes and it was, like, "Okay." So the first session I was observing was someone that had high blood pressure and had been coming for awhile. This was not their first session and had a routine that they had learned to do. At the KYM, actually, they work on platforms not too different from this, that's raised up. It's a little wider. But the student is on the raised platform doing their asanas and their breathing. So I'm sitting in the corner being unobtrusive and taking notes and, okay, high blood pressure sequence. So this idea that yoga therapy is 90% waste removal is actually referring to this rather profound insight that if you remove what's undesirable, what you are left with is an increased state of health and wellbeing and potential for healing. It's my desire to study this healing potential of yoga that brought me to Madras to study with Desikachar years ago at the Krishnamacharya Yoga Mandiram,
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lies down and it's exhale, inhale, exhale, inhale. I'm thinking, "Gee, that diabetes treatment looks a lot like that high blood pressure treatment." Then they're doing this and this. Now, it's not exactly identical. There's variations that have been given in the number of repetitions and the breathing and the focus and all of that. So my second set of stick figures was looking awfully like the first set of stick figures. Okay, okay. Well, now someone is coming in. This person they are helping to recover from cancer. I say, "Oh, the cancer treatment has got to be different." Exhale. Inhale. I think you're getting the picture. Just about everyone I observed that day started with apanasana. But that really points out this principle even more strongly, that yoga therapy is about 90% waste removal. If you can help somebody to increase the power of their elimination, you're gonna help everything. It also points out another very important principle, is that people are helped the most by the simplest things we teach them. Not the most complex. With a simple set of tools that bring together breath and movement and attention and get the diaphragm moving a little more effectively and get the elimination happening more effectively, you can help people with a wide range of difficulties in their bodies. And yes, there is a science of sequencing and adapting and modifying all of these practices for the individual. It doesn't mean that all of the treatments are identical. It just means there's a simple set of things that can be incredibly powerful and transformative if we remember that mostly what we're doing is eliminating what's undesirable so that what's left is more space for prana. That's what does the healing.

Unit 1
In Review

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Leslie: So to start off Unit One we talked about some of the fundamental concepts that we will be using to guide our exploration of anatomy. We talked about sthira and sukha, the concept of stability and mobility as being an overall way of looking at how living systems work and how we can make our bodies work better by understanding that we need to find a balance between stability and mobility, between flexibility and strength, between tension and compression, between space and boundaries.

Amy: Then we looked at what we are covering in terms of anatomy, kinesiology, and physiology. The idea that the map is not the territory and we're going to look in detail at some things, but mostly try to give you tools for using the information to explore your own experiences. We did a somatic exploration of the cell, tissue, organ, and body systems to experience it in your own body.

Leslie: And then we spoke about this term anatomy itself, and understood it to mean 'to cut into', thereby making anatomy basically a story that's told with a sharp instrument. Whether it's the sharp instrument of our mind, our consciousness, penetrating into our own living system, or through observation of other living systems, or it's the actual sharp instrument of a scalpel cutting through layers or separating them from each other, it's all a story, all of which are potentially valid and useful depending on what we want to use the story for.

Amy: We spoke about how different body systems interact to create homeostasis, and that balance is a dynamic state. It's not about being one particular way or about symmetry, but is instead about adaptability. We then looked at three systems in detail. Connective tissue, bones, and muscles, and with each one had an embodied experience of sensing those systems in your own body.