

I'm guessing today is November 30th. All right, I was going to make too many days out of this month. November 30th, 2016. This lecture is the first of two devoted to sexual anatomy and, for not good reason, we'll start with men. It is simpler, so I guess that's a good reason to start with the male. And we will follow a sort of format beginning first with the identification and description of what is visible externally. In other words, the external genitalia. Certainly, here is a good starting point. We see a mid-sagittal section through the pelvis, and apart from the penis, the most conspicuous structure of the male is the scrotum. Now, the word scrotum is Latin, it means "bag." B-a-g, and so it is. It is a container for the two testicles. A medial pouch, which normally encloses the testes. The scrotum has actually two separate compartments, even though it might not be obvious to an owner of a scrotum, there is a dividing wall there, and the name of that is the scrotal septum. Essentially, this keeps the left testicle from switching places. That is, it keeps the left testicle on the left side, and prevents these from crossing over, so to speak. It also tends to isolate each of the testicles, and therefore, prevent spread of infection should one testicle become traumatized or infected, and that infection would be confined to one side. Now, the fact is, even though the scrotum contains, or should contain two testicles, there are instances where that is not the case. In other words, on occasion, male children will be born with only one testicle in the scrotum. Or maybe none at all. And that addresses an interesting fact, and that is, the testes do not develop in the scrotum. They actually develop in the pelvic cavity, very near the kidney, and they normally fall or descend into the scrotum on about the seventh month of gestation. So, when a baby boy is born, it should contain two testes, but occasionally not. This is called undescended testicle, also known as cryptorchidism, or hidden testicle. Of course, this speaks to the basic issue, why have the testes in the scrotum at all? And what is wrong if they don't descend there? I think you know that in the scrotum, the temperature is quite a bit what? Cooler. It is about 3 degrees cooler in the scrotum, and that seems to be necessary for proper sperm production. So if the testes do not descend, then sperm formation will be crippled or diminished, and that, of course, would be unwelcome perhaps later in life. So undescended testicle typically is dealt surgically. That is, there has to be physical replacement or repositioning of the testicle in the scrotum. The surface of the scrotum is wrinkled and it is wrinkled because of a very thin, but superficial skeletal—excuse me, smooth muscle, referred to as the dartos muscle. The word dartos means "flayed," or "thready" because this muscle is very gauzy. Gauzy, meaning thready and thin. The skin of the scrotum is very thin as well, and this allows temperature to be transmitted to this muscle. Maybe you know this, but smooth muscle tends to contract when placed against a cold environment. So, when the environment is cold, what happens to this muscle, it contracts. And therefore, the scrotum shrinks, and brings the testes closer to the body wall. That is helping to warm the testicles. Is the opposite true? What if it is warm? What happens to the smooth muscle? It relaxes. And the scrotum hangs further down, and as a result, the testes are further away from the body heat of the pelvis. So, you could argue the dartos muscle helps to adjust and control the temperature of

the testes. In other words, when it is too cold, the scrotum will contract and bring the testes closer to the body wall, therefore warming them, and when it is too warm, the scrotum will relax, and therefore, the testes will be pulled away from the body wall. So, this temperature is an important concern, and this is a neat, called a thermogram, and I guess you know about these kinds of photos. What colors are normally associated with the warm temperature? Reds, and yellows. And what colors connote coolness? So in case you're not getting this, this is the scrotum and this is the penis. So the scrotum is relatively cool, because of its distance from the pelvic cavity and the meager blood supply there. This could be further interesting in the sense of underwear, believe it or not, there's two kinds of underwear for men, right? There is whitey-tighties, what are those, the Jockey's, and then the other are what? The boxers, which would allow more freedom or more shall we say less constraint to the scrotum, and so the Jockey shorts would tend to bring the testicles closer to the body wall, and therefore perhaps raise the what? Raise the temperature. So if you are trying to maximize sperm count, what sort of underwear should you wear? Okay, that's my endorsement, you should wear boxers. Only half-true. All right, now the interesting thing apart from that is that not only is each testicle isolated, that is, separated by this septum, but it is quite possible for a testicle to rotate, and twist itself within the individual compartment. This is called testicular torsion which doesn't sound good, right? Certainly, if you're a man, it sounds very bad, and of course, it would lead to lack of blood supply, and could be actually lethal to these cells. When this happens, it's not only painful, but it is a medical emergency because if nothing is done, what is going to happen to this testis? It's going to die. So this often happens in youth, sometimes can be related to sports activities. It's called testicular torsion, and it gets the attention of the individual right away, because it is so painful and needs attention immediately. So let's move on outside the scrotum, and certainly the next important piece of genitalia is the penis itself. The word penis is Latin. It means "a tail," t-a-i-l, and may resemble that in some way, but in terms of its function it is obviously the male copulatory organ. As such, it has to be capable of changing its status because it is quite common knowledge that the penis is normally flaccid, F-L-A-C-C-I-D, that means limp. And that is because there is nothing in the penis to make it stiff. There is no cartilage, there is no bone. And that might seem appropriate, or even obvious, but many animals do have a bone in their penis. Whales. Horses. Cats, dogs, cattle. They all have some kind of stiffening structure within the penis, but not humans. And actually that is a blessing, I think, in the sense that you don't have anything, shall we say stiff, down there, which would be constantly annoying. So overall, the penis is normally flaccid. Yet, it has to be converted on command, so to speak, into something that is turgid or stiff enough to serve as an organ of copulation. And this reaction or response is called an erection, and is essentially a hemodynamic process, meaning a function of blood pressure and blood flow. So here is a cutaway view of a penis, and before we get into the hemodynamics of it, let's at least first describe what we see and know about the penis externally. The tip of the penis is often compared to a mushroom. But more exactly to an acorn. In fact, the

tip of the penis is called the glans penis, and the word glans in Latin means “acorn.” I can’t sit through those Ice Age movies, much anymore [laughter], you know what I mean? Some of you do, because there is that critter in there, that is chasing this acorn, and I can’t help but thinking, penis, penis, penis [laughter], but that’s just me. But anyway, I say that because a lot of people don’t know what an acorn is, until I mention that movie. But anyway, doesn’t it look like an acorn? Okay. Anyway, the glans is very sensitive to touch, direct, indirect, deliberate, accidental, and would be constantly stimulated if it weren’t for the fact that it is naturally and normally actually hooded so to speak and that hood, or covering, is known as the prepuce, also better known, perhaps, as the foreskin. And so this particular penis appears to have no visible prepuce, but let’s keep in mind, that is a natural and normal covering for the glans. As such, its presumed function is to isolate the glans, and therefore, prevent spontaneous or unintentional stimulation of it. Needless to say, when the penis becomes erect, the foreskin will retract naturally, and the glans will emerge, and therefore become available for contact with vaginal or other structures. So the prepuce has a normal, natural function. That said, what is the practice that we know with respect to the prepuce? Cutting it off. It’s not a home surgery necessarily, but what is that practice called? Circumcision. Circumcisions have been practiced for literally thousands and thousands of years. But what about this? Worldwide, right now, are there more men that are circumcised or not? Not. Seventy percent of males on this planet are not circumcised, don’t care about circumcision, don’t even know what that means. In other words, it is not a natural, normal or necessary practice. So only 30% of men are actually circumcised. And naturally, that is done as a surgical procedure. What is the justification for it? Is there a justification for it? There must be some good reason? A lot of people will say well, it’s cleaner to have this gone, it will be easier to clean the penis, as if that were a big chore [laughter], and in fact, if cleanliness was the thing, then let’s cut off our toes, so we wouldn’t have to worry about cleaning those either. And maybe, because it is kind of a nuisance to have to clean between the toes. I’m being only facetious here, because there is no legitimate reason for removing the prepuce. That said, some cultures, some religions insist on it, and so in Israel, for example, 100% of males are circumcised, automatically and without question. In this country, today, the number is about 50%, and actually decreasing rather than increasing. And again, in this country, it’s a choice, not by the individual, but by the parents of the individual, right? And so if we really strip away all the pretense here, circumcision is cosmetic surgery. What does that mean? It’s made for the sake of aesthetics, right? And why would parents subject their young, tender-aged boy, that baby boy, to the brutality of circumcision? Why do they do that? Because they want junior to look like dad, or the rest of the guys, or at least their perception of the rest of the guys, so it is a practice based upon aesthetics, rather than anything medical. Do health insurance companies pay for circumcision? Well, you’ve got a good health plan then, I want to know what that one is, because that means they’ll pay for boob jobs, and they’ll also play for rhinoplasties, and everything else. Great. But most health insurance plans

do not cover circumcision, because why? It's not medically indicated. There is no legitimate reason for it, other than aesthetics. Enough of that. Now, let's move on to the shaft of the penis, which is sectioned here, a cross-section. This is referred to as the dorsal. This is the ventral surface. Remember, we said there is no bone, no cartilage anywhere in the penis, this is all soft tissue. Essentially, it consists of three, three parallel cylinders, just like placing three fingers in a kind of triangular pattern. One, two, three. The two larger ones, which are close to the dorsal surface, are referred to collectively as the corpora cavernosa. Corpora, a word meaning body, cavernosa, meaning cave-like. Cave-like. A lot of room in here. And on close inspection, you would see that this looks like, well, bread, again. In the sense that there is lots of voids. More like a sponge. And this is an area, then, which is called a vascular sinus. Meaning, a potential, a potential space for blood. But, in fact, there's very little blood in the corpora cavernosa, most of the time. Notice that each of these structures receives a rather sizeable artery called the central artery, which runs down the center of each of these lengthy bodies. The dilatation of these arteries brings blood flow to these sinuses, and essentially fills them with blood, just as if you were to put a kitchen sponge in water. What happens to a kitchen sponge when you put it into water? It expands. And so these cylinders, these sinuses, will expand both in girth, both in diameter, and in length, but that in and of itself does not make it stiff, it just makes it what? Bigger? So what converts this now bigger penis to an erect penis is that as these sinuses swell, the veins, which carry blood where? Do veins carry blood into the penis, or out of the penis? So as this swells, the veins are going to be pinched, and so now, we have blood going in, but not going out. And what does that do to the pressure of blood now in these two sinuses? And that converts this organ from a flaccid, downward pointing organ to a rigid upward pointing organ. Here is an actual cut through a real penis. So, to reiterate, these are side by side, the corpora cavernosa. Below, and on the ventral surface is this singular and smaller sinus, which goes by the name of corpus spongiosum. The distinction here is that this is traversed by a tube, which carries urine and/or semen. And the name of that tube, you know, is the urethra. So the corpus spongiosum is traversed by the penile urethra, and normally carries urine, occasionally also semen. Cross section, then, of a penis. Now, we love these pictures, because they're very graphic aren't they? We see the scrotum, but this penis is in what state?

>> Flaccid.

>> Flaccid. And here, it is obviously not right? And what about the color change? Why has the color gone from green and blue to red and magenta? Well, blood flow. Blood flow, heat flow, etc. So this is pretty common knowledge, and the reaction is essentially a hemodynamic reaction due to increased blood flow. That said, what do we know about blood flow in general, in men, in women, as they get older? Do vessels get wider or narrower with time? And that is part of a process called atherosclerosis, or arteriosclerosis. And so, as we age, does the blood flow through our coronary vessels improve? No, it gets worse. Are the genitalia immune from that effect? No. So what am I leading

to? The achievement of an erection is obviously more difficult if blood flow is compromised for any reason. The inability to achieve an erection is now known by the more, well, neutral name. What's that? Acronym? ED, erectile dysfunction. Used to be called impotence. People got a little squirmy with that. So ED. Since 1998, we have got a fix for that, and what is that fix? Viagra. You can't watch TV without learning about Cialis, and Viagra, and Levitra, and XYZ. These are extremely, extremely profitable, extremely useful drugs for erectile dysfunction. Let's be clear, though. These don't cause an erection. They just make the achievement of an erection easier, especially when there is any vascular explanation for erectile dysfunction. So, here again, we see the penis. This time, in long section. And here, on the left, the flaccid diameter. And here on the right, the erectile diameter, which compromises the loss of blood that is, pinches veins, and therefore allows the erection to be maintained. Now, here is an interesting transition, because obviously our next point of interest would be the testicle itself, right? And like many of you, I just accepted that word when I was first introduced to it. That is what they're called, testes. I never really stopped to analyze the name. But in Latin, the word testicle means what? Little witness. I don't make this up. And that, that really intrigued me. What is the deal with that? This all goes back to Roman times. And in Roman times, of course, there were judicial procedures, in other words, hearings and trials, and which gender was allowed to actually attend a criminal or other trial, only males. And so obviously, if you came into the courtroom, you had to be confirmed to be a what? A male. And how would you confirm that, you suppose? You would examine, or otherwise confirm that they had testicles. So, I'm not making this up. And in fact, this word, testicle, has a modern-day, modern-day word associated with courtrooms. What is that? Starts with a T. Testimony. Yeah, to give testimony is of course to be a witness. Now, this cartoon makes fun of that, because apparently the testicles are witnessing something else, but it's a cute cartoon nonetheless. There is a reference here to something we are about to name, and that is a curious, a curious serous membrane around the testicles, which is called the tunica vaginalis. So, let's get into it. The internal organs are, of course, the testes. Is that plural or singular? Plural. What is the singular version? Testis. That is, subtract the E, add an I. These are, of course, the primary male gonad. And they do not function early in life, but once they begin to function, they remain active, that is capable of producing sperm throughout the person's life. This is an actual photograph of two normal testicles. Their gross anatomy is similar in size, and even appearance to an ovary, but their internal anatomy is very different, as we will see. Each testicle is surrounded by a serous membrane, which is not terribly surprising, because what have we come to expect for serous membranes? Why is an organ usually surrounded by a serous membrane? All right, to reduce the F word, friction. Are these testicles constantly in motion? Take it from me, they are. And so this reduces what? Friction. The tunica vaginalis is the strange name for this serous membrane, but just to remember, a serous membrane has how many layers? So the one that is actually in contact with the testis is called the visceral layer. The one that is not is called the parietal layer.

And, like any serous membrane, there is fluid in between there. So the function of the tunica vaginalis is to essentially reduce friction and heat or discomfort that might otherwise arise from that. The only curious thing about this is why is it called the tunica vaginalis? The word tunic means jacket. J-A-C-K-E-T. Vaginalis seems to be related to a vagina, but actually the word vagina just means a sheath, a sheath which is sort of a cloak. So actually the word vagina is not feminine, and is not meant to be a feminine reference in this case. But with that said, what if there were too much fluid between the visceral layer, and the parietal layer of this serous membrane? Well, that would put pressure on the testicles, right? And in fact, that is something which is called a hydrocele. Hydrocele. And if the testis becomes pressurized like this, would that interfere, you think, with sperm production? Or at the very least, would it be painful? So, hydrocele is a condition that sometimes can develop if there is too much fluid in this otherwise useful serous membrane? Now, before we move on, what is, you think, the most common reproductive cancer in men between the ages of 20 and 30? Testicular cancer. And why in that age bracket? Nobody really knows. But certainly it is something to be aware of and mindful, and on the lookout for. How would a man screen himself for possible testicular cancer? Obviously he is going to have to take his fingers, and massage the scrotum, and feel. Feel for any what? Any lumps, or nodules, or irregular surface features. And you might think that to be silly, or unnecessary, but it is a serious cancer, and with that said, who is the survivor of that terrible affliction that we know, as a celebrity—it's this guy here, who is he? Lance Armstrong. What's the surgery—oh, I gave it away. What's the treatment for testicular cancer, okay, that means castration. Incidentally, just to set the record straight, castration is not cutting off the penis. Cutting off the penis is something else. Cutting off the testes is called what? Castration. And actually Lance didn't have to undergo bilateral castration because his cancer was confined to one testis, and so he is holding his child there, and testimony not only to his survival, but the survival of his sperm count, and his capability as a father, at least. So, testicular cancer of concern for young male adults. The next structure that we see, at least externally here, is referred to as the epididymis. The word epi means upon. The word didymis means scrotum, and in this graphic, we see the testicle, but more importantly, we see this outer shell so to speak, which is a reservoir, a storage site, for sperm. No sperm are made here. Sperm are stored here, and the question would be how long are they stored here? Years? Decades? No, they tend to survive out here only for about two weeks max? What happens at the end of two weeks? If they're not ejaculated, well, they just basically fall apart, and fragments are reabsorbed. So that is a natural and normal transition. The epididymis. The epididymis tapers down into a single tube, which then starts an ascent, and the name of that singular tube, I think you know, is called the vas deferens, also known as the ductus deferens. This is not unlike the urethra. That means it's made of three layers. And the most important layer of the vas is the middle layer, which is made of muscle, what kind of muscle? And so that is smooth muscle, actually exercises peristalsis, and despite what you might think, sperm don't swim up the vas deferens. In fact, sperm don't swim at all, until they

get into the vagina. So their ascent is not because they're swimming uphill, but rather peristalsis of this tube, what is this tube? The vas deferens. Which is one of many structures that comprises the bulk of a larger so-called cord, a cable-like collection of vessels, nerves, lymphatics. And the whole assembly is called the spermatic cord, which then obviously embraces and encloses the vas deferens. Surrounding the spermatic cord is yet another muscle, which is actually derived from the internal abdominal oblique, and the name of that muscle is called the cremaster muscle. The cremaster muscle also responds to temperature. That means it contracts when the temperature is cold. And that helps also to elevate what? What are we going to elevate when it's cold? We are going to elevate the testis. Or testes. So, if someone were to say what are the two muscles that are involved in repositioning the testes? One would be in the scrotum. The name of that was dartos. The second one is this, which is skeletal muscle. It's called the cremaster muscle. Now, the passage of the spermatic cord into the pelvic cavity is made possible through a slit, in the abdominal wall, which is called the inguinal canal. I'm quite sure it's up here. The inguinal canal, then, represents a weak spot in the abdominal wall which sometimes can be pulled open. So, what if this slit were to dilate? What would be allowed through would be intestinal segments, or loops, especially the small intestine. And would you, as a man, like to have your small intestine move into your scrotum? Doesn't sound good to me. And the name of that, if it happens, is called what? A hernia. An inguinal hernia. And it is naturally—that requires surgical intervention, you can't just duct tape that closed or anything. So these are some of the features, then, of the testis itself. Cutaway view of the epididymis, LU stands for lumen, and SP, guess what, stands for sperm. Here is one looking at you right, now. And yes, these are kind of tadpole like cells, with flagella for propulsion. Remember, no sperm are made here, they're only what? Stored here. And then, occasionally, ejaculation will bring them into what? The... vas deferens. What if you didn't want that, is there a way to block the passage of these sperm, and therefore create some form of contraception? And what is the name of that surgical snipping? It is called a vasectomy. Now what's the female equivalent of that? Females don't have a vas deferens, but do they have tubes that can nevertheless be cut or tied, yes, a tubal ligation. Both of those should be, should be promoted and understood to be permanent, even though they are, in fact, reversible. But with that said, what is the more common of the two? Are more people lining up for vasectomy or tubal ligation? Actually tubal ligation. And why is that sad and unfortunate? Tubal ligation is more expensive. Tubal ligation is more invasive. Tubal ligation is more risky. Why, then, are there not more men standing up for vasectomies? They don't want anything going on down there. Sort of paranoid about anybody messing with their equipment, shall we say. And so there is mystique, and misinformation about it. Here is an interesting historical story. This goes back to the 1960s actually. These are about the size, well, they're only about half an inch from here to here. And this is a little valve. These were made out of 24 karat gold. It was an experiment in the 1960s, and hopefully you're ahead of me. These were implanted right here, in the what? In the vas deferens. And what was the thought or thinking in

that sense? Well, yeah, you could reach down there, and you could go eh, eh, and you could what? Yeah, no I'm not making this up. You could either start the flow or stop the flow. So if you wanted to conceive, turn them on. If you wanted not to, turn them off. Made perfectly good sense. You say, well why can't I get these at Walmart [laughter]? Well, because it didn't work [laughs], why didn't it work? Well, the valves work, but just because you cut off the supply right here, there might be some maverick sperms up here, some rogue sperms. Distal to there, and so it was just a mess of embarrassment, and law suits, and everything else, so you don't see it anymore. However just a year ago, I saw a resurgence of this. Now they are thinking of implanting something in there that could actually be a key to a keyfob. This is [laughter], yeah, so yeah! So you have sperm or no sperm, right? So I can just see that on a date. Let me—let me get out my keyfob here, should we go or not? Huh? On, off. Kind of spooky, but you know, let's see what happens. All right, so let's rejoin reality here. This is the penis. This is the testis, this is what? Epididymis. Now, we are tracing uphill the vas deferens. The vas deferens, if you recall, is not alone in the spermatic cord. Indeed, there are blood vessels, both artery, vein, lymphatics, nerve supply, and the whole thing is wrapped up in muscle, seen here in red. And the name of that muscle actually is the—here it is, cremaster, which is really a piece of the internal abdominal oblique. Therefore it is not smooth muscle, it's skeletal muscle. Its function because it reacts to temperature is to pull the testis up, or allow it to what? Up, down, therefore adjusting temperature, and promoting proper sperm production. Speaking of the vessels that are found in the spermatic cord, and even, of course, in and around the testicle. Notice in this view that there are way more veins than arteries. And of course, these veins are carrying blood which way? And that's uphill, isn't it? So are these veins subject to dilatation? And what's the word for that? Varicose. Can you have varicose veins in here? Yes. And the name of that condition, which is not uncommon at all, is called varicocele. The reason that is worth mentioning is because that tends to delay blood flow out of the testis, therefore, what does it do to the temperature around the testis for that reason? It raises the temperature. So varicoceles are often correlated with, and maybe a cause of what? Low sperm count. So, if a man has low sperm count, first thing you're going to check is for this, a what? A varicocele, which can be dealt with surgically. Now, the microanatomy of a testis is certainly important, and is reflective of the hormones that stimulate the testes, so we know that internally there are literally hundreds of feet of these nearly microscopic tubes which you can see magnified here, seminiferous tubules. These are divided by septa into certain compartments, so this is a bunch of them, bunch of them, bunch of them. And these are the septa, which basically isolate them. The important thing about these, what are they? Seminiferous tubules. It's that they are dormant. That means they do nothing until puberty, and then they respond to this hormone coming from the pituitary called FSH. So in simple terms, what is the difference between a 10-year-old boy and a 13-year-old boy, it all boils down to FSH. And therefore, the production of sperm. Outside the seminiferous tubules, but still inside a testis are the cells that are called interstitial cells.

These are those that have nothing to do with sperm production, but rather they produce the hormone what? Testosterone. So here is a cutaway of a seminiferous tubule. And obviously these are sperm yes? What are these cells out here then? Those are the interstitial cells. They produce testosterone, which supports the development of the sperm. Here, again, seminiferous tubules, zig-zagging in there, really crammed in there, estimates 200 feet. Two hundred feet of seminiferous tubules in a single testicle. Whereas the seminiferous tubules react to FSH, the interstitial cells depend upon ICSH, which is an acronym for interstitial cell stimulating hormone. Here is a photoshopped version of the same thing. Clearly this is the seminiferous tubule, these are sperm, and these cells out here would be interstitial cells. Moving on to the accessory reproductive glands, which support the functionality of male reproductive anatomy, the first thing to examine here would be the vicinity of the bladder, and if this is not already labeled in your syllabus, you should label this as anterior or posterior view. What do you think? It's a posterior view. You cannot see the seminal vesicles from the front. But, clearly they are visible in this illustration, and they are bilateral. About the size of a, I don't know? Baby shrimp? And they are indeed posterior to the bladder. The word vesicle means container. The word semen, the word seminal, means semen, so these are in effect containers for semen. But more than that, these are the source of the fluid otherwise known as semen. They produce no sperm, they store no sperm. They produce only seminal fluid. And so they secrete this fluid into a collecting area within the prostatic urethra, which is called the—what is it called? The ejaculatory duct. Because this is where semen and sperm meet each other for the first time, so to speak. The gland seen here in green, which is hardly ever green, is called the what? Prostate? Not prostrate, but prostate. And it is often described as a plum or a walnut. It is more of a donut, really, which surrounds the prostatic urethra. It produces some, but not most, maybe 30% of the seminal fluid. What's the most common reproductive cancer in men between the ages of 50 and 80? Would be prostate cancer. You know about that. The enlargement of the prostate is not necessarily cancer, and it produces a syndrome known as BPH. Benign prostatic hyperplasia. And if this organ were to be two times larger, would it strangle the urethra? And would that make passage of urine more difficult? And would that lead to the individual unable to sleep through the night, and getting up and voiding twice a night, or something like that? The answer, of course, yes. So, in fact, here is a sketch of normal prostate anatomy, and one which is afflicted with BPH. BPH is not cancer. It is, by definition, benign. Benign prostatic hyperplasia. Distal, and seen here in yellow, are two pea-sized organs which are actually exocrine glands. They produce semen, but a very different kind of semen. One which is not white, but clear, and one which has a very different function. Perhaps, we're saying semen, the function of semen, is to provide a nutritive vehicle for sperm to swim about, or otherwise be carried in. This semen is very different. Often called the pre-ejaculate, because it is actually released before the bulk of ejaculation. It is clear, and therefore, often goes unnoticed, and it is secreted in very small quantities. Its function, we think, is not just to lubricate, but rather neutralize the urethra,

because what normally goes through the urethra? And urine is acidic, so would you want your sperm to be launched through an acidic tube? No, you want them to be buffered, or otherwise isolated from that. So this so-called pre-ejaculate, which is produced by these bulbourethral glands is thought to help neutralize the acidity of the urethra, and therefore, minimize harm or injury to the sperm as they pass through. Finally, then, here is the pathway for sperm, as we literally terminate this discussion. Sperm are made where? Yes, they're made in the testes, but where? In the seminiferous tubules. And that process is 24/7, 365, as long as you have what two hormones? What two hormones have to be in place for this to happen at all? FSH and ICSH. Once this process is initiated, it is 24/7. Where do sperm get stored? Epididymis. Where do they go from there? Vas deferens. From there, they travel through the inguinal canal, eventually reaching the ejaculatory duct. There, semen is introduced from the seminal vesicles, as well as from the prostate, and then their journey is prostatic urethra, membranous urethra, penile urethra, female vagina, or wherever. And so, that is the path that we will pick up next time. Have a great afternoon. A great weekend.

[ Background Conversations ]