THE PROFESSOR: All right, guys. So Chapter 1, general concepts of disease and principles of diagnosis. All right, so the characteristics of disease. Basically disease is the disturbance of the body structure or function. Lesions are gonna be well-defined, characteristic structural changes in organs and tissues as a result of disease. For example, a skin lesion, okay? We use that term to describe a characteristic as a structural change.

Now, let me just see one other thing here. All right. And the book divides disease into organic and functional, all right. And the idea of functional disease refers to no morphological abnormalities; in other words, no obvious abnormalities, yet the body functions, okay, are disturbed.

More and more what we used to consider functional diseases do have some structural abnormalities, okay? So that's not as important a fact. The organic disease talks about being associated with structural change, okay? And very often it can be evident on gross examination or histologic examination. Histologic exam refers to looking with a microscope.

Okay. An example of an organic disease would be an atrial-septal defect, an ASD. And that would be a small, what we call hole or aperture or opening in the septum that divides the right atrium from the left atrium. Okay? That would be a structural change, another structure change. Another structural change would be cleft palate, okay, or club foot; that type of thing.

All right. So pathology, what's pathology? Pathology is the study of disease. The term "pathologist" refers to a physician who specializes in diagnosing and classifying diseases by studying the morphology of cells and tissue. The pathologist is the person in the hospital who is paid by the hospital, okay, or he can be in an outside lab, but in the hospital you guys might be a little more familiar with.

When anything is removed at the time of surgery, it all goes down to the pathology lab. In the pathology lab the specimens that are removed then are examined, okay? There's a gross examination, and then there's a microscopic examination where they prepare slides, microscopic slides, to examine the cells and the structure, the morphology of the cells and tissues. And the purpose of that is to make sure that the pre-op diagnosis agrees with the post-op diagnosis. You don't want someone coming in for a benign breast lesion, having them remove the benign breast lesion, and having the post-op diagnosis being benign breast lesion or benign breast tumor and not checking it microscopically to find out that there's occult
or beginning cancer there, okay? So that's what the pathologist does.

"Clinician" refers to a physical or health care professional that cares for patients. All right? Symptoms are subjective manifestation, such as pain or weakness. Signs are physical findings, okay, or objective manifestation such as swelling or redness. What's an example of a symptom? Any other examples of symptoms you can think of?

THE PROFESSOR: All right. Actually, that's a sign, okay? Because a sign is a physical finding. So you can take a temperature with a thermometer, okay? So that's a sign.

Tingling, okay, good. Headaches, nausea, those are two common ones, okay? And you can say you have a migraine; I can't really confirm it. Okay. I can see pain in your face and holding your head, but you really have no way of documenting that.

All right. So let's see. So characteristics of disease. You can have symptoms or you can be asymptomatic. All right? And the distinction between asymptomatic and symptomatic depends on the extent of the symptoms; for example, with HIV, HIV disease, basically it's asymptomatic. If it's in the early stages, okay, you don't have the symptoms. All right? And if not treated, it will progress to symptomatic usually.

"Etiology" refers to the cause of the disease, okay? If we know the specific cause of the disease, we'll say it's an etiologic agent, okay? So the agent responsible for causing the disease is the etiologic agent.

"Pathogenesis" refers to the process of the development of the disease, how does it develop. Okay? How does it develop. Pathogenesis of AIDS, a person with AIDS, those are T-cells, okay? Reducing the efficiency of immune system, all right? And then you get secondary illnesses, all right, due to the reduction and the deficiency of the immune system.

The pathogen is any microorganisms that causes disease, okay? And these are terms I will want you to know for your tests.

So now, congenital and hereditary disturbances, you can have disturbances in development. Congenital means from birth, okay? It means from birth. It does not necessarily mean hereditary, okay? Hereditary, all right, the disease is present or the abnormality is present from birth. Maybe it doesn't present itself right away, okay?

Hemophilia. Hemophilia is deficiency of clotting factor 8, and it's carried on the X chromosome, so it's sex-linked. It's present from birth. It's hereditary. However, it doesn't present because it's not diagnosed at that time. It's really diagnosed later on when the child starts to walk, falls, and has bleeding issues. We'll go into that more later on in the lecture, okay? So that's hereditary.
Congenital. Congenital is from birth, all right? A club foot is a congenital issue. All right.

So what are the causes of congenital and hereditary diseases? Genetic abnormalities, okay, abnormalities in the chromosome number and distribution. We'll talk a little more about that.

Injury within the uterus can happen. Interaction of genetic and environmental factors. All right. An example would be, we mentioned the hemophilia.

German measles, all right, that's an environmental issue. It's an environmental factor, in that if the mother gets German measles, okay, while she's pregnant, the worst time to get it is in the first three months or the first trimester. Baby has difficulty with vision, hearing. It can get -- have an enlarged spleen, has a characteristic rash, all right, and can be compromised.

All right. So classification of disease. Inflammatory diseases, the body reacts to an injury through an inflammatory process. And an example of an inflammatory process: If you guys got a splinter, you don't take it out, okay. If you get a splinter and it's not removed, then the inflammation starts, the site gets red, it gets swollen, it gets hot, it gets tender. That's part of the inflammatory process and it's not specific, okay? Everybody in this room, if you get a splinter, if you don't take it out, you have the same inflammatory process.

Now, let's see. Also including in the inflammatory process could be the allergic reaction and it gives you the illustration of hay fever, okay?

And we'll discuss allergies at another time in greater depth.

Autoimmune disease, basically what that is is people develop antibodies to their own antigens, okay? Anybody know what SLE stands for? Anybody?

STUDENT: (Inaudible.)

THE PROFESSOR: Systemic erythematosus, right. And it basically is also known as lupus. And lupus, what happens is, patients develop antibodies against nuclear antigens, antigens in the nucleus. And depending on what cell type, all right, of the nucleus, they develop antibodies that will determine how the disease presents. If it's a kidney, the kidney has a nuclear antigen, they're going to have kidney issues, okay?

So the autoimmune disease basically is the development of antibodies against your own antigens. Antigens are characteristic proteins. They're proteins on the cells that are specific to an individual person, okay? So every person in this room has a set of antigens that are particular to them; and their immune system, okay, knows that those antigens are particular to them, and their immune system will fight off any type of foreign antigens, okay? So that's how the body develops and responds to colds, bacteria. Also antigen cross-matching is
very important in blood transfusion and organ donation. Okay. We'll go into that more in another chapter.

Let's see. Degenerative diseases, also, okay, that's when a tissue organ degeneration results in basically in aging or breakdown.

Arthrosclerosis does -- does cause deterioration. I don't think that's a great example. Arthritis, osteoarthritis is a great example of degenerative disease. Osteoarthritis basically occurs in the older-aged population, all right? It's due to wear and tear on the joints. Now, if I were to ask you: What joints do you think get the most wear and tear? All right, knees and hips, hips. Knees and hips. Okay.

And so it is a disease of the older age group, okay? It's due to -- it can be accelerated by injury or being overweight for a long time, okay? Someone who's 300 pounds for 50 years of their life, okay, their hips, their knees are going to be worn out.

When I used to practice, I had a patient who used to be a big runner. I talked to him about the fact that he always ran. He lived near a park, so he used to run to the park all the time. I talked to him about running on cement. I said, that's so unforgiving, such a hard surface, why don't you run on a track, grass. But he said he had all these maps, you know, all his routes mapped out. So he kept on doing that. He was pretty good for about and 15 years, and now he's had both hips replaced, one knee, and I think the other knee is gonna be replaced. He's basically otherwise in good health. But that's an example of osteoarthritis and degenerative joint disease.

Metabolic diseases, all right, disturbance of the metabolic process of the body -- diabetes, overactive thyroidism, which is an electrolyte imbalance. And we'll talk more about that at another time. Chapter one is just an overview, okay, guys? So we will go into all these other diseases in a much greater depth.

Neoplastic diseases. "Neoplastic" is defined as out-of-control cell growth. They can be benign or malignant, okay? And we'll go into -- in the oncology, the cancer chapter, we'll talk about what makes a lesion benign and what makes it malignant.

All right. And then the classification of similarity of lesions, similarity of pathogenesis. Let's see.

So, you guys, I think you guys know this slide. Good health is more than the absence of disease, really. It also is something that's desired, and basically it's ideally where mind and body function harmoniously together. Traditional medicine, the goal is to cure or ameliorate disease. Modern medicine advances try to relieve suffering and advance human welfare, but it's difficult to guarantee good health. There's a continuum of health and disease. We have good health on one side, and serious illness on the other, and everyone is somewhere between
the midpoint, okay, of good health. Hopefully everybody's very close to good health.

Good health requires active participation, assuming responsibility for one's health. And what's that mean? Eating properly, exercising, avoiding harmful excesses such as overeating, smoking, heavy drinking, using drugs, okay, and also uses one's mind constructively.

Now, principles of diagnosis. How to diagnosis disease. Basic diagnosis is determination of the nature and cause of illness. All right. And so what do you do? Well, there's three components here. You want to take a clinical history. You want to do a physical exam, and then you determine differential diagnosis, okay? This is what happens when you go to see a doctor or health care provider. They ask you, "What's going on? How come you're here?" Okay. And after they take that history, then they do the physical exam, and then they come up and make a differential diagnosis. And the differential diagnosis, you determine your most likely diagnosis, second and third, okay?

And prognosis then is the eventual outcome of the disease, giving them specific treatment. Basically then you outline what the treatment should be, whether it's directed at the underlying cause. Maybe you can't eradicate the underlying cause, but then you give systematic treatment, try to alleviate the symptoms, but it doesn't influence the course of the disease.

Okay. I'll give you one interesting case I had when I was in -- as an intern at the emergency room at GW. I had a guy come in to me, and he was your age, okay? Nothing outstanding about him, normal height, normal weight. Nothing unusual. And I said, "What brings you here?" He said, "I feel like I have an elephant sitting on my chest." Okay. So I looked at him and, like I said, he was normal height, normal weight. He was about your age. He was working at the student bookstore at George Washington. He was -- he had completed like three years, two-and-a-half years, three years at GW. He had to stop working to earn money to pay for the rest of his education.

So that's what he said, chief complaint, "Elephant sitting on my chest." Okay. So then it was up to me to take the history. Okay. So you were in the emergency room and someone came up to you and said, "I feel like I have an elephant sitting on my chest," what are some of the questions you'd want to try to ask to determine what was going on and come up with a differential diagnosis? Okay. So what are some of the questions?

STUDENT: (Inaudible.)
THE PROFESSOR: Right. He was working in the store, okay, cataloging books.
Yes?

STUDENT: (Inaudible.)
THE PROFESSOR: I asked him if he had a family history of
heart disease. He said no. Okay.
Yes?
STUDENT: (Inaudible.)
THE PROFESSOR: Yeah. I think Matt said that. He was at
the store cataloguing books, sitting down cataloguing books.
Yes?
STUDENT: (Inaudible.)
No tobacco. No excess caffeine use, one and a half cups in the
morning, that was it. No extreme alcohol use.
Okay. What else?
STUDENT: (Inaudible.)
THE PROFESSOR: Yeah. Wasn't related to breathing. Okay.
Yes?
STUDENT: (Inaudible.)
THE PROFESSOR: No obvious mental illness. I asked him if
he had been seen by a psychiatric. He said no. I asked him if
he was on any psychotropic drugs. He said no.
STUDENT: (Inaudible.)
THE PROFESSOR: Yeah. He said he had been lifting some
boxes, but he also said he's been doing that for the last couple
months. (Inaudible.)
STUDENT: (Inaudible.)
THE PROFESSOR: Yeah. Told me, "No medications."
Yes?
STUDENT: (Inaudible.)
THE PROFESSOR: He said -- when I asked him that, okay --
and I didn't ask him that directly, okay. But what I'm getting
is I said any family history of heart disease, and he said no.
When someone comes and says they feel like they have an elephant
sitting on their chest, what's your first thought? Heart
attack, right.
And sometimes you have to rephrase your question. So
family history of heart disease, no. I said okay. So I
approached it from a different angle. I said, "How about your
parents, are they in good health?"
"Well, my mother's in good health."
"What happened to your father."
"Well, he had a heart attack."
Okay. Now, what's the next question? If he died of a
heart attack, what's the next question?
STUDENT: (Inaudible.)
THE PROFESSOR: "What age did he have a heart attack at?"
His age of the heart attack was 35. Okay. Any siblings? One,
a brother. I said okay. "Is he in good health?"
"No. He had a heart attack and died at age 32."
Okay. So sometimes when you're taking a history, you have
to think you have to be creative, okay, because sometimes the
lingo that you use, the patient doesn't always get.
Now, obviously this is a long time ago. But nowadays you
ask someone about family history of heart disease and they're gonna understand and know and be aware of their family history. Okay?

So anyway, what do you do if he has a genetic disorder familial hyperlipidemia? He had high fats in his blood and he did indeed have a heart attack, okay? He was admitted to the CCU and under the care of a cardiologist. I followed his care, and then when he was discharged, I lost track of his care.

All right. So, classically, I took the history, did the physical exam, a very quick physical exam, because I didn't want to guy to arrest on me, and got an EKG, did some bloods, did the differential diagnosis, and admitted him. And I called my senior resident, and he called the attending, and we admitted him.

All right. So let's go on.

All right. So when you do the clinical history, it's a current illness, severity, time of onset, character of patient's symptoms.

Medical history, you want the details of his general health, previous illness, okay?

Family history, health of patient's parents, family members, diseases that run in families, okay? And let's see.

Social history. All right. Patient's occupation, habits, alcohol, tobacco consumption. Then you don't really have a good understanding, you go to review of systems and just start at the top: Any problems with the following: Any visual difficulties, hearing difficulties, swallowing, and just go through the whole systems of the body. That's called the review of systems, okay?

The idea of doing that is to pick up another abnormality that you can use in supporting the formation of your differential diagnosis. All right.

Then you do the physical examination. The patient -- look for any abnormalities. And then the differential diagnosis is when you consider different diseases and you prioritize them. Okay.

Screening tests, screening tests for detection of disease, significant, okay? More and more, what are the examples of some of the screening tests we have available today?

STUDENT: MRI.

THE PROFESSOR: Okay, now, we do have MRI. You know what? MRI is really -- I don't believe it's really considered a screening test because it's too expensive, okay? What are some other screening tests that we have?

STUDENT: Pap tests.


What are we screening for with men? Pap smear for women, mammography. Men?

STUDENT: Prostate.
THE PROFESSOR: How do you screen for that. The name of 
blood test is PSA. Prostate specific antigen, okay? So we have 
screening tests, detect early asymptomatic diseases amendable to 
treatment to prevent or minimize late-stage organ disease. 

You guys may not know his, but what well-known person -- if 
I say his name, I believe you all are going to know him -- just 
came out and said he had prostate cancer? Anybody? All right. 
How many here have heard of Warren Buffet before? Okay. Warren 
Buffet came out and said he has prostate cancer, stage one, very 
early. I'm sure he had his yearly physicals with PSA. His PSA 
was slightly elevated. Diagnosis of prostate cancer. He's 
gonna have treatment in July. Start treatment in July because 
it's a very slow-growing tumor that men get when they're older 
and very amenable to treatment. 

Screening for some genetic diseases. All right. You can 
screen for carriers of some of the genetic diseases. We're 
going to talk more about these in detail in another chapter. 

The genetic diseases can be transmitted from parent to 
child and it's either dominant or recessive. We'll talk about 
dominant and recessive later. Also, you're going to identify 
carriers, which allows us to determine effective persons and 
help them make decisions on future childbearing or management of 
current pregnancies. An example of a genetic disorder is sickle 
cell anemia. 8 percent of the black population statistically 
has sickle cell. All right. 

Requirements for effective screening, and this goes for 
public health and community, significant number of persons must 
be at risk for the disease, okay? So you have a large 
population that must be at risk, has to be an inexpensive, 
noninvasive test. So an MRI is gonna be ruled out, okay, 
because that's not an inexpensive test. And it cannot yield a 
high number of false positives or false negatives, okay. False 
positives are when the test is positive they have the disease, 
and they don't. Or false negative is when the test is normal 
and they do have the disease. And early identification and 
treatment of the disease will favorably influence the course of 
the disease. PSA is an example. All right. 

Diagnostic tests and procedures, test of electrical 
activity, okay, to measure electrical impulses associated with 
bodily functions and activities. You got the ECG for the 
electrocardiogram. EEG measures electro activity of the brain. 
The EMG measures electrical activity of the skeletal muscle. 
All these are diagnostic tests. 

Radioisotope, all right, what that is is a radioactive 
chemical or atom is then used to evaluate organ function. The 
best example is thyroid studies. Actually, in the book, I 
believe they have a bone scan. And what happens is radioactive 
phosphorus is injected in small amounts and phosphorus is used 
in -- the uptake is used by bone cells. 

And let's see here. I think we've got a diagram here.
Yeah. Okay. So we've got the diagram here. See the arrows? The arrows point to increased areas of uptake, all right, of the reactive phosphorous. So it's going to be the skull and -- in the lower spine and pelvis.

Now, they don't say what that is, and you cannot make a diagnosis from a bone scan, really, what type of cancer it is but I think it might be multiple myeloma, in that it -- multiple myeloma tends to occur in the adult in the pelvis and lower spine and also the skull. All right.

So the radioisotope studies evaluate organ functions by determining the rate of uptake and excretion of substances labeled with a radioisotope.

Endoscopy. "Oscopy" means to look, okay, to look to examine the interior of the body using rigid or flexible tubular instrument, okay? It has a lens and a light source. The GI tract lends itself to endoscopy very well. So you can take a look at the esophagus, okay. And as I said, oscopy means to take a look. Esophagoscopy, look in the esophagus. Gastroscopy, look in the stomach. All right. Colonoscopy, someone mentioned colonoscopy, all right, look into the colon. All right.

To perform surgery formerly done through large abdominal incisions, what they -- really, that should be a separate heading. That's laparoscopic surgery using a laparoscope.

All right. When -- as a gynecologist, I did a ton of laparoscopic surgery we'll talk more about during the semester. Ultrasound is mapping echoes produced by high frequency sound waves. What they are are echoes. Okay. And then as the echoes go out, some of the them bounce off the tissue and come back, they come back to the source. They then are analyzed. The changes in tissue density affects the return of the echoes. This is then analyzed, okay, and it ends up producing images.

Another -- one of my other unique claims to fame was when I joined my two partners, okay -- and once again, I'm ancient because it'll tell you how old I was, but when I did my -- finished my residency, I had a lot of ultrasound experience, okay? At the time, the type of ultrasound that was done predominantly was what we call base scans, and they were ultrasound, but they were static, so you just scanned once and you had a picture. They were not what we call realtime. You guys I'm sure are all familiar with realtime ultrasound. Realtime ultrasound was just coming into play. But I had done a lot of ultrasound. I said to my partner, I said, "You know, we really need an ultrasound machine in the office." And I said, you know, "I'm comfortable with it. I know what I'm doing and we need to do that." So after a couple months I convinced them that we should do that. And we were the first practice in New Jersey to have ultrasound in the office.

Now, I know just about every obstetrician-gynecologist in the state of Florida has realtime ultrasound in their office, but when I first started practice, that was not the case, all
right? So ultrasound is a great diagnostic technique. Here's an example of the ultrasound, and you can see the profile of the baby, the nose, the lips. You can see the ribs. And you can tell a lot from that -- from that ultrasound. For example, from the baby's face, there's a big black area. That's amniotic fluid. If you look close, right above the forehead you will see some spots, and then if you look upwards towards the screen, you'll see the thickness of that -- like almost like a cloud. That's the maternal surface of the uterus for the pregnancy. Okay.

So x-ray, use of high-energy radiation wavers at lower doses to produce images to help diagnose disease. Can penetrate through tissues at varying degrees depending on the tissue density. And, of course, acts as a photographic film or plate. So as it goes through the body the plate's gonna be behind. Now, here is an x-ray of the colon with radiopaque barium sulfate. Radiopaque means basically it doesn't allow the x-rays to really pass through well. Okay. So as a result, it comes out as white. And the arrows pointing to a narrowing of the colon right there. It looks like -- how are we going to describe that -- as an inverted U. The right side is very thick. That's the caliber of the colon. After that little bend with the arrows, that's where the narrowing is, because the narrowing, the colon after that is going to be much more narrow, because it's not going to be filled with stool.

Here's an x-ray of gallbladder. This is a great x-ray of the gallbladder because it does two things. Number one, it shows all the stones, okay? So when you look at the x-rays, you can if you look close, you can see all the stones. And then you see that big shadow, which corresponds to the big gallstone. Okay. And this patient had their gallbladder out, so it's likely they were symptomatic; however, there are patients who can have a gallbladder like that and be asymptomatic, okay? So gallbladder disease, as far as presenting and causing symptoms, is very variable.

All right. CT scan. All right, basically, CT scan, computed tomographic scans. And what that is is radiation detectors. They record the amount of x-rays or ionizing radiation absorbed by the body. And what happens is the x-ray source rotates around the body, so it's different from the static x-ray, okay? It rotates around the body, and as a result, then after it rotates around the body, the computer gets the information, it interprets and reconstructs the data into an image.

So here's the diagram. You got your CT scanner. And those arrows indicating the rotation of the x-ray field. And here, okay, is basically, a CT scan of the chest. The big white area is the heart, okay? The more dense tissues shows up white on the CT scan, and the arrow is pointing to a nodule in the lung field. Notice the lung field is black. That's the way it
should be. And right in the center of the empty black lung field is something very dense and white, okay, and that density corresponds to a lung cancer.

Here we have the abdomen. You've got a cyst on the kidney. The arrow's pointing to it, okay? So the arrow points to the cyst. Immediately to the left is the kidney; and then also the center white is going to be the spine, the vertebral body; and then to the right of that is going to be the other kidney.

All right. MRI. What this does is it's computer-reconstructed images as based on the response of hydrogen protons. All right. The vibration of -- or magnetic fields of -- vibrations within the magnetic fields with the hydrogen protons. So then that is determined and an image is then produced through that, okay?

Here is an MRI. It's not as affected by bone density as an x-ray is, so it works better. It is affected by bone density, but not as much. The principle is the action of the hydrogen protons in a magnetic field. So there's not a lot of hydrogen in bone; so as a result, it doesn't really interfere, and we get a much better picture. Okay.

So the MRI does use ionizing radiation, okay? It can detect abnormalities in tissues surrounded by bone, such as spinal cord, orbit -- "orbit" meaning the eye or the skull. The bone does interfere with scanning because of its density, but doesn't produce an image in MRI because of its low water content.

Cytologic and histologic exams, very significant, okay? One of the biggest problems in medicine is the diagnosis, okay? A lot of malpractice suits originate because of the wrong diagnosis. When you've got the wrong diagnosis, you tend to give the wrong therapy, the wrong treatment. Wrong treatment, wrong therapy, wrong results.

So the best way to avoid a problem is to try to establish a diagnosis. The best way to establish a diagnosis is to get a piece of tissue, okay, a biopsy. All right. By getting the tissue, it can be analyzed and the diagnosis can be confirmed. Okay. It's one thing to have a breast exam done by the doctor and have him say, "That lump feels like it's benign," okay, that's one way to deal with it. Or it's better to go to a pathologist and have a fine-needle aspiration. A fine needle aspiration is where they take a fine needle the size of hair, they go into the lump, they attach it to a syringe, they back draw on the syringe, create some negative pressure, get a little bit of tissue in the syringe, remove the needle. They push the tissue on the glass slide; the pathologist then looks at it underneath the microscope and he says, "All these cells are benign," or maybe "they're suspicious and we need to do a surgical biopsy," or "they're malignant." Okay.

So a biopsy is getting tissue, okay, and when the tissue is obtained, it gets sent to the lab for histologic examination
underneath the microscope to determine if there's any abnormalities there. Okay.

And the pap smear, what a Pap smear is, a cotton tip applicator is rubbed on the cervix, okay. Cervical cells are shed. We're going to talk about cells -- types of cells in the next chapter. The cells are shed continually just like shells on the skin, okay -- not shells, but cells on the skin are shed. And by rubbing on the cervix with a cotton tip applicator, you get the decimated cells. Cells then can either be rubbed on a Pap smear on a glass slide, sprayed with a fixer so they lay flat, or that cotton tip applicator can be placed in a small vial solution. Either way, they get sent to the lab.

And in the lab, a cytologist, a person specialized at looking at cells, then looks at the cells and says they either look normal or they are abnormal. And then what happens is the degree of abnormality is graded, okay? And depending on the grade, okay, will determine the treatment. Sometimes follow-up in three months or six months is indicated, and sometimes a biopsy needs to be done, all right? So -- but that's basically what a Pap smear is, identifies abnormal cells in fluids or secretions and, basically, to look for early changes, okay, associated with cervical cancer.

And, of course, the causative agent for cervical cancer? Anybody?

STUDENT: HPV.

THE PROFESSOR: HPV, right. And the name of the vaccine for HPV?

STUDENT: (Inaudible.)

THE PROFESSOR: What is it?

STUDENT: (Inaudible.)

THE PROFESSOR: Good. Okay. Great. This is the last slide, no -- yes, it is. Okay. We're gonna stop here for today, and we're gonna start back again in five or ten minutes, okay, so we have a break here.

(37 minutes).

CERTIFICATE OF TRANSCRIPTION

I hereby certify that the foregoing transcription is a verbatim account of the recorded proceedings.

__________________________
JULIE AGUSTIN
Hardeman Realtime, Inc.
813.404.2488