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Transcript: Day 2, Session 6

DISC: 6

RECORDED MINUTES: 1:02:21 (62 ½ minutes)

REFERENCE: Healthy Breathing Day 2, Disc 6

(Audio Time Disc 6: 00.00.00)

J: Disrupt that means what sort of disease goes up on to that normal heart what creates it you see, okay and that function, function is like normal function, or disease function you see, there are two functions we use two function area, 0021 in the normal and over here, it's not functioning properly if it functions properly, why it functions properly is there something happened to heart, and lung and heart, maybe it's not function properly, and if its ?been function properly and some Yol;ju their heart's healthy functioning normal, 0048 that's like the function word, we need to sue that in both healthy and this how disease how it functions normal or getting sick, you see.

R: And James, the tests that the doctors do, they can measure how abnormal it is. -115

J: Exactly.

R: And then you can do the test again after the treatment to see if the function has come back to normal.

J: That's what I'm saying.

R: To monitor the programs.

J: To monitor the programs, and the functioning properly. Yeah. The program. 0132

M: Can I just say, back to what I was talking about at the very beginning, yesterday. There's two things going on here. One of them is the whole business about Yolngu consultants and what Waymamba was talking about, the research process and how we get you guys to come and help to do research and make reports on that. So that, in terms of what has been said just there and what Dhumungur (Waymamba) was saying before and other people have been saying yesterday, what we will do is after we've all gone home, we'll have a look at it, Christian's got it on video. We'll get the key points out of it and then we make the little report, and if we've got they money we'll put it onto a little website, and then we have to come back and talk to all of you people one by one and say this is what we think people agreed about, are you happy with that. And if you're happy with it, that's when it goes to the next stage that says okay, you guys out there, you're the ones with the money, this is what the Yolngu consultants have said needs to be done if we're going to do a good job on making this multi-media; and this is the process, these are the ideas, this is what people have said where to start and where to finish off. So that there's a process of reporting from this workshop that allows us to um make recommendations and even maybe find somebody that can sit down and work out how much it would cost and then go off and see if anyone's got the money to pay for it to be done properly. It's not cheap, as Rob keeps telling us. But I'm just talking about the process of this workshop. We make some notes and then we make sure that you can see what's going on and if you're happy with it, then you can put your name to it and then you might want to change something because you might say no, I didn't say that, or whatever. But as part of the process, we have to get back to you again after things have settled down a bit. (to John) Are you going to put heart up there or not worry? Or are you still thinking about that one?

J: No, I'm not thinking about that, no, no, no, no. 0336

R: It's the heart and the circulation isn't it. If the heart is part of the circulation really, or we should put heart and circulation really, because they're both, if you think about the oxygen story, breathing is to get the oxygen down into the lungs but then you have to have the gas exchange to get it into the blood and then you have to have the heart and the arteries and the circulation to carry it to the organs. And to carry the carbon dioxide back to the lungs and then breathing to get it out. So both the heart and the circulation are just as important in the process of getting oxygen into the body to keep the cells alive and functioning as the lungs are; you need both really and they're very

integrated.

M: But maybe the circulation story and the heart story is really the blood story is it? So you've got one story which is the njir' story and you've got another one which is the blood story? No?

JG: Oh, yeah, I think the njir'...

M: Just from a Yolngu point of view is that the two key things, the gulaŋ and the njir' or is it more the doturrk (heart) and the burrgutj (lungs) ... , do you know what I mean.

R: They're both parts of the story of gas exchange.

Mun: Walŋa

J Walŋa ŋe'?"

M: And they both circulate.

JG: Walŋa.

M: Walŋa is the whole thing isn't it. It's njir' and gulaŋ together.

JG: So is njir' the whole thing too, njir' is also like...

M? .., the circulation but.

JG: It includes circulation and includes breathing but it also it includes life. 0511

M: Right, and gulaŋ.

JG: And gulaŋ, but.

M?: Those are the sorts of questions we need to ask if we had a further workshop to work out exactly how to position the whole thing in terms of Yolngu understandings of the body and health and words for ...

R: They're both important and they're both linked. If a person starts to die you have to do up for the heart and low into them for the breathing. This is resuscitation isn't it. You have to do both breathing and the heart together. You know how when they teach health professionals in the hospital how to do resuscitation, you do pushing on the chest, push, push, say five times then blow in, so you have to keep the heart going and you have to keep the lungs going because they're both necessary for life, to get the oxygen into the cells to keep the cells alive and functioning. So they're linked.

J: Michael. You doturrk (heart) got a problem, that doturrk , you work in the hospital, and what they say is okay, we can check that doturrk with the camera. Manymakk, so they put that through here, angiogram, then make them anesthetic make it numb so the patient watches that thing.

R: They squirt the dye in and then they take x-rays.

J: Yeah, they squeeze the dye in and they take.

R: Of the inside of the ...

J: Yo. they need to explain that one too, because that's where the camera goes in through here and the angiogram goes in through here, goes to the heart and inside the heart and the camera squeezes the power thing, take pictures where the heart is having a problem, you know, where the heart stops. So they take a picture, then it only takes half an hour, twenty minutes.

R: Yes, that's right. James can I say one thing and that is they are both linked, breathing and the heart but the cardiology, the heart doctors, have already made some DVDs, the heart story book, ARDS have recently made a DVD called 'the heart story' that talks about coronary heart disease and heart failure. There are very few resources for respiratory so I think that they are linked and you have to mention them both together but I think the resources that concentrate on respiratory disease are missing. We need to, I think we need to make some or somebody needs to make some. But already there are some at least for the heart side of things. Have you seen the ARDS heart story DVD?

J: No.

R: And they also did one, the iron story, which talks about the blood carrying oxygen. But there is no DVD for breathing.

J: Respiratory, yo,

Dh: Yes, that's right there is no story for that.

JG: I think when Dhāṅgal was talking about respiratory I think it's possible, like looking at that animation this morning, if there's a lung, where one lung is carved out, can fit in there, and I think trying to put them both together at one time would be fraught with difficulties. And ṅir' can talk about blood, it can talk about air, and it can talk about life, but I think if there are maybe layers would be another way to say it. Look at one layer and we have the breathing and zooming in maybe and looking in at the anatomy, so you can see a body standing there, exercising, rest, zooming in and looking at the lungs more closely. Then add in a layer and then see the heart, take off the lung layer and look at the circulation, so that it could be layered and melded; but being able to zoom in each time and see for deeper explanations or animations of the functions there.

R: So for example, 1006 the one with the lungs, the animation we've been looking at this morning would be used for the lungs; and maybe for the heart that other one that we saw yesterday with the heart pumping and the circulation of the blood to the body. Something like that. So it could be done in the same style probably.

JG: Yeah. The other point though that ... mentioned somewhere about having an image of the body so it fits into people's view of how they see the body so the outline of a body fitting in there makes, it is probably an important issue.

R: Do you think that works reasonably?

Dh: Blue carbon dioxide and the red with the oxygen, mmm.

JG: Colour. I explained them.

R: 1128 So this one shows the lungs inside the body, so of the whole body, particularly where the lungs sit in relation to the outside of the body. And it stays like that in this one. You can still see the outline of the body here, and the arms and the chest here. 1200

JG: those things?

Dh: yes, they are good, aware that marṅgi, how the air goes into it. (YM) ...

JG: See, what's missing, Dhāṅgal is just saying as long as we can see where the air is going in; because at the moment all we can see is...

R: Well, we need the head bit, we need the head for the mouth on this one. It should have the mouth up the top here.

JG: And maybe a mist or something, a misty...

R: Yes, like a.

M: Is that right, so you can see maybe a mist of, a wakulungul (fog) maybe going in.

Dh: That represents the air that we breathe in.

R: That one we had over there does that. 1254 But the one for the circulation that we were showing yesterday doesn't really show the body properly.

J: respiratory, we confuse heart problem and the respiratory story, the breathing and heart

R: So this one shows the heart and then the two circulations to the lungs and to the rest of the body or to the brain.

Dh: Yeah, manymak.

R: But it doesn't show the body around the outside.

Dh: There doesn't have to be a body there. People can.

R: It doesn't matter?

Dh: Doesn't matter. They understand. The air going up to the brain.

R: Yep, but the brain is just representative because it also goes to the kidneys and the muscles and the arms and legs and everywhere else. It's a step in circulation. 1415

M: When I saw that yesterday I thought what about the hands and the feet and

JG: Yep I thought that too... I reckon it should have the whole body there.

M: It's got the blue coming in the lungs and going out red but you've got the red coming out and going all over the rest of the body.

Mun: ... system ...?

R: Well, I guess.

Dh: I know what you're talking about, there's that picture.

R: It also goes down but it goes to the kidneys, which sit here. It goes to the.

Dh: It goes to the , picture like Betty (in TTTS)

R: Yeah, ...

J: She's just saying the picture is like.

R: These ones, yes. These ones are very good, showing the whole circulation.

Dh: Yeah, the whole where the whole circulation goes.

R: But they're not so good for showing how it works in a dynamic way. 1505 The animation is very good for the dynamic function and the change in the colour of the blood and all that sort of thing but it doesn't give the whole picture so maybe you could introduce the whole picture with ...

Dh: Would that be ...if like with the picture of the whole, not that one, the other one, hang on

R: If you tried to put the whole body

Dh: No hang on...

R: and the blood going everywhere like this it would be a huge task for an animation to do, wouldn't it? We'd have moving parts everywhere.

Mu:

M: That's the type of question we would need to get scoped out by people but I don't think it's such a big problem as you think it is, at this stage.

Dhan: What about different tasks for ...

JG: Don't say that..

Dh: It can be done. Body outline (you've got it there... ..

R: So what you would have is this one.

M: You've got the wrong book there. This one is the aorta, okay.

Mun: Central Australia.

Dh: The other one with Galitju's photo on top.

(Some quiet conversation in YM)1650

R: You would like an animated one of that?

Dhan: Yo.

M: Well, just like that in there but the rest of it all going, the little red ones coming back and the little blue ones going up again. See, is the difference between the blue and the red clear, do you know what they're talking about there?

Dh: Yeah, just the blue and the red going all around, yo.

M: But the blue changes to the red in the burrgutj, and the red changes to the blue in the body, because it's njir'miriwyirri (becoming without air) or whatever.

R: It's the oxygen ??? being added in the blood.

Dh: Yo, it can be done, yeah.

R; Makes red

Ga: outline, and then colouring it all over...

JG: Like that? like that midiku? (sister)

Ga: Yes

(Some very quiet conversation in YM).

JG: Sister was also saying that showing a full body ... the people have to see whole... without seeing it detached.

R: It is, I'm sure it's done for simplicity but again we do need to talk to animators.1812 You know the breathing animation with the lungs.

M: Is that a ... what they want, more realistic?

R: Well, then let's look at it,

J: I don't think it has to be absolutely realistic, I think it's just got to have a good resemblance.

Mun: .. for the kids, they use computers, they like... Very quiet conversation in YM) 1902

R: That's for the breathing but not for the circulation.1934

J: Yeah, and the only thing that Dhargal would have added would have been maybe something showing, but, yeah

R: Yeah, with the head so you can see the blue incoming ... out the mouth.

J: Yeah, and as you say the restrictions up here..

R: Is this one useful? 2004

Mu?: it's got no head, (YM) ... 2022

R: It needs the head so you can show the upper air way too for the snoring. Okay. Will we move on and talk a little bit about the disease processes before we have lunch?

M: Do you want to see the next one about diseases before we have our lunch? I reckon that's not a bad idea.

Mun: Yeah.

JG: Yeah, I think that's basically sort of we've got answers there really, I think, from what's been discussed this morning. So look at representations, animations.

R: So the next one is about what the disease processes that affect the lungs are and how they disrupt the function of the lungs.

HOW DISEASE PROCESSES DISRUPT HEALTHY FUNCTION

Disease mechanisms (pathology) affecting lungs and heart

- **Inflammation**
- **Airway narrowing/collapse due to pressure**
- **Narrowing/blockage of blood vessels**
- **Muscle (pump) weakness**

Now, there are sort of four basic groups of disease mechanisms. The first one is inflammation and that can be due to infection or allergy or irritation. Have you got a good idea about what inflammation is? Redness or heat, soreness, what inflammation means. I'll show you what it looks like under the microscope. The next one is narrowing of the air ways and that might be due to, because the muscle in the wall constricts them or it might be because they collapsed because they've lost their elastic support, so that's mechanical narrowing of the airways. The next one is blocking of the blood vessels and that can be important in the heart and in the lungs, and the blocking of the blood vessels can be due to atheroma or atherosclerosis from fatty deposition of all of the arteries. Or inflammation of the wall of the artery, vasculitis. Or clots, either in the arteries to block the artery or in the veins like thrombosis that causes swelling of the feet. Then the fourth mechanism is, we've talked about both the lungs, the chest as a pump, a respiratory pump that works off muscles, the diaphragm, and the heart is a pump; and if you overload those pumps then you get muscle failure or respiratory failure or heart failure. So they're the four general disease mechanisms that affect the heart and the lungs.

CAUSES OF INFLAMMATION

- **Infections - microorganisms (bugs, bacteria, viruses, fungi) can invade airways, lungs, circulation**
- **Allergies - body makes antibodies to environmental proteins**
- **Irritations**
 - rubbing
 - chemicals
 - burning
 - low O₂

Chronic inflammation → scarring/narrowing of tissues, airways,

blood vessels

So if we start with the inflammation one, it can be due to infections and that might be bacteria, bugs, or viruses, fungal infections, and they can invade any part of the respiratory system or any part of the circulation. Allergies is one that's important particularly for the lungs because asthma is part of inflammation that's due to allergy, and in allergy, the body has made an antibody to something in the air. It might be pollens, or it might be house dust mite, and when that antigen is breathed into the lungs, the body remembers it and has antibodies to it and the antigen and the antibody come together, and cause bad effects such as inflammation of the lungs. That's what asthma is. Chronic irritation is another source of inflammation and that's like smoking irritates the lining of the airways and makes them inflamed. And if you get chronic inflammation that causes scar formation and the scar contracts and causes narrowing of arteries and of air ways and that disrupts their function as well. So there are different types, different causes of inflammation as a disease process.

IRRITATION

-
-
- **Airways → cold air – asthma
smoke – chronic bronchitis,
emphysema**
 - **Coronary arteries – narrowing by inflamm,
fatty plaque
– heart attack, angina**

Powerpoint 3 slide 4

Irritation, I've talked a little bit about smoke irritates the lining of the lungs and causes inflammation of the bronchi and that's called chronic bronchitis and that makes people cough and spit; and also the inflammation destroys the air bags or the alveoli and that's what emphysema is; you've lost a lot of the alveolar service membrane where the oxygen diffuses across. Cold air is an irritant to the air ways in everybody but particularly in people with asthma, so that cold air can be a trigger factor that can bring on an attack of asthma, and I'll show you how that works with some diagrams. Irritation in the coronary arteries, you can get inflammation and you get that fatty plaque build up and that's what causes heart attack, where there's narrowing of the coronary arteries that supply the muscle of the heart, because of inflammation and fatty depositions. And they're in the arteries, in the coronary arteries.

Now you need to start thinking about what inflammation is and people commonly start with, if you get a wound in your skin then that will get red and sore and inflamed; so you get inflammation in the tissues when you cut the skin.

Powerpoint 3 slide 5 (Unable to obtain permission to show illustration)

This is a diagram that shows how the skin has been penetrated and that has introduced bacteria or virus, micro-organisms into the soft tissues underneath the skin. Now, those bacteria release enzymes, things like histamine or little chemicals, and the chemicals do a number of things. The first thing is that they make the blood vessels leaky so that the blood cells can come out of the soft tissues. They also have special chemicals which attract white blood cells to the area of the injury. Now, that's a body defense mechanism because these white blood cells gobble up the bacteria and that's a defense mechanism to try and stop the bacteria from spreading. So the aspects of inflammation are the capillaries, the blood vessels, get leaky and fluid leaks out and that causes the swelling.

M: So that's the blood vessel along the bottom, that brown thing?

R: This is the blood vessel along here.

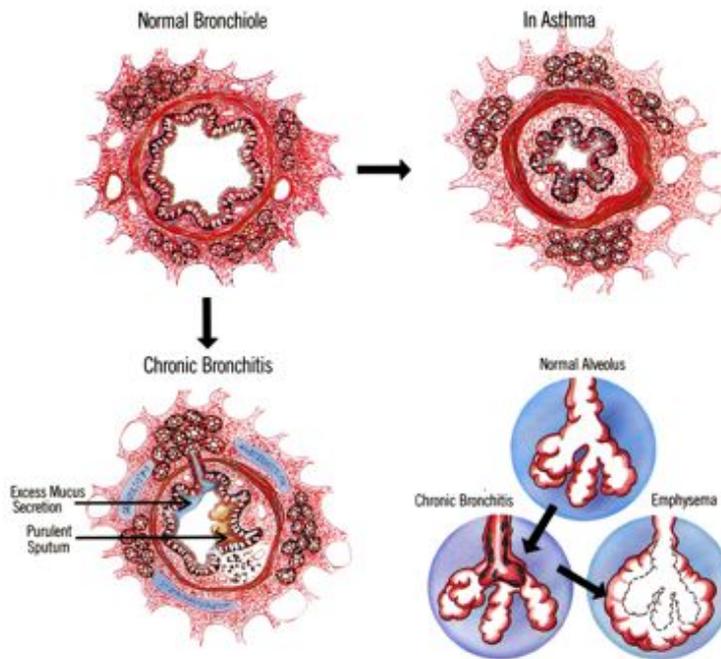
M: So the blood moving along.

R: This is the blood vessel. Here are some of those red cells that look like a disk that we were talking about, the ones that carry oxygen; 2748 and then these ones are white blood cells, and they carry the immune defence properties of the blood. But they come out of the blood into the tissues and they set up an inflammatory reaction; they're trying to protect the body by killing the bacteria that got in there. So that's the process of inflammation as it happens when you wound your skin.

Healthy Breathing and Heart

- **Airway inflammation**

Airway Inflammation



Powerpoint 3 slide 6 (Obstructive Airways Disease - A4 size laminated chart Riker 3M. Front Fig 3.6)

Now, in the lungs it's different. This is a normal air way. Now if you think, any one of those little bronchial tubes or air ways and you cut across it, this is the air movement where the breathing is going in and out, and you can see it here, can people see the pointer all right? This is a single layer of cells, 2052 the lining of the air ways, and these cells have little hairs called cilia on the surface and they move continuously. Out here are mucus glands and these secrete mucus into the lumen and the hair-like cilia all wave in one direction and they move the mucus blanket up out of the air ways. So when you breathe in dust it lands on the mucus, it sticks to the mucus, and the cilia move, they sweep the mucus and the dust particles up out of the lungs. So that's one of the lungs' defense mechanisms. One of the things that smoking does is it damages these lining cells and destroys the silia so that, and also by irritating causes in increase in the mucus; so what chronic bronchitis from smoking is, is excessive mucus, the cilia don't work so the mucus stays in the lungs, it's not being cleared out by the cilia, it stays in the lungs and it gets infections, it gets bugs in ti so that's what chronic bronchitis is. 3015 So that's this lining, layer of cells called the mucosa that lines the airways. The other part of it and these are the alveoli around, these are holding by elastic force, holding the air way open; this here is a muscle layer so there are the muscle fibres, which are arranged around the lumen; when that muscle contracts and shortens it's going to squeeze the lumen, and that's what we mean by broncho-constriction and that's what you get in asthma. It's contraction of the smooth muscles in the walls of the air ways. So just remember, this is the diagram and it's showing the elements of the airway bronchial tube here where the breathing is happening, there's a lining layer of cells, it's got muscle around it, it's got mucus glands and it's got the alveoli or the air bags supporting it from the outside. That's what the normal air way looks like.

This is an air way in asthma and you can see that the room that's left for breathing, the lumen is very small, this is the layer of muscle where you can see these cells lying around here, 3149 these are the muscle cells, and you get constriction, you get increase in the muscle and constriction of that muscle, to narrow down the lumen; you get inflammation, instead of being just being a single layer of cells there are white cells and inflammation comes in here, in this mucosa and in the sub-mucosa, and there's also inflammation out here as well. So the two things in asthma are inflammation inside the air ways and constriction of the smooth muscle. Now, the inflammation, the swelling in the sub-mucosa here pushes the mucosa in and narrows the lumen and separately, the constriction of this muscle also narrows down the lumen. Now, in the next one where we're talking about how treatments work you'll see the puffers that you use for asthma do two things. The first thing is that they stop inflammation and that they make this inflammation go away; and the second thing is that they relax the smooth muscle. So ventilen you will all be familiar with which is the little blue puffer that people take when they're feeling very short of breath, that relaxes the smooth muscle. Some of the other more preventive pumpers like this type and things like that or seratide, they have an anti-inflammatory medicines in them as well. So that's how.

Dh: So broncho-constriction or whatever that is.

R: The broncho-constriction yes.

Dh: Is tighter when there's an asthma attack?

R: Yes.

Powerpoint 3 slide 7 (Unable to obtain permission to show illustration)

So this person's asthma looked like the one before, it was normal, and then they breathed in something that they're allergic to, maybe pollens or grass pollens or house dust mite, they have an antigen, anti-body reaction which makes the inflammation; 3403 the inflammation squeezes this down and it also triggers a contraction in the smooth muscle, so the bronchio-constriction narrows the air way. So they have difficulty moving the air in and out of their lungs so the breathing is wheezy. (wheezing noise) This sort of noise is the air moving through very narrow air ways. Okay, in chronic bronchitis, this is just a diagram. This is a normal bronchiole or small air way. This is the asthma one showing how it's narrowed down. In chronic bronchitis due to smoking you see a lot of increase in the mucus glands, there's more mucus glands here than here, so you get an excess of mucus production that goes into the lumen and that narrows the lumen; and again you get inflammation from the irritation of the smoke. And you also lose those cilia of the cells that stops the normal mucus blanket defense mechanism.

Powerpoint 3 slide 8 (Unable to obtain permission to show illustration)

Now, I want to talk a little bit about allergy. The way this works is that if a person has asthma and has an allergy, then they have white blood cells in their lungs, this is a mast cell, it is one of those types of white blood cells, and it has anti-bodies on its surface.

Powerpoint 3 slide 9 (Unable to obtain permission to show illustration)

They're sitting there in your blood and in your lungs if you have asthma. Now, when you breathe in a grass pollen it gets across, it gets through the mucosa into where the white cells are in the bronchi and it reacts with the anti-body that was already on those cells, and that reaction between the antigen that's breathed in and the antibody that was already carried there as a memory that you're allergic to this particular antigen causes the white cell to release a whole lot of granules of inflammatory chemicals. Chemicals that set up an inflammation reaction.

Powerpoint 3 slide 10 (Unable to obtain permission to show illustration)

So that's how allergy works to set up inflammation in the lungs and how the body remembers from last time you inhaled pollens or grasses, because it carries these special anti-bodies which are specific to that particular antigen program. That's why an asthmatic can develop very severe breathlessness and wheezing within a couple of minutes after inhaling an antigen because they've got the anti-bodies in their blood and in their lungs that are ready to react. These are just other diagram ways of showing the white blood cells with the anti-body and here's the antigen coming in, so there are various ways of doing that.

Powerpoint 3 slide 11 (Unable to obtain permission to show illustration)

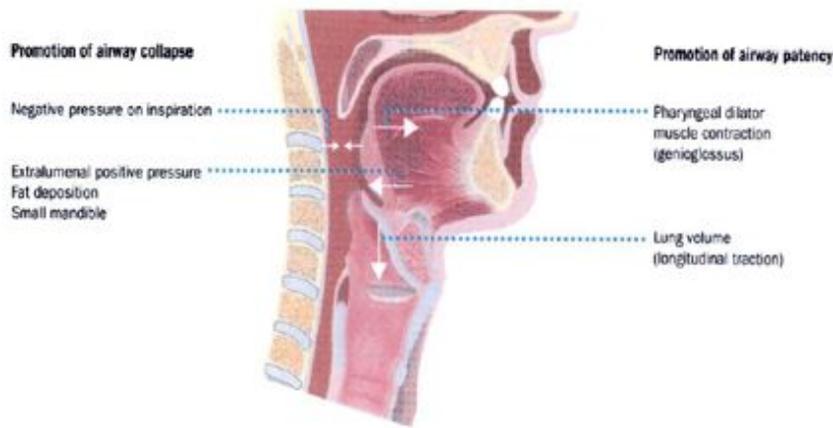
The other place that inflammation is important in the heart this time is in rheumatic fever. Rheumatic heart disease is a very common condition as you are aware I'm sure, and it destroys the valves in the heart. With rheumatic fever it happens after streptococcal bacteria infections and you get inflammation on the valves inside the heart, this one is inflamed, this one is normal, and that destroys those valves. And it might make them leak or it might make them very narrow.

Powerpoint 3 slide 12 (Unable to obtain permission to show illustration)

And if you think back yesterday where we've got the heart chamber pumping the blood through the valve, if the valve leaks then the heart pumps the blood out but it can come back in, the valve doesn't stop if from coming back in, so that messes up the circulation function of the heart. Or if the valve is very narrow and tight then the heart muscle has to pump a lot harder, squeeze a lot harder to get the blood out, and it's what we call stenosis of the valve. So conditions like stenosis of the aortic valve, can happen from scarring of those valves from rheumatic fever, it's a cause for people to get very sick from heart problems and then they have to have an operation to replace the valves; and the cardiologists have those sound waves, they have cardiograms, they can actually see the valves, see them opening and closing, can tell if they're too narrow or if they're leaking backwards. That's how inflammation can cause disruption of the heart and circulation functions. I won't go over this stuff again but I just wanted to talk a little bit. So that's inflammation as a disease process, it can affect anywhere in the lungs or anywhere in the circulation.

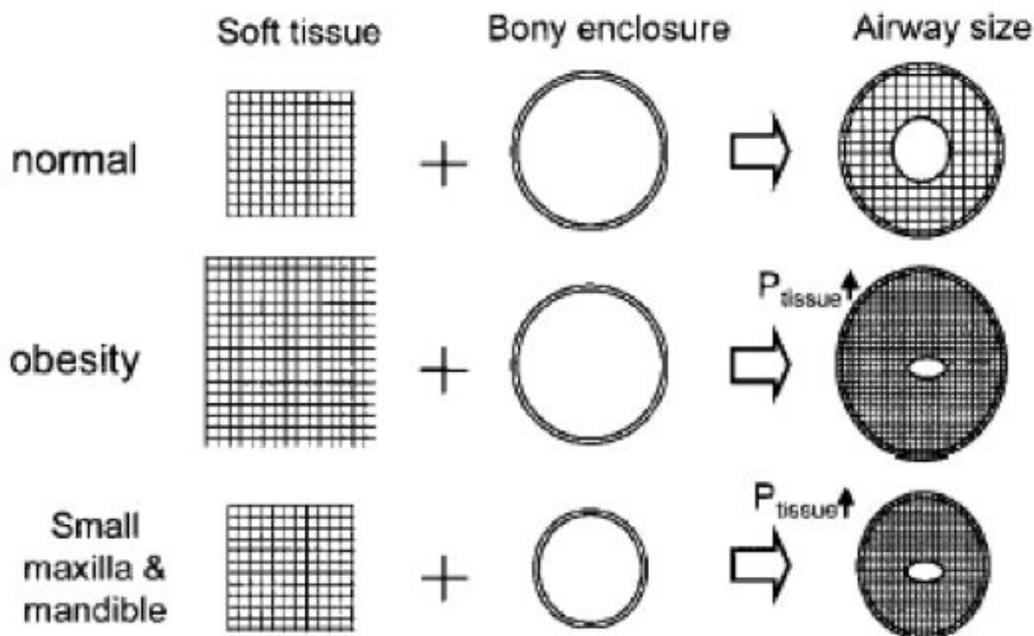
Healthy Breathing and Heart

Narrowing / Collapse of airways due to pressure



Powerpoint 3 slide 13 (© American Thoracic Society. Used with permission)

Healthy Breathing and Heart



Powerpoint 3 slide 14 (© American Thoracic Society. Used with permission)

The next thing was this narrowing or collapse of air ways due to pressure and we talked about if you've got too much soft tissue inside the bony box here then you'll have a narrow upper air way and that will cause snoring and it will cause sleep apnea and it will cause you to stop breathing when you go to sleep, when you dilate the muscles of your upper air way and relax. We talked about that problem yesterday.

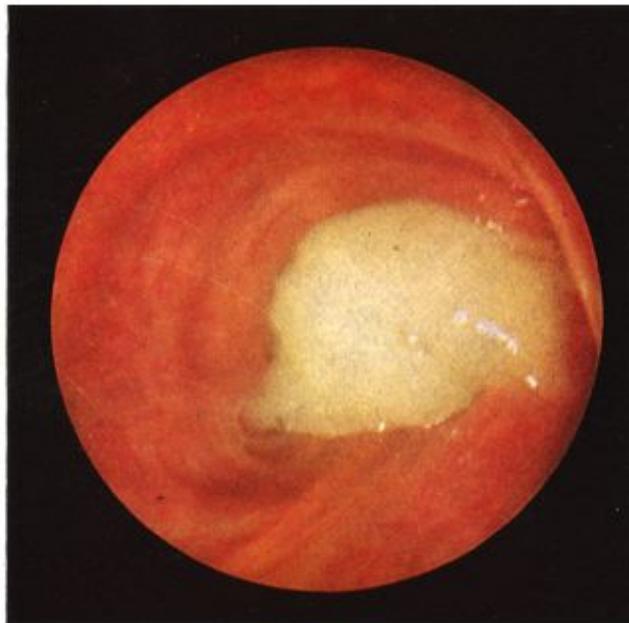
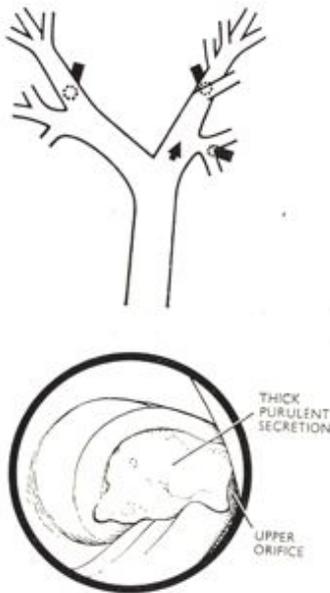
Powerpoint 3 slide 16 (Unable to obtain permission to show illustration)

Now, pressure is also important in air ways in asthma and a whole lot of other inflammatory diseases of the bronchi because this is a normal air way wall and it's normally supported by the alveolar walls around it, but there's a whole lot of mucus or pus in the lumen so this would happen in pneumonia where there's an infection and you've got pus and mucus, blocking up the air ways. So this is one mechanism by which an air way can be narrowed. Another mechanism is if the wall is very inflamed and thick that will narrow the lumen down as well. Another mechanism which is in emphysema is if you've got a normal thickness air way wall but it's lost the elastic support because the

alveoli have been destroyed. So this air way just collapses down because it hasn't got the springs holding it open. So there are a number of different mechanisms by which the air ways get blocked. This one would be pneumonia, for example. This one would be asthma where there's inflammation and constriction of the muscles in the wall. This one would be emphysema where the air way itself is normal but the lungs' spongy structure that holds it open is deficient so it is able to just collapse, it's left floppy and it can collapse down. So these are different mechanisms by which air ways can be narrowed. 4150

Healthy Breathing and Heart

Pus occluding bronchus in Pneumonia

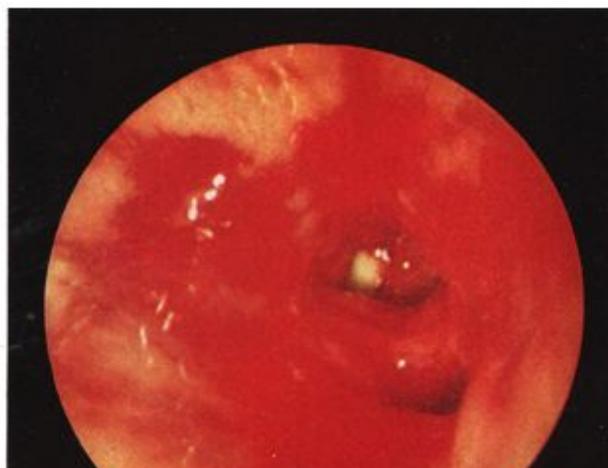


Powerpoint 3 slide 17 (Diagnostic Bronchoscopy 1973: Page 53 - Plate 52 P Stradling Churchill Livingstone. Used with permission)

We saw yesterday some photographs taken down the bronchoscope. This is what you might see in a person with pneumonia. Their large air way is full of pus so there's no room for air to get past. That's why pneumonia blocks up the airways in the lungs. This one is the condition of

Healthy Breathing and Heart

Airway narrowed by inflammation in bronchiectasis



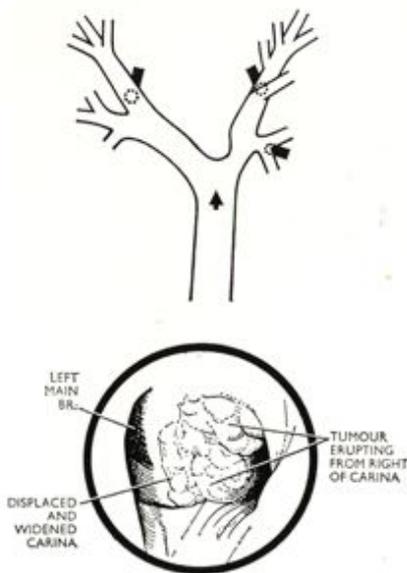


Powerpoint 3 slide 18 (Diagnostic Bronchoscopy 1973 : Page 56 - Plate 56 P Stradling Churchill Livingstone. Used with permission)

bronchiectasis which is a common chronic respiratory infection in children, who get lots and lots of upper respiratory infections in their sinuses and ears, but they go down into the lungs as well and they cause chronic infection and damage to the bronchial tubes; and you get this redness and inflammation, bits of pus, and that would be there chronically all the time. Usually, like with this one, this person gets pneumonia, it's a severe illness, it lasts for a week or two; it might kill the patient but if the patient doesn't die then they will improve; so you only have this here for a short time, for some days. But the bronchiectasis is a chronic condition so there are many children, and particularly so in central Australia, whose air ways look like this all the time because they've just got chronic infection that's destroying and scarring their air ways on a chronic basis. 4325 Now, this illness starts in children as recurrent upper respiratory infections and by the time these people get to about thirty they've got chronic respiratory failure, their lungs are completely ruined and scarred by this chronic infection, and without a lung transplantation they will die. 4310 There are a whole lot of issues about lung transplantation in Indigenous people but these people have chronic respiratory failure and will generally die without a transplant.

Healthy Breathing and Heart

Airway blocked by lung cancer

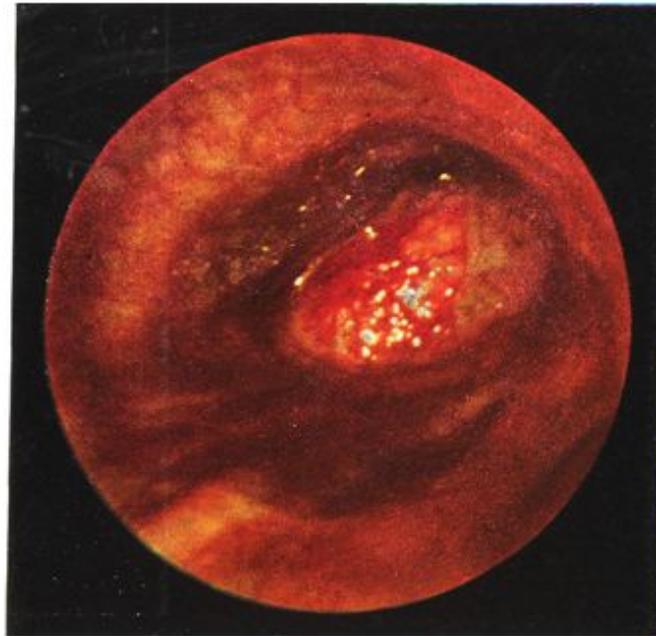
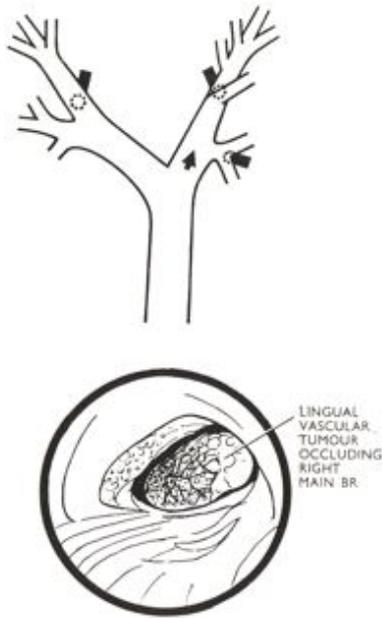


Powerpoint 3 slide 19 (Diagnostic Bronchoscopy 1973: Page 86 - Plate 107 P Stradling Churchill Livingstone. Used with permission)

The other thing that can block, that can happen in the air ways as a result of chronic inflammation is that a cancer can form. 4413 Cancer is a response to chronic inflammation and this is a cancer in the air way and you can see that it is a new growth, that is what cancer means. Cells have got out of control in their growth and they're just growing without any control; but it blocks up the air way. Now, you can imagine if your trachea here, if you get even a small cancer it's got a fairly small movement and it doesn't take a very big cancer to block it off completely, so we sometimes see people that come into hospital and (breathing wheezing in), they have a noise when they breathe in that is called stridor or inspiratory stridor, and it will be due to a cancer that's blocking their trachea; so the treatment for it is to put down a bronchoscope and with a laser or forceps to pull out the cancer, to open up the air way again so that they can breathe clearly again, and then their breathing goes back to normal. So that can be a very dramatic treatment for cancers.

Healthy Breathing and Heart

Airway blocked by cancer



Powerpoint 3 slide 20 (Diagnostic Bronchoscopy 1973: Page 91 - Plate 118, P Stradling Churchill Livingstone. Used with permission)

Here's another cancer where you can see this one is completely blocking an air way that is further out in the lungs and the patient is still able to survive by breathing from the other one. So we've talked about narrowing and collapse due to pressure,

SITES THESE PROCESSES OCCUR IN DISEASE

- **Narrowing/collapse due to pressure:**
 - Upper airway :** ↓ muscle tone in sleep → *Snoring, Sleep apnoea*
 - Lower airway :** collapse of airways - *emphysema/COPD*
airway blockage – *lung cancer*
- **Inflammation / Allergy :**
 - Lower airway :** narrowing in *Asthma*
 - Heart valves :** rheumatic fever - stenosis blocks flow of blood

perhaps in the upper air way and that's what snoring and sleep apnea are; and it also happens to the lower air ways, and emphysema causes pressure collapse in the air ways, and lung cancers can block air ways. 4600 We've talked about inflammation and allergy, it happens in the lower air way, is what asthma is, allergy and inflammation in the air ways; and it happens in the heart valves in rheumatic fever. You can also have inflammation in the heart muscle and the muscle doesn't contract very well when it's inflamed and that's the condition called myocarditis; there are some viral infections that cause inflammation in the heart muscle.

Now, inflammation, there will be a different name of the disease depending upon where the organ is.

	Infection	allergy
Upper airway	rhinitis, sinusitis	hayfever
Lower airway	bronchitis	asthma
Alveoli	pneumonia, T.B.	
Pleura	pleurisy	
Heart	myocarditis	
Heart sack	pericarditis	
Blood vessels	vasculitis	angio-oedema

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So if you get an infection in the upper air way in the nose it's called grynitis or a cold. If it gets into the sinuses which are the spaces outside the upper airway it's called sinusitis. In the lower airways it's called bronchitis. If it gets out into the alveoli or the air bags it is called pneumonia or pneuminitis. And tuberculosis is a type of pneumonia with a slow growing chronic bacteria. If it happens in the lining on the outside of the lungs it's called pleurisy or pleuritis and that's a very painful condition. If it happens in the heart muscle it's myocarditis. So 'itis' means inflammation essentially. You name the disease after the organ that it's occurring in The sac around the outside of the heart if you get infection in there it's called pericarditis, and then you get fluid build up in that sac and it pushes and squeezes the heart, and interferes with the function of the heart. You can have inflammation in blood vessels where it's called vasculitis. The allergic processes in the lower air ways is asthma. In the upper air ways it's hay fever, it's sneezing, it's an allergy in the nasal passages. It can also happen in the blood vessels and cause inflammation and narrowing of the blood vessels and angio-edema and that's anaphylaxis that happens after beestings in some people, that have been stung by a bee, they've got anti-bodies to the bee in their blood, the antigen from the bee sting combines with the anti-body in their blood and it causes cardio-vascular collapse, and that can be.

BAK: 4855 I thought it was interesting for everyone of the 'it is' is something and the 'card' is the heart, and the peri is ... Is it worth going through some of that.

R: Myocardium is the muscle of the heart.

B: So myo is muscle?

R: Myo is muscle.

M: Card is for the heart?

R: That's it.

B: Cardi...

R: Card, cardio, yes, is.

B: This is all Latin?

R: Yes, these are Latin, the word .., myo for muscle, cardio for heart.

James: That's why we asked you to make it into simple plain wording.

WG: You don't have an English word for it or that's the only name? 4943

R: That's what we use. No, this is the English word. It comes from a Latin root but it is an English word.

James: But just sort of like, to explain what those two or that one is.

R: Myocarditis, it means inflammation, itis, in the myo, the muscle, of the cardiac, or the heart.

James: I know you need to write that somehow but. When we do it further... then you can explain that.

Dhanj over here, on this side, (Some quiet conversation in English and YM).5020

R: Wouldn't there be similar logic behind the way you would name these diseases in Yolngu? 5035

James: Yeah, that's why we're asking you to make it..

Dhanj: Simpler to understand. ... ??? so heart, we know the heart and that one,

James... we need to know that heart so that we can put it into Yolngu language.

R: Yes. So is there a word for inflammation in Yolngu? 5052

JG: Yo. Swelling.

R: Swelling, yes.

Br: That word down there, that edema, is that swelling?

JG: Inflammation.

R: Edema is another word for swelling. Fluid in the tissues is edema. You know in heart failure when people get swollen legs they call it edema of the ankles, don't they, it's just serum leaking out of the vessels because the ... pressure is too high because the heart, it's building up in circulation and the heart can't pump ...??

J: This might be a good example where Yolngu talk about this, together.

All: Yo, yo.

J: What does 'itis' mean, like when Rob said 'myo' means muscle anywhere; 'card' or 'cardio' means heart; 'itis' that inflammation. So with people, talking about that with someone like Rob, in lots of languages, that would be a good way of conveying that meaning to Yolngu.

D: Yo.

BAK: I wonder if card and postcard came from sending your heart.

Dh: Postcard (laughing).

R: Send a message from the heart.

James: then you live longer 5212

J: My card?

BAK: Muscle card? What's the other? What's peri?

R: Peri means around the outside.

WG: Outside of what, the lungs?

R: Like the periphery. Peri means around the outside.

JG: Perimeter. Peri. Enclosing.

J: Yo, yo.

R: So the heart sits inside a sac called the peri-cardium and normally there's no fluid in the pericardium, it's just a potential space if you understand me, but if you get inflammation of the pericardium, that's the outside of the heart, it can cause fluid and swelling inside the pericardium, that's the sac around the outside of the heart. If the fluid builds up in there it squeezes on the heart and stops it from filling up with blood, so it interferes with the circulation. Similarly the lungs have a lining on the outside called the pleura and there's a lining of pleura on the outside of the lungs and on the inside of the chest, and the two layers are very much together; so that the lung can, when the lung expands there's no friction, it makes it easy for the lung to expand and move inside the chest; because there's a little tiny bit of fluid there that acts like a lubricant. Now, if you get pleuritis or inflammation on the pleura on the outside of the lung then that causes fluid and swelling to occur, and then you get a pleural effusion, which is fluid outside the lung but inside the chest, and that can push the lung down, that can push the lung down and interfere with the breathing. And the lung can't do it properly because there's fluid outside the lung and inside the chest. Another thing that can happen is called a pneumo-thorax and that is when you get air outside the lung and inside the chest. Sometimes if you break a rib it will puncture the outside of the lung and let the air out, and now you've got air outside the lung but inside the chest and that can push the lung down as well. It's a common injury after motor car accidents and the treatment is to push a big tube into the chest, the air comes out quickly and then the lung can re-expand again; so the person after a motor car accident will be dying on the road, and you can tell because they can't breathe properly because their trachea is pushed across; because too much air outside the lungs pushing the heart and all the contents of the chest across to the other side. And when you listen with a stethoscope this lung is breathing but this lung can't breathe because it's too compressed down and when you tap you get a very drumming tympanic sort of sound, and that tells you that there must be a whole lot of air in there that's stopping you from breathing so you have to quickly put a tube in and let the air come out, so that the lung can re-expand. So that's a little bit about the pleura. So diseases of the pleura can be inflammation or pressure effects from the air ...
5617

M?: I wonder if we should have a break at 12.30?

R: I'm just about done here. There's a couple more slides if I may. So the next thing is the link between blockage of air ways and what symptoms does that cause.

Blockage of blood vessels

Blood clots – (solid) → block flow of blood in arteries or veins

Pulmonary arteries → Pulm embolism – block O₂ uptake in lungs

**Coronary arteries → heart attack - heart muscle cells die
→ pain in chest**

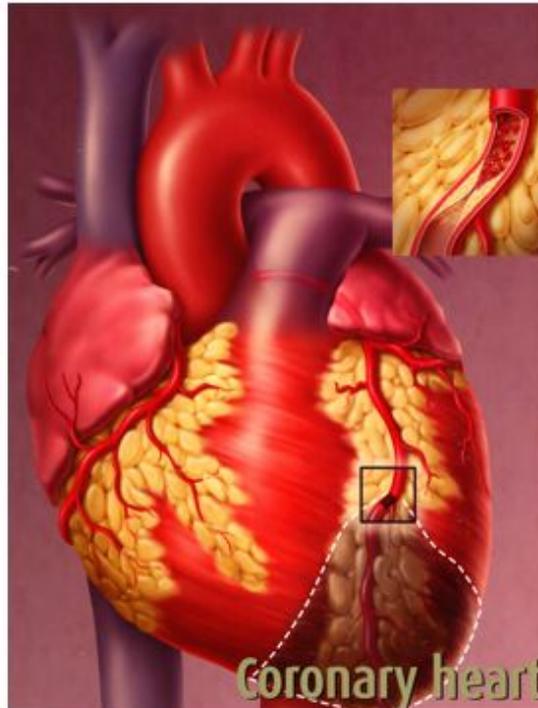
Veins - thrombosis in veins can break off and lodge in lungs

So when the air ways are blocked it decreases the breathing or the ventilation and that decreases the oxygen uptake by the lungs into the blood, so the blood oxygen will be low okay because the air ways are blocked. Now, this makes the person feel short of breath because the low oxygen in the blood tells the brain to try and increase the breathing,

so that comes through in the person's mind as a feeling that they're very breathless and they have to increase their breathing. They won't be able to run or exercise because they can't increase their breathing like a normal person can. They'll be blue, most of their nails and their lips, are blue, and in people with dark pigmentation in their skin, Indigenous people, you could look underneath the tongue and that should be pink but if there's low oxygen in the blood then underneath the tongue will be blue or purple. Often you will see that their chest is very hyper-inflated and that can be because the air ways are narrow and it's trapping the gas inside. So they are symptoms that occur because air ways are blocked.

Healthy Breathing and Heart

Blocked coronary artery causes heart attack



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The next type of disease is blockage of blood vessels or clots, and if you get a clot in an artery it will block the flow of blood to that organ and that organ will, the cells in it will die because they can't get oxygen... Clots, if you get a clot in your leg vein then you get swelling of your leg and that's called thrombosis and you'll be familiar with that, and also the people in the hospital, if one leg is very swollen it's due to a clot blocking the vein. If some of that clot breaks off, it travels up through the vein into the heart, goes out in the pulmonary artery into the lungs, it will get stuck in the lungs and that's what the condition of pulmonary embolism is; and that could be rapidly fatal condition, when a clot from a systemic vein gets through the heart and blocks the lung arteries, so that now no blood is flowing through the lungs, so you can't get oxygen, and that's called pulmonary embolism. We have talked a little bit about the inflammation or blockage in the coronary arteries that will cause a heart attack, which means that some of the muscle cells in the heart die because they've lost their blood supply and their supply of oxygen because the artery that carries them is blocked; and we've talked about the thrombosis.

Muscle – weakness/tiredness - effects on the body

Breathing pump - Respiratory failure

↓ O₂ in blood - cyanosis

↑ CO₂ in blood - sleepy

short, rapid Breathing

↓ exercise tolerance

Wt Loss, debility, deconditioning

Heart pump – Heart Failure

blood flow ↓
↓ O₂ blood,
swelling of ankles
short rapid Breathing
↓ Ex tol
chest pain (angina)
central sleep apnoea

Powerpoint 3 slide 25

This I think is a good way of illustrating, this was a photograph that I got off the front cover of a medical journal but this is the heart that you've seen, and these little arteries here are the coronary arteries that carry oxygenated blood to the heart muscle, and these arteries can get blocked up. Here you can see epi plaque, this is cholesterol on the inside lining of this artery, narrowing it down and blocking the flow of the blood; and you can also get clot forming in here and that will also block the flow of blood. Now, when you get a blockage in the artery here this muscle dies and the pain is due to enzymes released by the muscle, when this muscle is dying it causes a lot of pain and that's what the pain of the heart attack is. So when we talk about a heart attack it's usually due to the death of some muscle cells within the heart because their blood supply is blocked. Now, the rationale for the treatment is you can put a catheter in here and dilate up to undo the blocking, you can do a heart bypass surgery where you take a vein or a blood vessel from somewhere else in the body and put it around there, so the blood can get around this blockage, so that's what a coronary artery bypass surgery is, and it's a fairly common operation... 10140 And the angioplasty is when you put a catheter in through the groin, back up the aorta, these arteries come off the aorta, so a clever radiologist can just flick it so it's in here, and you squirt some dye in, and you see that this is narrow, then you'll put a balloon catheter in here, blow it up, and it squashes the fat back out into the wall and opens up the artery and restores the blood supply to this. And if you can do that quickly enough then you can save this muscle from dying and that's why it's so important for people with a heart attack.

END OF DISC