Biophotonics
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Lecture 39
Real Life Examples of Photodynamic Therapy (PDT)

Welcome, so today I have this topic on Photodynamic Therapy and I thought in this particular module I will give you the information that a patient might receive while undergoing photodynamic therapy. What happens from a patient's perspective when she is getting photodynamic therapy for curing some of our ailment? So, the information that I am sharing with you it is available in public domain and it is coming directly from the NHS - National Health Service of the United Kingdom.

So, it is pretty much authenticated, this is pretty much standard procedure that a patient who is undergoing photodynamic therapy what she or he might be asked to undergo or what sort of instruction she might be receiving or what sort of instruction she might be told what sort of information, she might be told. This will give you an overall general perspective of photodynamic therapy from a patient's point of view and I think that will be a real-life example.

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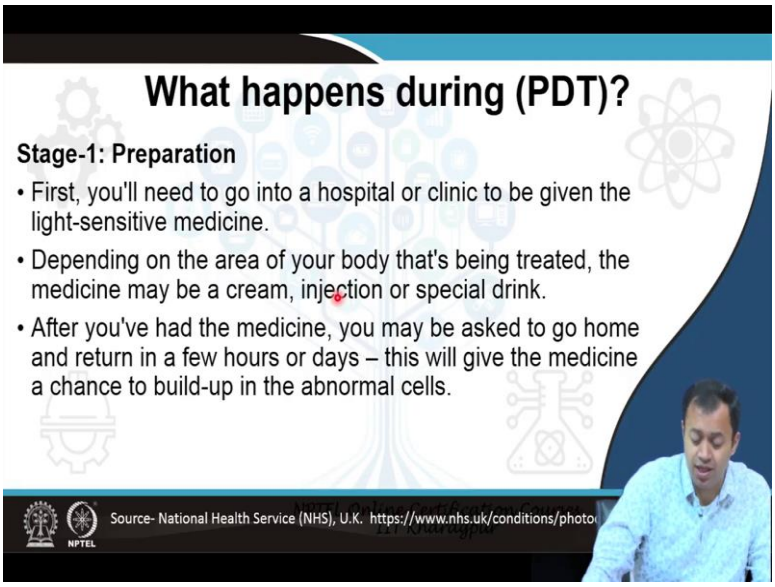

So, there are two steps what happens during PDT, the step one is preparation and the step two is actually the light activated process, the first point which is the preparation, well obviously where you go to the hospital or clinic, while the medicine will be given to you and depending on the area of the body that is being treated the medicine may be a cream.

So, if it is a surface-based phenomenon, you are being given a particular cream that is applied on to a certain area of your body of your skin, it can be injected or it could be a special drink, so something upon your oesophagus or intestinal or somewhere else it could be other areas as well you get that medicine.

So, the idea here is that the medicine will spread initially all over your body, but after due course of time after 48-72 hours the medicine will aggregate or medicine will be targeting a specific, specific location of your body only. Initially the medicine might have spread somewhere else but the idea at least is that after some time the medicine only affect to certain areas.

Now this happens to pharmacy or drugs all the time, when you are having a severe headache and you take some sort of aspirin, the medicine obviously spreads all over your body, but it finally accumulates or try to cure something that is happening in your head, so that is the overall area I know I have simplified I have simplified it much, but overall that is the general idea that once you have the medicine may be asked to go home and return in few hours or days this will give the medicine a chance to build up in abnormal cell.

So, that is the idea after having the medicine you wait and depending on what sort of medicine you have been given what sort of photosensitizer have been given, how selective it is, how fast it is, how quick it is, you may be asked to return in few hours or days, so that duration 48-72 hours that is the time, taken by the medicine to accumulate or built up in specific cells that it has been initially asked or given the duty to target, in the first case the medicine is all over.

Give it some time some area will be rejecting, some area will be accepting, it will finally heterogeneously un-uniformly will get accumulated or built up in abnormal cells, the targeted cells, these are cells that you are going to target and as I said if it is external, some kind of a skin disease, cream, if it is an injection it can be intravenously sent or you can drink it, so that digestively it is being spread.

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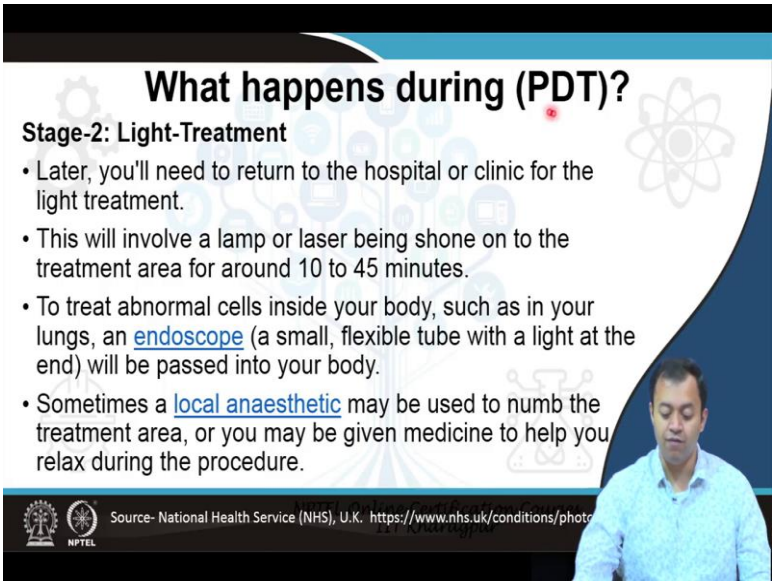

Stage two that is the light treatment. Well, obviously you returned to the hospital or clinic for the light treatment and this will involve either a lamp or laser being shown on to the treatment area for 10 to 45 minutes, 10 to 45 minutes you will be shown the light, you will be shown the light either laser through the tube, through the optical fibre inside your body or you are asked if it is a skin problem which is a dermatological problem, you will be sitting in front of a lamp, what happens if it is a macular degeneration, do you think we inject laser inside your retina or will we be asking you to look into a bright light. Think about it.

Well to treat abnormal cells inside your body such as in your lungs and endoscope will be passed into your body, as I told you in previous lecture why endoscope we can monitor things in real time sometimes, so not always a local anaesthesia might be used to numb the treatment area or you might be given medicine to help you relax during the procedure, the second case is the most important.

You might be given medicine to relax you because obviously it is a psychological trauma laser is entering inside my body and burning, so I might have tingling sensation, etc. So, these are basically from the pamphlet basically these two stage one and stage two is what a patient who is under medical condition who is under medical treatment through the National Health Service of UK will be instructed, this is what you will be instructed to undergo and these are your steps these are something that you need to follow, if you are going through to and if your medical practitioner have mentioned PDT treatment for the particular disease.

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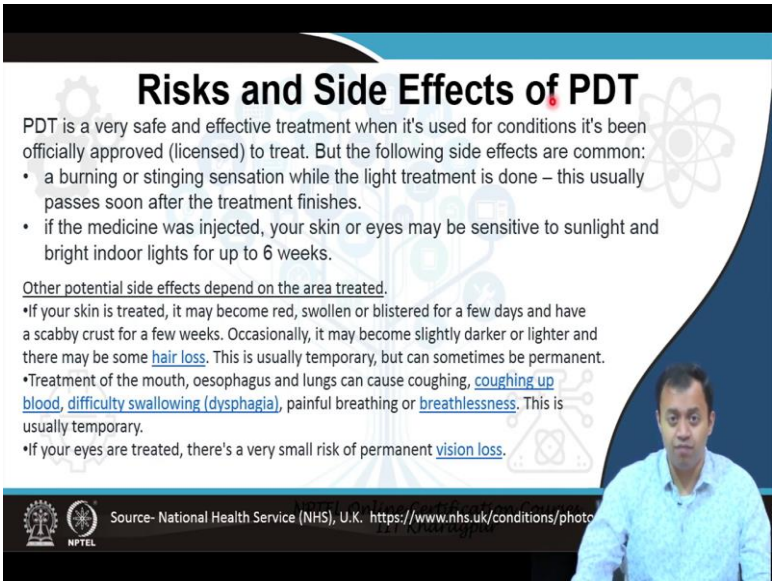

And like everything else you have risks and side effects of PDT, it is very, very safe and effective treatment when it is used for condition it has been, it is officially approved to treat FDA NHS, NIH and several other organizations have approved it, ICMR to the best of my knowledge have also approved, but it is still in certain sections not, but the following side effects are quite common a burning or stinging sensation when the light treatment is done because at the end of the day certain cells of your body are getting burnt.

So, you might have a burning or stinging sensation somewhere, but this heat is very very localized, this heat is very very localized it gets dissipated after few cells are destroyed few sales keep on destroying inside your body anyways, few cells keeps on destroying your body anyways, every three years I heard that entire you know cellular process resets itself or all of your cells have divided and gone to some newer version of themselves.

So, small burning or stinging sensation can happen and if the medicine was injected your skin or eye may be sensitive to sunlight and bright indoor light up to six weeks, so these are the most common side effects, you might have photo sensitive skin or photosensitive eye, so stay indoor do not go out into huge amount of artificial strong artificial light or strong sunlight.

But there are other potential side effects very, very negligible side effects, though they should be mentioned if your skin is treated it might become red swollen or blistered, there are few occasions where hair loss has happened, treatment of mouth oesophagus or lungs can cause coughing difficulty swallowing and if your eyes are treated there is a very small risk of

permanent vision loss, this is the case with any eye surgery LASIK or retinal detachment, cataract eye surgery there are the rarest of the rare chances one in a million case where vision loss may happen.

So, any surgery any surgery whatsoever has some amount of risk any ophthalmology surgery has a risk, even if it is a run of the mill cataract operation that happens as medical camps at rural areas, these are these common that the patient need not be coming into the hospital, they can be treated at their own place, so they are that much risk free.

Yet they sometimes contain the risk of permanent vision loss and once or twice you see in news that cataract operation has gone bad and some people have lost their vision and that is actually frankly speaking quite difficult to do. You have to be really clumsy to cause permanent vision loss, so similar type of risk, similar type of risk with PDT exist. There is a very small risk of permanent vision loss according to National Health Service and well hair loss and this skin becoming red swollen or blistered these are condition that may be present, but similar conditions are available in several other treatment.

So, the most common being a slight burning or stinging sensation as the cell is getting destroyed, the other being minor inconvenience, where you have to stay indoors and cannot go to very bright light four to six weeks. So, that the residue drug that has not yet been excreted and that is staying in some part of your healthy tissue healthy cells is not being damaged by subjecting it to a huge amount of light.

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So, these are some common example before and after treatment, again the pictures are copyrighted the treatment, so I am getting some examples, you can read it this is Greek, therapy this is pi, so these are the skin condition that has been treated mostly by IR - Infrared Light. You can see the acne and you know, so yes, this have been removed off to an extent.

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The finger was the, these are watts I think, finger watts, these are removed, these are patient A, patient B, after few days, check out this department of dermatology of Freiderich Schiller University in Jena. This university does this PDT on different types of skin diseases, different types of skin diseases, so you basically apply the cream, the PDT cream, they take some time to accumulate few hours if it is skin and then you subject it to lamp.

No need to shine laser light onto it, put it under some kind of an arc lamp and after 10-15 minutes you will see, after the treatment these specific parts going away, so these are some very common real-life example. Obviously other images or other examples exist, I ask you to look through them, using an internet search PDT image before and after they are copyrighted material, so I could not show you all of them, I could not show any of them, the cancer based highly copyrighted.

But you can, you can look into internet and see actually before and after a particular tumor cell they have used endoscopy to image it, if you want in the forum I can give you the paper link but I think you will be, you are sufficiently imaginative enough to figure it out yourself, it is simply internet search. But these are some of the real-life examples this is something a

patient will undergo these are the images these are the pamphlets that a patient might see if she's undergoing PDT treatment.

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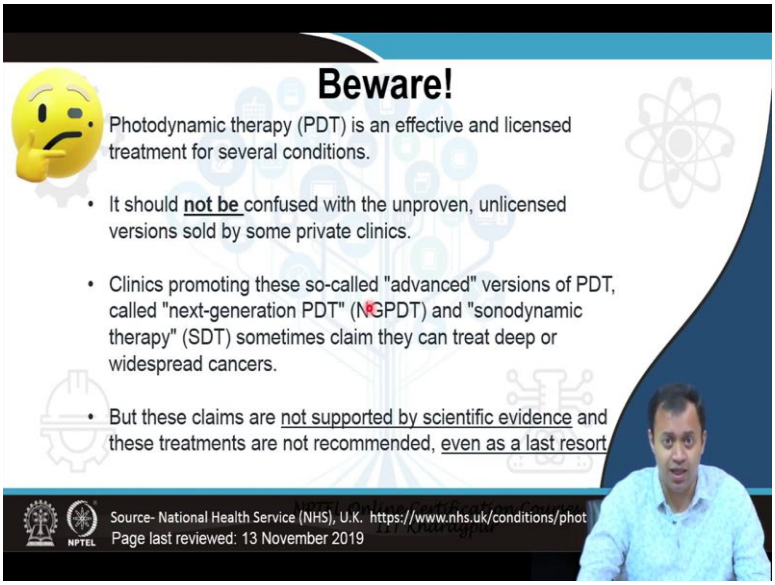

Now comes the most important part that is so important for light therapy, it is an effective and licensed treatment for several conditions. So, it is a licensed treatment and it should never ever, ever be confused with unproven unlicensed version sold by private clinics, especially if they talk about next generation PDT, sono dynamic therapy, et cetera. none of them are supported by scientific evidence and these treatments are not recommended even as a last resort even, even as last resort.

So, I was dreading this part because I received several pseudo-scientific questions or unscientific unverified questions as soon as I started taking this course on biophotonics on bizarre and different topics like light therapy, human beings are ejecting light and you are detecting that light some kind of astral projection out of body near death, some sort of pseudoscience, some sort of mumbo jumbo unscientific bunkum basically.

So, whenever we talk about light therapy, let me be absolutely, absolutely clear this is very, very scientific the light is laser which we prepare in our fabrication facility you can create laser you can make laser, laser based machine these are available there is nothing spiritual or nothing extraordinary about the laser we know, laser is one of the most important discoveries of humankind and we know a substantial amount it scientifically this laser is made to excite a chemical agent, a particular drug, a photosensitive drug photosensitizer and that photosensitizer react with the surrounding species by generating reactive oxygen species.

So, the photosensitizer upon activation of light generates reactive oxygen species that oxidizes the cell or tissue, it has nothing to do with anything. I do not know unscientific or other worldly or spiritual or something of that regard, I am not saying that you do not need to be spiritual or spirituality per say is something that is not welcome or spirituality is bunkum, it is just that this is not it.

This is scientific as it gets. This is scientific as it gets and we know the entire procedure from a very very scientific point of view, this is coming from a very, very scientific point of view. This has nothing to do with you know the light that a human being emanates, we image it and then try to find out whether this is good or bad and then we generate, put the person under sunlight and then that cures several different ailments.

This is not that, this is most definitely not that if it happens, it happens. I do not know I am not an expert, I am not an expert in astral projection, human aura, human those near-death experience, those soul coming out of the body, this is most definitely not that, this is as rigorous scientific as it gets. Laser is as scientific; the PDT the photosensitizer is as scientific it gets. So please, please be aware of those things. Light therapy has been used. In fact, the term bio photon has been misused, used and misused and abused by several non-scientific people.

They are not supported by any scientific evidence and even if it is a last resort, they should not be recommended. That is all I want to say. That is all I want to say. If something of that sort exist, it is used to me and it needs to be fully rigorously scientifically proved, it should be reproduced time and again and it should be mathematically scientifically completely disseminated and proved like we have done our photodynamic therapy.

The entire process of laser induced generation of oxygenated species is well documented, well standardized, well reproduced, we can do it both inside the human body outside it and it is, the science is quite strong here. So, evidence-based science is quite strong here. Not in the case of sonodynamic therapy or bio photon therapy or astral projection or I do not know telepathically, telekinesis or you name it whatsoever I get.

I do get several questions on that matter in the forum several times and if it works, well it works. I am not the person to answer you this question. Photodynamic therapy is something very rigorously scientific, there is nothing unscientific or there is nothing outer worldly towards it. So please, please be aware of that. You would not like to end Any questions on

photodynamic therapy that is beyond the realm of science because photodynamic therapy is very much scientific. So, this much I can tell you.

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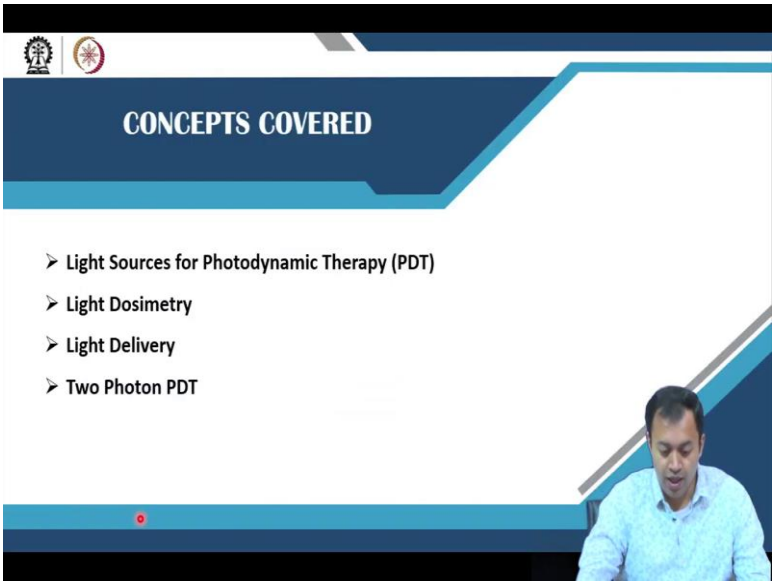

So, again these is the concepts These are some of the concepts that I discussed.

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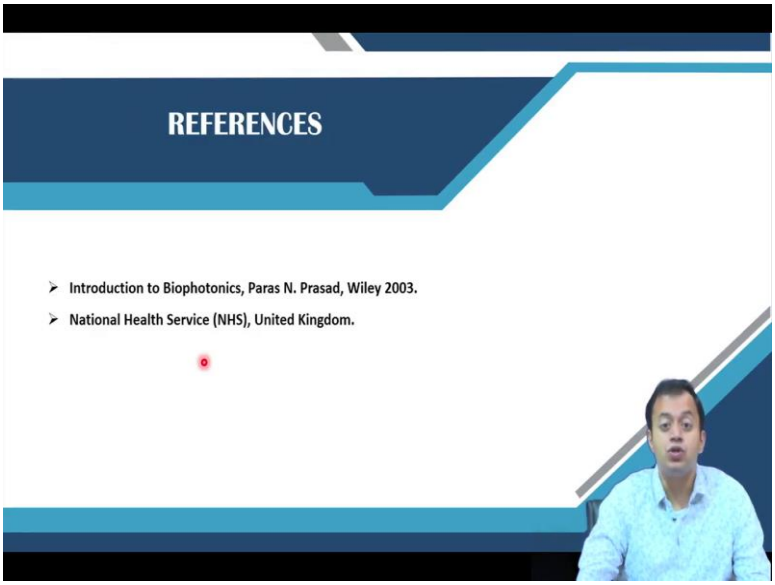

And these are my sources of information. These are my references, I asked you to go through this and let us let us conclude in the next chapter. The entire light activated therapy. Thank you very much.