Host-Pathogen Interaction (Immunology)
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Lecture: 7
An Introduction of Immune System-Link between Innate and Adaptive Immunity

Hi, in the previous lecture you have learned about the unique property and Hallmarks of immune system. Now I will continue with how this; what are the arms of immune system and how it is connected to each other in order to eliminate the pathogen. So, let us begin.

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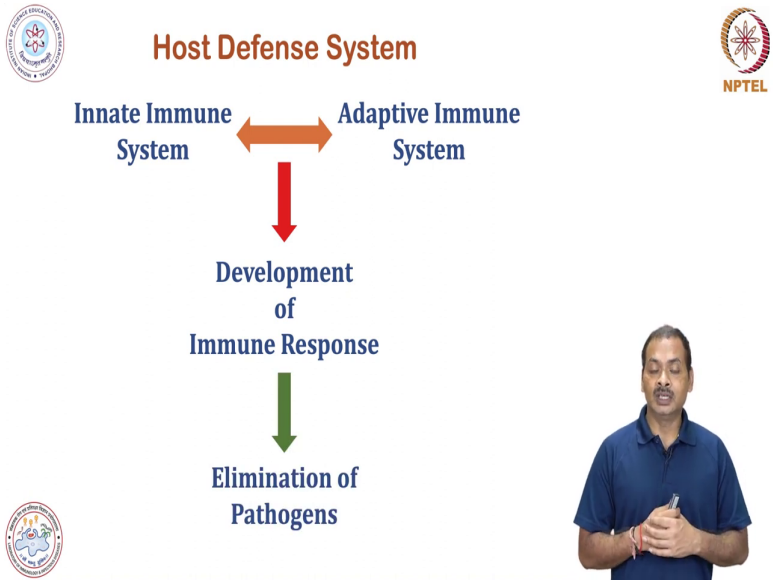

So, this immune system is basically there are two major arms of in immune system that is innate immune system and adaptive immune system. So, innate and adaptive immune system communicate each other and then this will induce the development of appropriate immune response. When I say always I always say use a word appropriate immune response means there should be neither more immune response nor less immune response.

If there will be a more immune response that may result to the disease or in technical term we call it as an immunopathogenesis. So, I just wanted to explain appropriate immune response. So, when these two systems communicate then there will be a development of appropriate immune system and that result to the elimination of pathogen.

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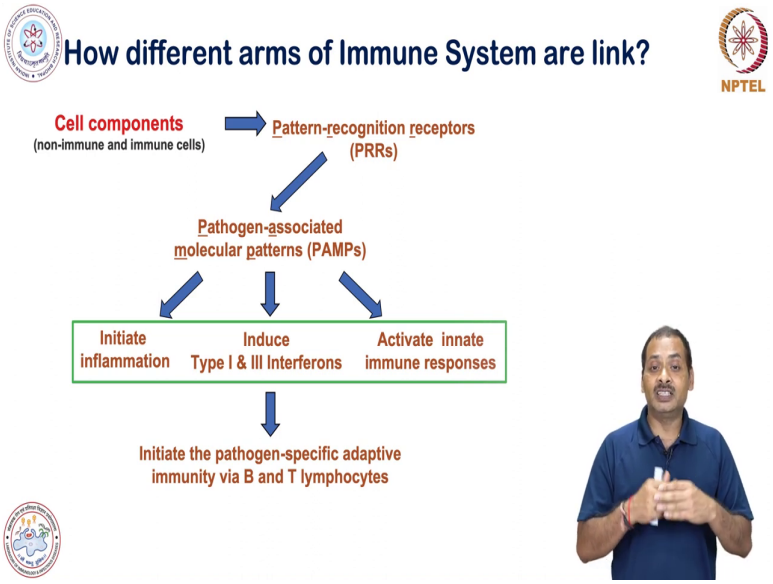

Now let us look at how these two different arms of immune systems are linked and whether it is linked or not or how it is linked. So, in innate immune system there are two major components besides others that one is humoeral component and another is cellular component. And in previous lecture I have told you in humoeral component variety of antimicrobial peptides are there which is playing important role in elimination of the pathogen.

So, in order to eliminate this pathogen these proteins act over the pathogen and eliminate it. Among these proteins one very important family of protein is there which we call it as a complements. So, these complements are set of protein which is synthesized in a leiver and then they do they act on the microbial pathogen and basically they induce three kinds of immune responses. One is very beautifully they will they will be get activated by Cascade of signalling.

And then towards end this will make a kind of hole in the pathogen then there will be a loss of iron and water and finally the pathogen will die. So, we call it as a technically we call it as a membrane attack complex. The result of complement activation is the first is development or formation of membrane attack complex. The second immune response is this when complement get activated there is some component of complement which cause the inflammation.

Inflammation is very much important in order to bring or to recruit the immune cells at the site of infection. So, first is a development of membrane attack complex second is

inflammation and the third and very most important is opsonization. Basically, this complement proteins will get deposited over the activated complement protein will get deposited over the over the surface of microbial pathogen.

And then this will be readily or very easily phagocytosed by some eating cells or phagocytes. So, in that way this humoeral component work here I just explained the outcome of complements but all these things are also mediated by the complement mediated things are also mediated by antibodies. So, here you can see that this complement family of protein or complement mediated immune response is a kind of linker between innate as well as adaptive immunity.

Similarly, there are some cells or cellular component of immune system which is which includes all immune as well as some non-immune cells and these cells basically expresses a family of molecule which we call it as a pattern recognition receptor. So, these patterns recognition receptor I think I have mentioned in my previous lecture this is a family of molecule there are various kind of family are there which I will discuss when we will take up the pattern recognition receptor under innate immunity.

So, these basically pattern recognition receptors senses the unique signature of the pathogen. If you remember in previous lecture, I discussed about the broad specificity. So, this PRR's pattern recognition receptor has a broad specificity and they sense Ppathogen Associated molecular pattern pathogen Associated molecular pattern like LPS, flagellin. The nucleic acid; the nucleic acid or we all have all living entity has a nucleic acid right.

But all these nucleic acids are quite different. So, our pattern recognition receptor can discriminate this different kind of nucleic acid. And this basically these PRR senses the PAM's and then this will induce or induce or activate the production of inflammation. And this inflammation is a basically important for the recruitment of other immune cells. This can also activate innate immune responses.

Innate immune responses means, for example there is a macrophage which is in native state or it is a unresting macrophages and there is a macrophage which is activated. Activated means there is a some factor which is produced by some immune cell and that will activate this; the macrophage and we call it as activated maicrophage. So, you can see a big difference

between this resting as well as activated macrophage. So, activated macrophage can readily ~~site parasitize~~phagocyte this pathogen.

So, here I mean to say that activate innate immune response means the innate immune cells will also get activated and this can also induce variety of cytokine molecules it can if it is the virus then it will induce the type 1 and type 3 interferons. So, basically all these things will eliminate the pathogen. However, if you do not have th~~ei~~es; if the pathogen is not eliminated then all these responses basically make a bed for the activation of adaptive immune response which is basically mediated by B cells and T cells.

So, in that way you can see that how beautifully this innate and adaptive unit is integrating and defending the host against the various kind of microbial infection. So, with this I will stop here and in next lecture I will discuss about the various immune organ thank you.