Host-Pathogen Interaction (Immunology)
Prof. Himanshu Kumar
Laboratory of Immunology and Infectious Disease Biology
Department of Biological Sciences
Indian Institute of Science Education and Research (IISER), Bhopal

Lecture - 60
Innate Immune Evasion by Viruses

So, we have learned about the innate immunity and previous session and now you can understand what kind of innate immune responses are elicited during virus infection. So, now I will talk about the innate immune evasion strategies by the viruses. So, of course the pathogen does not want to be detected by the host that is quite obvious they do not want to die. So, they developed some strategy in order to evade the immunity and infect the host.

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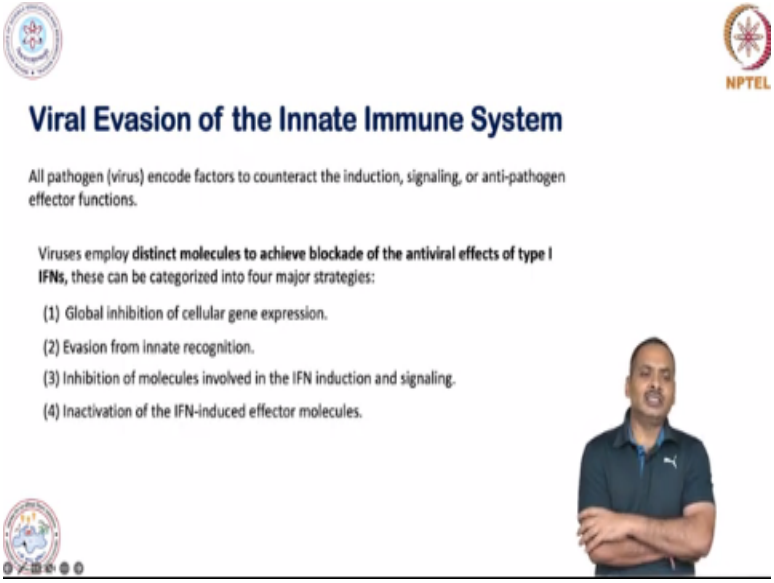

So, there are various viral evasion of the innate immune system various viral evasion strategies or there are some molecules are there which is used for evasion of innate immunity. So, all pathogen including virus it is not only the viruses have an evasion strategy all pathogen. They have a strategy they encode some factor to counteract the induction, signalling and anti-pathogen effector functions.

So, overall, the meaning is that they have they make some proteins, some molecules some method by which they can evade the host defense mechanism irrespective of innate or adaptive.

So, viruses employ the distinct molecule to achieve blockage of antiviral effect of type 1 interferon. So, you know that the type 1 interferon is very pivotal in checking the viral replication so particularly in innate immunity.

So, this is very important to check the viral replication. So, this type 1 interferon is doing that job. So, virus must have developed some way to evade this interferon and these are several ways by which they do this thing they evadeawait the type 1 interferon effects. First is that there is a global inhibition of cellular gene expression. So, there is a global inhibition of cell gene expression.

If you remember the type 1 interferon, they basically suppresses the host cellular machinery. Evasion from innate recognition. So, they can make a strategy by which they cannot be sensed by pattern recognition receptor. Inhibition of a molecule involved in a type 1 interferon induction pathway or signalling pathway. So, here there are two major ways by which type 1 interferon is produced one is PRR mediated production of type 1 interferon.

And another is the small amount of type 1 interferon which is produced this is produced and then this will bind with interferon receptors. And then that will trigger the JAK STAT pathway and that JAK STAT pathway produces a huge amount of type 1 interferon. So, this more amount of type 1 interferon is basically important in checking the viral replication. So, viruses have some strategy or they have some molecule or some protein which they can use it to inhibit this PRR mediated interferon production and as well as they can inhibit the JAK STAT pathway.

There is a strategy that inactivation of the interferon induced effector molecule. So, you know that once the interferon is produced then there will be interferon inducible gene. So, some viruses have a strategy to inactivate these interferon inducible genes or reffeactor molecules.

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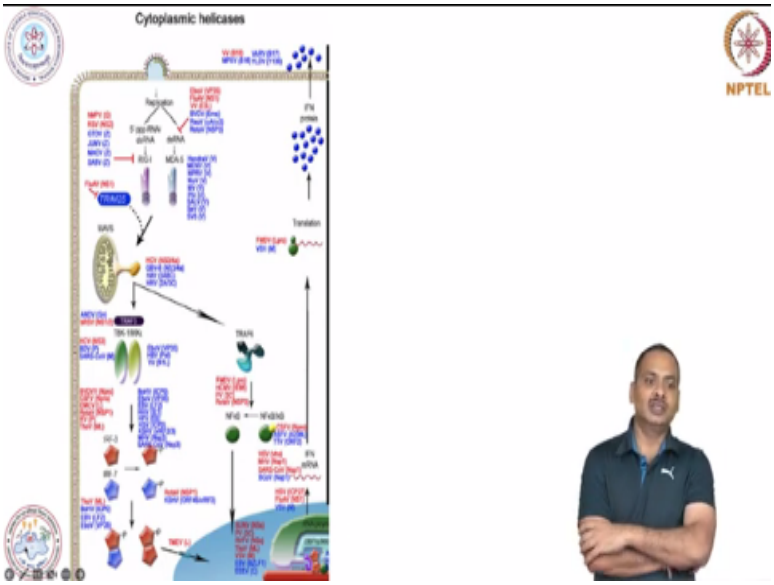

So, this is quite busy slide and here I am just highlighting the cytoplasmic helicases. Here you can see that there is a RIG I and MDA5~~FI~~. You can see that this RIG I and MDA5~~FI~~ mediated sensing can be inhibited by there are so many viruses. Here you can see that RSV, MPV, GTOV, JUNE, MAC. There are so many viruses and they basically inhibit the sensing. This is true for RIG I and this is true for MDA5~~FI~~.

There are molecules from viruses which basically inhibit the maps or IPS 1. There are molecules which basically inhibit the TBK1 or IKK epsilon. So, like that there are so many proteins or so many molecules from different viruses which basically inhibit the PRR mediated type 1 interferon production.

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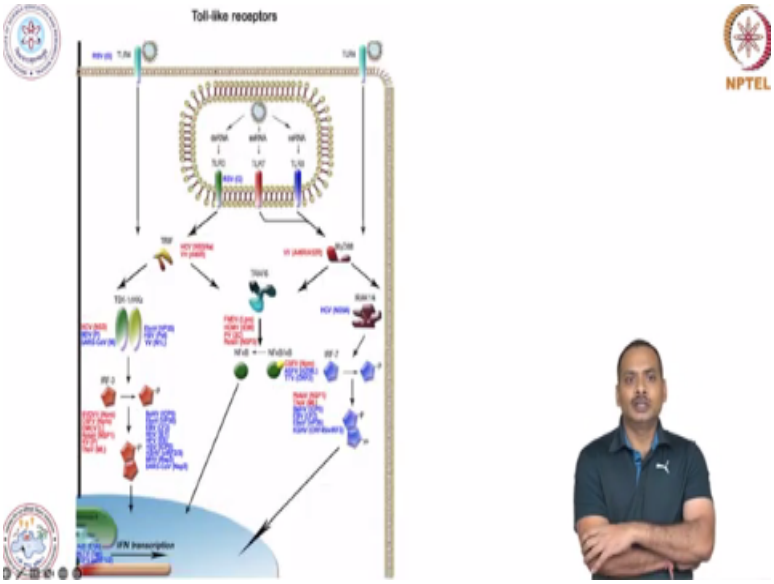

Here you can see that there are several viral factor or protein which basically inhibit the TLR mediated immune innate immune responses or antiviral responses. Here you can see that HCV virus they have some non-structural protein which basically inhibit this TLR three mediated signalling pathway like that there are so many molecules. And all these molecules the basic aim is to inhibit the production of type 1 interferon.

So, they are acting at different stages it is not that there is only one target. So, different viruses have a different target. Some targets the receptor, some target adapter, some target some signalling transducer and some are targeting the transcription factor also. Here you can see that IRF3 is targeted by so many protein from different viruses. So, overall aim of the viruses to inhibit this production of type 1 interferon as well as inflammatory cytokine.

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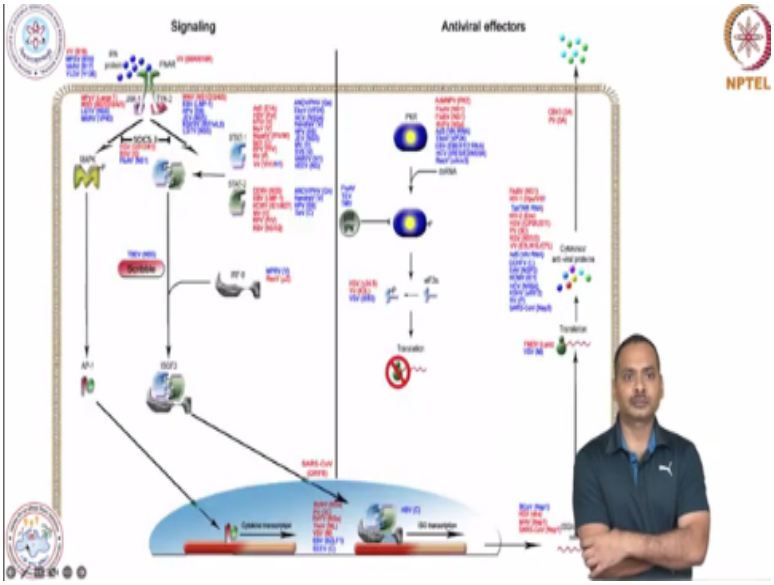

Here you can see that and there is a JAK STAT pathway. Here you can see that there is a interferon receptor and this interferon receptor is basically producing after binding with a type 1 interferon, it is producing more amount of type 1 interferon. So, here you can see that the receptor itself is targeted by some viral factor like there is a protein that is here you can see that it is derived from VSV sorry Vaccinia virus not VSV and that is targeting the receptor then that is downstream.

There are some protein which is targeting some of the adapter molecule or downstream transducer. So, there are so many proteins which is basically targeting one or another protein or receptor, adapter, transducer or transcription factor. And overall aim is to shut down the production of innate anti-viral state. When I say innate antiviral state, it means that these viruses basically shutting down the pro-inflammatory cytokine production and they are shutting down the type 1 interferon.

So, here I just gave you the glimpse of how the virus or viral factor can evade the antiviral innate immune system. And just for your note you need not to remember all this protein. Here just I wanted to show the importance of a viral factor which is basically used to evade the host innate immune responses. So, with this I will just complete this session and in next session we will discuss about the adaptive how the adaptive immunity check the viral infection.

Over there mainly I will talk about the antibodies and cytotoxic T cells and TH cells. With this I will stop and we will discuss in next session, thank you.