Host-Pathogen Interaction (Immunology)
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Lecture: 4
History of Immunology - 4 (Nobel Prizes in Immunology)

Hi, so in previous sessions I have discussed about the history. Although the history of Immunology is extremely long and I cannot cover everything in that history but I gave you some highlights of some disease outbreaks and then development of vaccine and I also talked about some of remarkable work which basically made a foundation of Immunology such as the there is a theory of involvement of some cells which plays a very important role in immunity.

And thereafter I have also discussed there are some scientists or some Immunologist basically they believe that there are some kind of soluble factors are there which is playing very important role in defence. And now we know that both cell and these soluble components plays a very important role in defence against any microbial pathogen or in maintenance of homeostasis and their dysregulation result to the development of disease.

And disease could be infectious or non-infectious that is a autoimmune disease or that may result to the development of some kind some or other kind of cancer. In today's session I will take you to the some very remarkable work in Immunology which received a lot of recognition and they received the Nobel Prize. And thereafter I will talk about the various branches of Immunology because as you know that Immunology is a one of established field.

And after the development of various field the Immunology field is also developed a quite a lot and this field basically made some sub sections because that needs these sub section needs to some special investigations. So, we will talk about various branches of Immunology.
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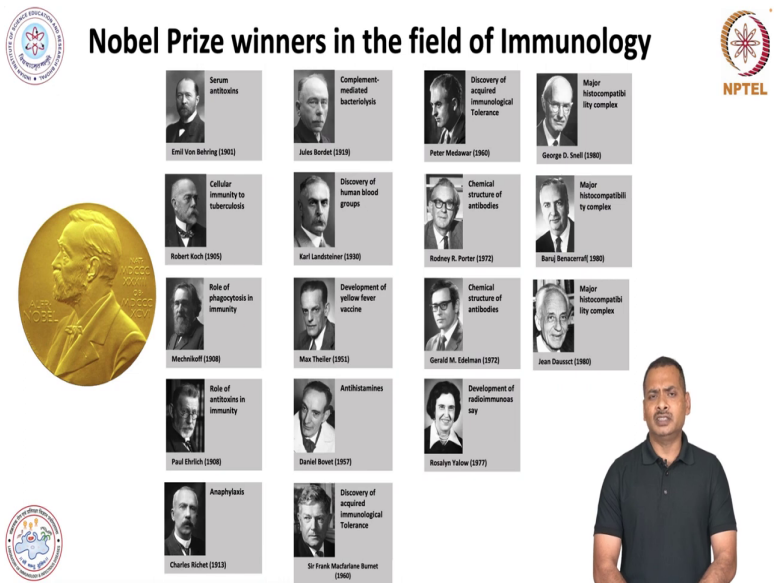

Now let us start with the Nobel Prize winner in the field of Immunology. So, here you can see there are there are so, many scientists and some of some of these scientists work I have already discussed in my previous session. So, for example Emil Von Behring, he basically discovered a antitoxin serum antitoxin and this serum antitoxin is basically now we also call it as a passive immunotherapy. So, this is basically his work result to the development of passive immunity or the way of treating some or other problem by infusing the serum which is pre-challenged with that particular antigen or pathogen.

We call it as overall we call it as a passive immunity. Robert Koch work I have already discussed Robert Koch made a lot of contribution like Koch postulate discovery of Mycobacterium tuberculosis and so on so forth. So, he got a the Nobel Prize for cellular immunity to the tuberculosis, Mycobacterium tuberculosis. Emil Metchnikoff infection cough he also received the Nobel Prize for role of Phagocytosis in immunity.

I have explained his "starfish larvae experiment" he put the throne and that thrawn was digested. So, Emil Metchnikoff received the Nobel Prize. Paul Ehrlich he also received a Nobel Prize he was a main founder of humoralist theory or his humoralist school of thought which gives that the immunity is basically mediated by some soluble component. So, his work also received this Nobel Prize.

Another is Charles Richest he received the Nobel Prize for discovery of anaphylaxis and anaphylaxis is nothing it is just opposite of pr0phylaxis it is a disregulated hyper immune response and that hyper immune response result to the variety of immunopathology. So, I will

discuss some or other part in coming sessions when I will take this cellular component of immunity~~humility~~ and in that cellular component I will discuss about the mas~~s~~t cell.

So, at that time you will understand some part of anaphylaxis or in more technical way we also call it as a hypersensitivity. Discovery of complement is also received this Nobel Prize and the recipient is Jules Bordet. He basically gave that there are some group of proteins which plays a very important role in innate immunity. Innate immunity basically is a natural immunity and that does not affected by pre-exposure of the pathogen.

So, basically the complement is a quite a huge topic and we will discuss in a great length about the complements and we will also discuss what happens if there is some deficiency in complements. Karl Landsteiner you are probably already aware that he discovered the human blood groups and Max Theil~~l~~er his work result to the development of this yellow fever vaccine which once upon a time it caused a huge death.

So Daniel Bov~~e~~it he basically discovered the antihistamine. Antihistamine you will learn when you will learn about the Mast Cell, histamine. hypersensitivity and all this thing. So, antihistamine is a very important because most of allergy related things are basically taking place due to lot of production of histamine and that need to be checked. So, there are some medicines also which blocks the production of histamine we will discuss when we will take up the mast cells.

Another work is received the Nobel Prize this was a S~~s~~ir Frank Macfarlane~~ron~~ Burnett and Peter Mede~~awar~~~~vor~~ were he basically these two workers basically got the Nobel Prize for giving the concept and giving the experiments which demonstrate the immunological tolerance. So, immunological tolerance is also very important so, we in our body we have some immune privilege area.

For example, eyes are very good immune privilege organ where there is a some level of tolerance. Another is our gut system and another the immune privilege area is the urogenital tract. So, all this all these places there is a some level of immune tolerance and that is very important because if there is no immune tolerance if these places are also start reacting with all o~~u~~r another antigen then that will cause a kind of a disease condition.

So, this price this work also received the Nobel Prize. Thereafter in 1972 the 2 scientists Rodney Porter and Garland M Edelman they received the Nobel Prize for his this remarkable work which basically gives an idea about the chemical structure of antibody. So, antibody is a very complex molecule and people triedy to elucidate the structure of antibody by various chemical methods and that work also received the Nobel Prize.

So, I will discuss in great length when I will take the antibodies. So, antibody is also used for various technique. You will you will learn about ElISAiza which is one of very promising technique which we use not only in research but we also use in various diagnostic things and one more technique is there which we call it as a radio immunoassay. So, for development of radio immonoassay in 1977 Rosalind Yalow she got she received the Nobel Prize for this work.

MHC probably you might heard that there is a some molecule which is present on some specialized cells which we call it as a antigen presenting cells and these antigen presenting cells Express this is specialized molecule which we call it as a major histocompatibility complex and this plays a very important role in development of T cell mediated immunity. So, for that work three scientists got the Nobel Prize in 1980 and they are George Snell and Baruj Benacerraff it is a complicated name and Jean Dausset they received this Nobel Prize for work in major histocompatibility.

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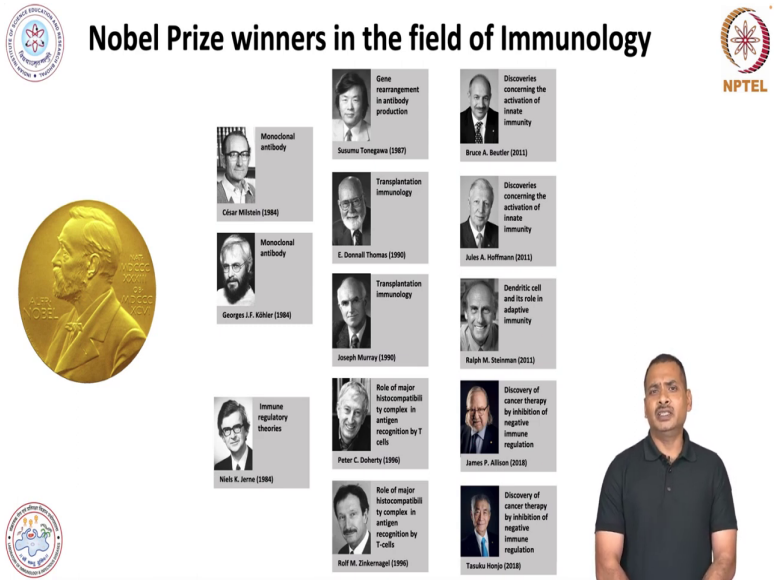

There are some Mmore Nobel Prize I will also tell these things Caesar Milsteione and Georges Kohnler they received the Nobel Prize for discovery of one of very important

molecule which we call it as a monoclonal antibody. So, this monoclonal antibody we use extensively in our research, in our diagnostic thing as well as now the monoclonal antibodies are also used in therapeutic. There are a lot of now in coming time you will see that there are a lot of monoclonal antibody which is used for the treatment of variety of autoimmune disease, cancer so on and so forth.

So, monoclonal antibody discovery also received this Nobel Prize in 1984. Immune regulatory theories were given by Niels Jerne and he also received the Nobel Prize in 1984. Another the great work of antibody diversity. So, it is it is a quite puzzling or very much interesting that we have a numerous kind of antibody in our body right. So, if you consider there are so, many genes for antibodies then you your nucleus cannot accommodate that much DNA.

But how this antibody diversity is generated the molecular basis of antibody diversity all these things were given by several workers and finally this work was well explained by one Japanese immunologist his name is Susumo Tonegawa. So, he gave the molecular basis of gene rearrangement and antibody production. So, basically what is happening in the cells there is a different permutation and combination of rearrangement of gene and that result to the synthesis of antibody, a functional antibody with high affinity.

So, all these theories were all these experiments were conducted by Susmo Tonegawa and his group and he received this Nobel Prize which is a really a very important discovery in the antibody diversity. So, I will discuss his work when I will take the antibodies. For transplantation Immunology two scientists received the Nobel Prize E Donnell Thomas and Joseph Murray. So, transplantation is not a very simple thing you cannot just take out the organ from one individual and place it in another individual.

This has a lot of complexity and lot of challenges and this for all this for giving explanation about the transplantation Immunology these two work he have got the Nobel Prize in 1990 and now there is established field which we call it as a transplantation Immunology. So, that deals about with all this thing tissue matching and all those things. So, I will talk after a while today in this session.

And there is a another worker Peter C Dorhaerty and Rolf Zinkgern Aangele he received the Nobel Prize in explaining the role of MHC in T-cell recognition. How this T Cell recognizes this MHC and antigen complex. So, these workers got the Nobel Prize in that. Finally, there are three people who got the Nobel Prize in the field of innate immunobiology and these are the Bruce A Butler, Julie Hoffman and Ralph Steinman.

So, Bruce Butler and Julie Hoffman they got the Nobel Prize for the discovery of patternt recognition receptor. There these pattern recognition receptors basically they discovered the toll like receptor which was originally discovered in a drosophila by Julie Hoffman. So, Julie Hoffman discovered in drosophila and further it is characterized by Bruce Butler and some more worker are there who characterize this work and basically this concept was given by Charlie Janway and unfortunately Charlie Janway is not not there. So, he passed away.

So but there are some more workers who are involved in this innate immunobiology the discovery of pattern recognition receptor and those are Shizuao Akira, he is from Osaka University and another the key worker who were mainly involved is Ruslan MajitovMedzhitov but unfortunately they did not get only Bruce Butler and Julie Hoffman got the Nobel Prize. Julie Hoffman originally discovered in RosafellaDrosophila and the further characterized by Bruce Butler and Ruslan Matitov Medzhitov and Shizuao Akira so, but only Bruce Butler got.

So, I do not know what is the complication. Ralph SteinmanWell first time and discovered a one very very important cell known as dendritic cells. So, he got the Nobel Prize and this cell the dendritic cells plays a very crucial role in innate immunity development of innate immunity and it is playing a very crucial role in development of adaptive imHumaunity. So, his work basically received this Nobel Prize.

And here there is a one story that it is an unfortunate story that before announcement of the Nobel Prize for year 2011 Ralph's time Steinman and passed away just three days before. So, this is a new thing that generally the Nobel Prize is given when the people are alive but in his situationsituation, it was considered because he just passed away three days before the announcement. So, this is this thing.

In 2018. again James P Allison and Tasuusku Honjo he received the Nobel Prize for basically Discovery or they worked in in cancer immunotherapy. So, with this I will I will stop here and in next session I will discuss about this branches of Immunology, thank you thank you very much.