Micro sheet no. 27

Today we are going to continue talking about the Trypanosoma which cause the Sleeping sickness which present at South Africa at West by T.Gambiense and at East by T.Rhodesiense which is the more sever one .

The doctor said that we also have a Trypanosoma that lives in the New World which is called “TrypanosomaCruzi” , they are different from the other ones and they only exist at South America but they are Trypanosome and the primary host still Human but the intermediate host is not a fly it’s a Bug called “Triatomine Bug” here also we have Trymastigote in the primary host and Epimastigote in the intermediate host but there is another thing called Amastigote that present at the primary host cells. The main problem here is that they affect the muscles of the body. The person that found this disease is called chagas so the American Trypanosomiasis is called chagas disease because of the scientist. Here the most affected site is the heart muscles causing defects in the conductivity of the heart and may cause heart failure and also they may involve the Myenteric Plexus Cuasing paralysis in the smooth muscles there but mostly involve the esophagus smooth muscles (the lower end especially) so the patient will have stasis in the esophagus resulting in Extension of the esophagus with refluxes there and that’s called “Mega Esophagus”, also it will cause problems in swallowing food. Also the large intestine is involved causing dilatation of the large intestine called “ Mega Colon “, this is mainly manifested as chronic constipation.

Note “the Rudimentary Bug causing TrypanosomaCruzi when it bite it also defecate and the feces contain the parasite or the disease and when we get in contact with site by secratching we get the disease.”

Now we will move to last type of protozoa which is the one causing Malaria which belong to plasmodium genus and the doctor said that they are a Coccidia which is a member of the Apicomplexa, there is 4 main types of plasmodium: P. falciparum, P. vivax, P. ovale, and P. malariae and there is another type that’s rarely seen and mainly affects monkeys known as “ P. Knowlesi “ << ( you can ignore the last one ) they are widely distributed except the last one like we said, they cause a lot of death every year for children. We used to have it in our environment in the past but it disappeared and we don’t have it now. The scientist said that it’s associated with swamps and the air around the swamps causes the disease. It’s transmitted by mosquitos called “Anapheles“ mainly the female because they feed on blood for energy. Now there are different morphology for malaria : the first one is Malaria Sporozoites which exist at the salivary gland of the mosquitos so the Sporozoites will get into the blood by saliva and this Sporozoites at it’s anterior end has a protein called CircumSporozoite Protein or CSP and there is receptors for it on the liver cells and once it attaches to the receptor it penetrate to inside the liver cells and after several weeks it starts dividing into organisms called “Schizont”, this organism is probably a parasite that get larger and produces many baby nuclei (16-20 approximately) then depending on the number of the nuclei it gives a rise to 16-20 different organism, this whole process of schizont dividing is called “schizogony” which is a form of binary fission. Now the resultant organism of the schizogony is called Merozoite and then this Merozoite will get out of the liver to the blood. This multiplication of malaria parasite in the liver is known as “Exoerythrocytic cycle of Reproduction”. After leaving the liver and going to the blood this Merzoite has specific receptor for the red blood cells that helps attaching it to them and that’s why they only affect red blood cells for example the P.Vivax has a specific receptor for the duffy antigen of the red blood cells so if u don’t have this type of RBC you are immune to it, and the sialo protein and other protein on the surface of the RBC can be the site of attachment for the Merozoite. Now in the RBC they change the morphology and become Trophozoites and this Trophozoite will become Schizont and will get into a schizogony again and give arise for number of Merozoites again and then the RBC burst and infect other RBC after bursting the symptoms occurs, now this cycle takes about 2-3 day depending on the species of the Plasmodium (vivux, falciparum, ovale and malariae).The first 3 usually the cycle takes 2 day and the symptoms occurs at the 3rd day and that’s why we call them Tertian Malaria, while P.Malariae this cycle takes 3 days and at the 4th day the symptoms occurs and that’s why we call it Quartan Malaria. The doctor showed some picture discriping the cycle and said that the first stage of Trophozoite is called Signet Ring, the Signet is the DNA and the Ring is the Cytoplasm which makes the Trophozoite. This cycle in the Red Blood Cells is called “Erythrocytic cycle of Reproduction”. The cycle in the liver which is the Exoerythrocytic cycle only happen in the beginning of the disease and after that the liver will not be involved again anymore only the blood with Erythrocytic cycle will be involved, all of this take time (Weeks, Months or years) it may cause to death or lead to a chronic malaria. Some of the Trophozoites in the RBC doesn’t change to schizont they change into gametocytes they maybe large or small gametocyte (Micro or Macro gametocyte) the Macro > Female, Micro > Male and they will remain in the RBC and it will not burst, when another mosquito bite they will suck the blood which contain Gametocytes and at the GIT of the mosquito the RBC will burst and this Micro and Macro Gametocyte will fuse together giving arise to a zygote, this type of fusion is the sexual type of reproduction of the parasite inside the Mosquito, this zygote will divide further giving new Sporozoites which will go to the salivary gland of the new mosquito and here ends the cycle of Sporozoites.

Now we will talk about the Disease, the Hallmark “Rigor”: fever with shivering and feeling so cooled for few hours and at the end of shivering the temp. of the patient will be 40 degrees and sometimes 41 and they may also have headache, nausea, vomitingand abdominal pain and at the end the patient will have whats called the Effervescence (intense sweating) < this is reaction of the rupture of the RBC, this is the main symptoms. When having P.falciparum the temperature keeps going up and down and it’s really the most serious one and that depends on the no. of RBC that are affected, (normally 2% of the RBC are affected when having vivax and the other while having falciparum it’s about 40% of the RBC are affected so we have a huge number of infected RBC so we have a lot of stages in many RBCs so in this case which doctor called malignant malaria falciparum the role of having the symptoms in the 3rd day is not applied here) < the doctor clarify that when he said malignant he said it because tertian malaria has 2 types which is the Malignant one (Falciparum) which will cause death and Benign which caused by (Ovale and Vivax) which also can cause death but it has really low mortality rate, also Falciparum is also called Malignant because it cause stickiness of the RBC by exposing some molecules to the surface of the RBC, so here we may get complication because of this stickiness like blockage which may happen in the kidney causing acute kidney failure which can cause deathor it may affect the capillaries in the brain causing encephalitis or malaria encephalopathy thus affecting CNS, this only happens with Falciparum type. Another thing that the patient can get if he has excessive hemolysis of the RBC is Hemolytic Anemia (associated with Falciparum since we lose a lot of RBC with this type) also he can get Hemoglobin Urea (hemoglobin in the urea and the hemoglobin get oxidized in the air appearing in a black color so we can call Malaria caused by Falciparum “Black Water Fever”) so due to this symptoms of Falciparum (Stickiness and dehydration) we call it malignant. There is no vaccine against malaria but some genetic diseases is associated with Immunity against Malaria like Thalassemia and Sickle cell anemia because they exist at the same place Malaria attaches so they don’t like the Hemoglobin with has Thalassemia and Sickle cell anemia and maybe because when we have sickle cell RBC they will be removed fast and because of hydrogenase deficiency which will give oxygen free radical which will kill the parasite this is the theories they have for this immunity or more accurately the weakening of the disease. We said there is no vaccine for it but prophylaxis is very important by using certain things like using insect reference and mosquito nets and its advised to use prophylactic drugs if you are going to places where u can be infected with malaria like quinolone derivatives and you take it 1 week before and every day during and after getting back from this places for 4 weeks.

Diagnosed by taking a blood smear from the patient and examine for the presence of the parasite but when having Falciparum we don’t see that half of the RBC are infected because they stick to the vessels so when count it, it shows that almost 3-4 % is affected only but so diagnose it accurately we check the morphology of the Trophozoites. The doctor said usually they do 2 blood smears one thick and one thin, the thick is for knowing the infection only while the thin is for knowing the morphology of the parasite inside.

The End

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