J Clin Cell Immunol 2015, 6:5
http://dx.doi.org/10.4172/2155-9899.C1.025

OMICS International
conferenceseries.com

4th International Conference and Exhibition on
Immunology
September 28-30, 2015 Crowne Plaza Houston River Oaks, Houston, TX, USA

Blood stream bacteria elimination in human body

Hayk Minasyan
Private Laboratory, Armenia

Background: The mechanism of bloodstream bacteria clearing is unknown. Bloodstream high velocity prevents bacteria recognition and phagocytosis by leukocytes, besides, erythrocytes are 99.9% of blood cells and leukocyte chance to get in contact with bacteria is extremely low. Many bacterial species that enter bloodstream and are resistant to blood humoral bactericidal factors nevertheless are rapidly cleared from bloodstream. Till now there is no reasonable explanation how blood bacteria clearing really happens.

Methods: Phase-contrast immersion vital microscopy with high speed video camera registration and standard microbiologic laboratory research methods in patients with bacteremia and sepsis.

Results: It was revealed that bacteria cannot grow and proliferate in bloodstream because they become turbo-electrically charged and this electric charge stops trans-membrane inflow of nutrients and outflow of metabolites. Interaction of both bacteria and erythrocyte electric charge provides bacteria attraction and fixation on erythrocyte surface that stimulate erythrocyte membrane receptors and causes oxygen release and bacteria killing by oxidation. Killed bacteria lose zeta potential and cannot be kept on the surface of erythrocyte and are released back to plasma and then are digested in the liver and spleen by local macrophages. Bacteria that are resistant to release oxygen concentration on the surface of erythrocyte may penetrate erythrocyte membrane producing variety of enzymes (hemolysins, hyaluronidases, kinases, exfoliatins, lipases, etc.) and enter erythrocyte. Inside erythrocyte, bacteria are killed by reactive oxygen species (ROS) and are released back to plasma. Very few bacteria resist ROS and survive inside erythrocyte by means of catalase production and metabolism slowing down. Erythrocyte with bacteria inside may continue to function for a while but usually it is decomposed during passing the spleen and released bacteria are digested by local macrophages.

Conclusion: From bacteria elimination point of view, human body consists of two separate but interacting compartments: (a) Compartment of blood circulation (pulmonary circulation and systemic circulation); (b) compartment out of blood circulation (the tissues that get oxygen from blood circulation, lymphatic vessels, lymph nodes, etc.). The liver and spleen are some special kind of interface between these compartments. In bloodstream bacteria clearing is performed by erythrocyte: bacteria attraction and fixation is an electric charge interaction phenomenon whereas bacteria killing are provided by bacteria oxidation on the surface or inside erythrocyte. Erythrocytes in arterial blood have maximal bactericidal activity whereas in venous blood erythrocytes attract and fix or engulf bacteria but cannot kill them because of lack of oxygen (oxy-hemoglobin). Venous blood erythrocytes kill fixed or engulfed bacteria during blood oxygenation in the lungs. Compartment out of circulation is the realm of leukocytes and bacteria killing occur by means of phagocytosis and production of different humoral factors.

haykminasyan@rambler.ru