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2nd World Congress on CARDIOLOGY
&
39th Annual Congress on
MICROBIOLOGY AND MICROBIAL INFECTION

July 23-24, 2018 | Rome, Italy

Merab Beraia et al., Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C1-002

ELECTROMAGNETIC PROPERTIES OF THE ARTERIAL BLOOD FLOW

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Introduction: Blood flow acceleration increases from the left ventricular outflow tract, to the sinotubular junction and the ascending aorta, while it must be decreasing due to the flow turbulences in the Valsalva sinuses and increased diameter of the vessel. Total energy of the pulse wave in the arterioles is up to 7.2 times higher, than in the ascending aorta, while it must be low due to the energy dissipation in the viscous flow, with the distance from the heart. Work made by the left ventricle, at least 2.0-2.5 times lower to the work needed for the blood displacement, in the systemic capillaries.

Purpose: The purpose of the study is identifying the additional possible energy source, for the arterial blood flow.

Methods & Materials: 12 healthy volunteer students (male) underwent echocardiography, ECG gated MRI of the heart for the visualization intracavitary flow in the ventricles, MR angiography of the aorta. Blood flow velocities and acceleration were studied in the different sites of the heart and the aorta.

Results: With the DU in the left ventricular outflow tract blood acceleration is 1430±120 cm/sec^2, in the sinotubular junction and ascending aorta 2395±195 cm/sec^2, at the aortic arch 1390±225 cm/sec^2, isthmus of aorta 2180±135 cm/sec^2, middle thoracic aorta 1260±140m/sec^2. With the MRI (TrueFisp. mean curve), blood acceleration from the left ventricular outflow tract to the sinotubular junction is 3.5±0.3 times higher and to the ascending aorta 2.5±0.2 times higher. Systolic blood pressure from the ascending aorta to the femoral and saphenous elastic arteries enhancing 1.3±0.1 times, increasing energy transmitted to the blood. Direction of the electric charge in the heart's ventricles from the circulating erythrocytes and in the fibres of the Purkinje (ECG), mathematically are coincident.

Conclusion: Availability of the heart, as the possible single tool for the blood flow, looks imperfect. Electric oscillate field from the heart dipoles can be impact to the blood charged particles. Erythrocyte forms the modulated naturally ultrasound vibration and associated with it colloid vibration current propagating distally to the all cell membranes. Blood motion in the heart chambers and arteries has the additional basis, besides the heart contraction: rotating blood particles in the heart chambers and in the arterial branching sites or the high resistive areas, with the concomitant oscillating electric field triggered from the heart, creates to the additional electromagnetic repulsing force, providing to the flow. Modulating ac electric field, transmitting by the oscillate blood particles, besides the flow, creates additional energy/signal source, enabling the spontaneous chemical reactions proceed across the cell membranes. Electromagnetism can be affect gas exchange in the systemic and pulmonary capillaries due to the different affinity of the oxygen and carbon dioxide in the diamagnetic/paramagnetic haemoglobin.

BIOGRAPHY

Merab Beraia has been graduated from Tbilisi State Medical University in 1986, as a Medical Doctor, with the specialty of Internal Medicine and took a Diploma in Neurology from the Institute of Clinical and Experimental Neurology Tblisi, Georgia. Later he obtained his post-graduation diploma in Radiology from University of Graz, Austria and then started working at The Institute of Clinical Medicine Tbilisi, Georgia, where he has continued his research. Presently he is working at the Tbilisi.

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