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ESTIMATE OF THE EFFECT PRODUCED BY THE AUTOMATIC VIBRATORY MASSAGE ON THE FUNCTION OF CARDIOVASCULAR SYSTEM

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The results of our previous studies demonstrated the substantial increase of the arterial blood pressure in patient who underwent the session of a low frequency vibrational massage. We were wondering how it may affect the observed positive therapeutic results from the massage.

It is well known that the blood pressure is affected by several factors including peripheral resistance and elasticity of vessels, blood volume in circulatory system, and cardiac output of a heart.

Firstly, blood volume affects blood pressure. When there is a greater volume of fluid, more fluid presses against the walls of the arteries resulting in a greater pressure. When there is less volume, there is less pressure.

Secondly, anything that decreases cardiac output, also decreases blood pressure, because there is less pressure on the vessel walls. An increase in cardiac output results in increased blood pressure. Anything that affects heart rate or stroke volume affects cardiac output and thus blood pressure.

Mathematically, it can be demonstrated in the following way. We used the Hagen–Poiseuille equation to model the blood flow in arterial portion of circulatory system:

$$p = \frac{8\eta \cdot L \cdot Q}{\pi R^4} \quad (1)$$

where p – is a blood pressure, Q – is a cardiac output (CO), η – is a viscosity of blood, L – is a blood vessels' length, and R – is an effective radius of blood vessels. Cardiac output is a product of a stroke volume (SV) and the heart rate (HR):

$$CO = SV \times HR \quad (2)$$

In our experiments we observed the increase in blood pressure and the following increase in stroke volume as it follows the equation (1). The change in heart rate was marginal and we neglected its change.

The resulting increase in volumetric rate Q of the circulating blood provides necessary nutrients and oxygen for tissues and cells. In our opinion, this short-term intense functioning of a cardio-vascular system explains the invigorating and therapeutic actions of low frequency automatic vibratory massage of a whole body.

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THE HAZARDS OF 5G TECHNOLOGIES TO HEALTH

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Mobile communication is becoming the basis of economy and social life, and requires new standards that can provide virtual reality, the Internet of Things, intellectual medicine (e.g. the possibility of patients' physiological indicators monitoring, the health status of cancer patients monitoring, etc.).

It is a well-established practice in the world every 10 years to provide a new generation of cellular communications. The first generation was emerged in the early 1980s, and in 2009 world gained access to 4G Internet. The generation of 5G can become a reality in 2020 in Ukraine too. The necessary Presidential Decree on the Fifth Generation Mobile Communications Conditions in Ukraine has been signed and the Ministry of Infrastructure started testing 5G in April, 2019.