Applications of Electromagnetic Forces in Medicine

Murgoci, Cristiana (School: International Computer High School of Bucharest)

The present research focuses on three applications of electromagnetic forces in medicine: improving blood circulation, developing faster ways to transport medicaments, and reducing blood viscosity. Most importantly, the research is centered on non-invasive procedures to solve medical challenges. The first research topic, improving blood circulation, was approached by creating a structure that would treat atherosclerosis, using external flexible electrodes and a controllable magnetic field generated by a solenoid. Recalibrating the experiments, a pressure was generated so that it was high enough to eliminate cholesterol and to improve the parameters of circulation (flux and velocity), and low enough not to destroy the blood vessels. In the second application, developing faster ways to transport medicaments, a new method was involved to reduce the delivery time of cancer drugs from hours to minutes, at least for small distances on human body, thanks to the conducting properties of medicines that contain nanometric carbon particles and ferromagnetic substances. Experiments were carried out on microchannels that designed and fabricated in the National Institute of R&D in Electrical Engineering. For the last application, the findings of Dr. Rongjia Tao, stating that an applied magnetic field in the direction of blood motion would significantly decrease its viscosity, are being probed. Theoretical models have been integrated until now, but strong magnets, qualitative microscopes and sensors will be employed soon to analyze the drop in blood viscosity, thus replacing the commonly used aspirin.

Awards Won: