



Tesla's inventions of importance for medicine: reality or new visions of science (In honor of the 160th anniversary of the birth of Nikola Tesla)

Teslini izumi od značaja za medicinu: stvarnost ili novo gledanje na nauku (U čast 160-godišnjice rođenja Nikole Tesle)

Elizabeta Ristanović

Institute for Microbiology, Military Medical Academy, Belgrade, Serbia; Faculty of Medicine of the Military Medical Academy, University of Defence, Belgrade, Serbia

“From time to time in the rare intervals, the great spirit of discovery finds itself on earth to communicate the mystery that will advance mankind. It selects the most able, the most deserving and whispers its secret into his ear. As a flash of light emerges valuable knowledge. While catching the hidden meaning the lucky one observes a magical change ... Miracles that he sees, although distant in time, will come to materialise. He knows it, there is no shred of doubt in his mind, in every fibre of his body he feels – it is a Great idea.”

Nikola Tesla

This is not just another description about Nikola Tesla, the genius scientist of Serbian origin, who, as it was written in the history books, invented electricity, but this paper is also aimed at highlighting the lesser known parts of his creative activities whose results have been applied in medicine.

Nikola Tesla was born before 160 years, on July 10, 1856, in Smiljan near Gospić, Croatia and died on January 7, 1943, in New York, USA. He invented and patented the principle of the rotating magnetic field, a comprehensive system of production, transmission and utilization of multiphase alternating current (AC), the telephone amplifier, the induction motor, the generator of high frequency current (Tesla's electric current), Tesla's coil, wireless communications, radio, fluorescent light (aka. Tesla's electric arc) and about a thousand other inventions without which today's world would not be the same ¹.

Visionary Tesla envisioned the TV, remote control cruise missiles, suspended trains with magnetic levitation, space weapons with high-energy rays, and even the Internet about which he dreamed as a “global single system network communications.”

In the service of health: Tesla and medicine

Everything that he bestowed upon the world in the use of electricity is almost commonplace. However, Tesla's contribution to medicine is little known about.

The historians of Medical Sciences consider Tesla's most important contribution to this field the application of high-frequency and high voltage electrical currents. In an attempt to remove the sound vibrations that hindered the use of alternating current for the arc lamp, he constructed a high-frequency alternator, which, in turn, led him to the study of the properties of ultrasound. In the winter of 1891 Tesla revealed that rapid oscillation currents can cross the human body without causing any muscle spasms or tissue damage. Tesla claimed to have come to this conclusion by experimenting on his own body ².

The scientific world was soon informed of the fascinating properties of Tesla's currents. In New York, London and Paris Tesla performed a famous experiment with a lighted pipe in his hand, having been exposed himself to currents of 50,000 volts. The experiment was echoed as a sensation and hinted at the possibility of therapeutic application of high frequency current and voltage. High-frequency currents are obtained using the so-called Tesla's coils, and his experimental evidence that they may pass through the human body without any danger opened a wide range of their applications in electrotherapy, magnetotherapy and thermotherapy as well as the possibilities for exploitation until now unexplored and insufficiently explained Tesla's radiant energy of high voltage electrostatic fields.

Tesla was primarily interested in these currents (20–40 kHz) so as to solve the problem of lighting and remote transmission of electricity, but he noted that, using the aforementioned, without any danger can be warmed up tissues inside the human body³.

At the lecture on the occasion of the annual meeting of the American Association for electrotherapy, in September 1898, Tesla synthesized all his papers relating to electrotherapy. He described the three groups of the physiological effects of high frequency currents. By conducting the experiment on his own body he determined that these currents could cause, in addition to the thermal effect, extreme tiredness, drowsiness and changes in breathing and blood circulation. In addition, he believed in the bactericidal power of his currents which all can be explained today by neutralizing free radicals.

Tesla, for example, had never been sick and he experienced a ripe old age, just because he was occasionally exposed to continual frequencies of low intensity that killed viruses and bacteria around him and in his body. It is thought that by using the devices that generate pulses of square shapes in certain frequencies Nikola Tesla managed to heal the famous chanteuse Edith Piaf by his currents. Doctor Rife from the United States, the first man on the planet who saw an alive virus under a microscope and then hit it by current of a certain frequency and a certain strength, wrote it all down on paper. A certain frequency that is resonant for the particular virus successfully killed it effectively and easily. The University of Southern California appointed a Special Medical Research Committee in 1934 to oversee the treatment being carried out by Dr. Rife. Earlier it took him many years and many hours of continuous work until he defined exactly the oscillations that were specific to each disease. A pioneer of this study was Nikola Tesla and his radio frequency (RF) electric apparatus Tesla's star^{4,5}.

The second area of Tesla's research of interest for medicine were X-rays. He did experiments with tubes full of rarefied gas and electrode made of rubies, whereby he got an electron beam – X-rays known today. Contemporaries claimed that he was simply fascinated by these mysterious rays, but he had to abandon his experiments because of fire in his laboratory.

One of the first images using X-rays made in the United States, as stated in the "Phlogiston", a Journal of the History of Science, is the work of another physicist of Serbian origin, Mihajlo Pupin, a professor at Columbia University. According to this scientist's ingenious idea the "assault on the X-ray experiment resembles the onslaught of the West during the gold rush". A great deal of excitement was then present in the laboratories of Edison, Pupin, Herring, Frost, Thomson and Tesla. Only Tesla, however, used the great advantage of being able to adapt its high-frequency devices into powerful sources of X-rays. However, in an article published in 1896 on X-ray, he shows great respect for his wonderful discovery and describes the improved methods for obtaining X-rays⁶.

Tesla later repeatedly touched upon the problems of general biology. The movement is for him the basics of life. The behaviour of beings, he argued, is fully determined by external factors. As a real engineer, Tesla analyzes the automatism of living beings. Without scientific education in

physiology and biology he loses himself, especially at the end of his life, in metaphysical speculations that amazed the then public by their mixture of grandeur and naivety⁷.

Nikola Tesla was fascinated by the properties of the human eye. Due to incorrect interpretation of a scientific text he believed in the existence of some kind of "fluorescence" within eye during brain activity. Tesla devoted much effort to his desire to photograph human thought, because he was convinced that intellectual activity faithfully reflects itself on the retina. He knew that the eye projected observed objects, but he was of the opinion that within the eye the thought is being transferred into an image. "The function of the eye", Tesla wrote in 1919, "is to project the image on the retina, and to communicate information to the optic nerve fibers. I believe that every thought, by means of a return action, causes a similar disorder, and that by the interpretation of this effect on the retina, the image can be projected onto the screen. This image is linked to the mind in exactly the same way as the original impression. We have available certain facts, but it is extremely difficult to perfect an instrument to achieve this task. As things stand, although I spent many years studying this problem, my main support in the work is still hope." This Tesla's letter was published in the book *My findings*. Later research based on the idea that Tesla was the first to publish, can be used to control the movement of people and to control their mind⁸.

When it comes to electromagnetic effects on the human brain it is also known that the American physicist Bernard Iszlund, using the ideas of Nikola Tesla, designed the system High-Frequency Active Auroral Research Project (HAARP) in Alaska, which under the name of the Institute for Research of Ionosphere works on extra low frequencies that are identical to the frequencies of brain waves, from 9.5 to 50 Hertz.

About the famous experiment by Nikola Tesla, where he participated and which also witnessed the United States (US) military, was used the resonant alignment with the impulses of the brain and the so-called. neurolinguistic programming, which is, in fact, a prepared "conversation" with the subconscious of gathered persons. Such examples demonstrate the power of thought and the existence of the connection between the subconscious and consciousness in human reasoning⁹.

Instead of the conclusion: new visions and new truths

Nikola Tesla certainly is one of the world's most brilliant inventors. Tesla was not only the inventor of new type apparatuses, the inventor, but the creator of new truths and new principles. Tesla said that the most important product of the creating mind is an invention, and its ultimate goal was to master nature by one's mind and exploitation of its forces for the needs of humanity. "It was recognised that I was one of the largest workers insofar as the thought is equivalent to work, because I devoted to it almost all my waking hours", said Tesla. If someone removed his work, the whole world would remain in the dark, and the largest number of machines, mobile and fixed, would stop functioning. Hence the name of this ingenious planetary scientist shines today in its brightest splendour.

R E F E R E N C E S

1. *Popović V.* Tesla's Wonderful World of Electricity. Belgrade: Nikola Tesla Fund; 1984. (Serbian, Croatian)
2. *Marinčić A.* The Life and Work of Nikola Tesla. Belgrade: SANU, Nikole Tesle Museum; 1995. (Serbian)
3. *Commerford MT.* The inventions, researches and writings of Nikola Tesla. New York: The Electrical Engineer; 1894.
4. *Đimić K.* Nikola Tesla – Serbian genius, Belgrade: Prometej; 1992. (Serbian)
5. *Cverava G K.* Nikola Tesla. Leningrad: Nauka; 1974. (Russian)
6. *Babić RR.* Tesla about X rays. *Vojnosanit Pregl* 2006; 63(11): 979–82. (Serbian)
7. *Cheney M.* Tesla - Man out of Time. New York: Laurel; 1983.
8. *Tesla N.* My inventions. The autobiography of Nikola Tesla. Minneapolis, Minnesota: Filiquarian Publishing, LLC; 2006.
9. *Tesla N.* How cosmic forces influence our destiny. Belgrade: *Dijalektika*; 1983. 17: 1–4. (Serbian, Croatian)