

Pioneers – The History of Musculoskeletal Radiology.

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Nikola Tesla: “The world is not prepared for my project”

“My project was retarded by laws of nature. The world was not prepared for it. It was too far ahead of time. But the same laws will prevail in the end and make it a triumphal success” – said Nikola Tesla, an electrical engineer and inventor, who was tired of perpetual conflicts in the scientific circles.

Tesla was born on 10 July 1856 in Smiljan (the then Austrian Empire). His mother was Georgina Mandić, and his father, Milutin Tesla, was an Eastern Orthodox priest, all being ethnic Serbs. The father envisaged the same path for his son and wanted him to become a priest as well. However, thanks to the support of his school teacher, the boy, instead of a seminar, enrolled at the Polytechnic in Graz. After graduation, he worked in Budapest and then went to Paris where he found employment at the Continental Edison Company, which worked on and installed Thomas Edison's patents. No one knows how the further Tesla's career would follow if he had not had financial problems. Although each company acknowledged his work, he did not feel financially rewarded. The disappointed engineer decided to emigrate beyond the Ocean to Edison himself. To his great surprise, Edison welcomed him warmly and, as it might have seemed, the master and the student found a common ground. But life again would play a prank on him. Tesla received a task from Edison; as he managed to complete it, he was commissioned another task which he fulfilled but received no remuneration. We can only speculate how deeply disappointed he must have felt. Since that day, the motif of financial crisis would be inextricably entwined in his life and, finally, this great inventor would die in New York in 1943 as a poor man.

America gave him no fortune, but presented him with a destination to follow. He was thought to be eccentric or even insane, but he claimed that "The scientists of today think deeply instead of clearly. One must be sane to think clearly, but one can think deeply and be quite insane." In his case, one should also add "look deeply."

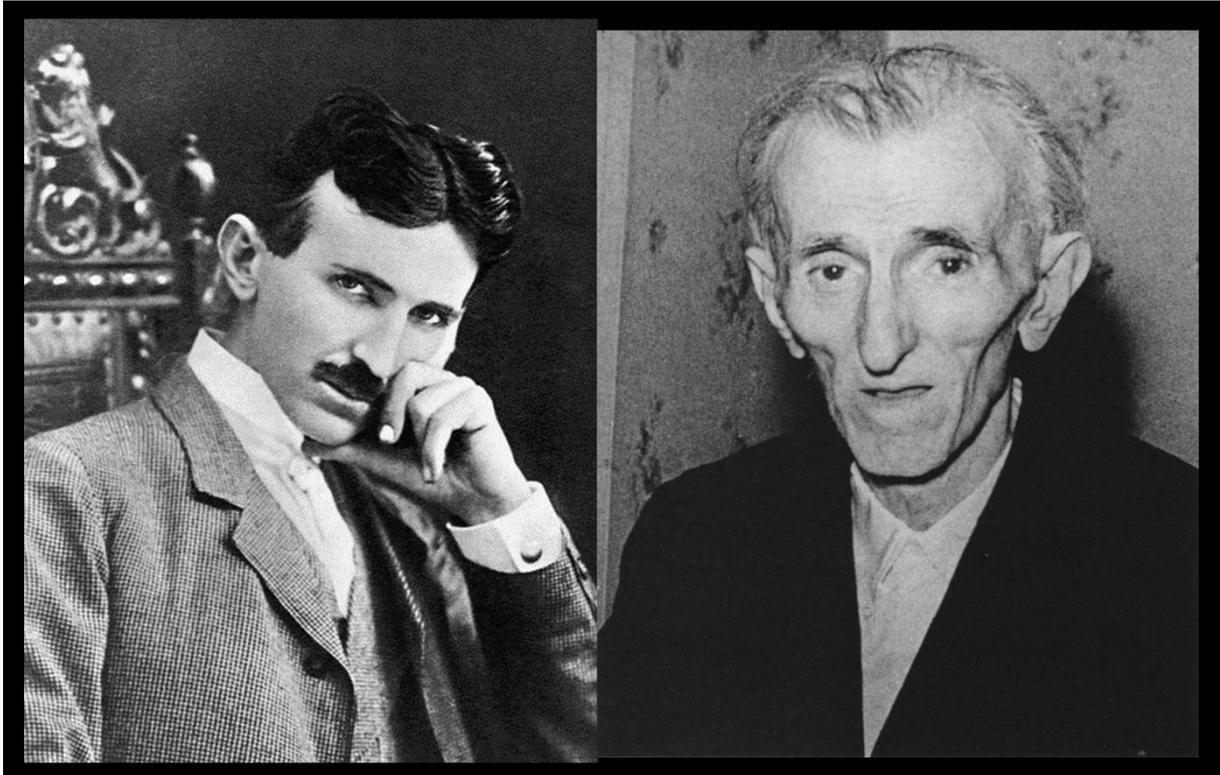
As long as every radiologist is aware of Nikola Tesla's research in the field of electromagnetism [the International SI unit of magnetic flux density, the Teslacon magnetic resonance imager (Technicare, Solon, Ohio) and Teslascan manganese contrast agent (GE Healthcare, Waukesha, Wis) were all named after him], the knowledge about his inventions in the field of radiography is much more limited.

This is undoubtedly a consequence of a fire which, on 13 March 1895, consumed his entire laboratory with all the apparatus and constructions that might have become great inventions. Suffice it to say that Tesla began to observe the then undescribed X radiation as early as in 1894 following the discovery of mysterious damage to photographic plates. For this purpose, he used the Crookes tube, which was well-known in his time, and his own vacuum tube. The first American X-ray image is said to be the effect of his further experiments. When Wilhelm Roentgen published his scientific discovery on 8 November 1895, Nikola Tesla was quick to congratulate him and sent his own X-ray images (see one of the enclosed letters). The "father" of X radiation also, in return, sent words of admiration for Tesla's work and was astounded to discover the vastness, advancement and range of the experiments undertaken by Tesla.

Moreover, Tesla described some clinical benefits of X-rays—for example, determination of foreign body position and detection of lung diseases—noting that denser bodies were more opaque to the rays.

What is more, he was one of the first men to ever become aware of the biologic hazards of working with unipolar X-ray tubes, attributing the harmful effects on the skin to the ozone and the nitrous acid generated by the rays, rather than to the ionising effects of the radiation. He described acute skin changes, like redness, pain and swelling, as well as late consequences, such as hair loss and new nail growth. Tesla understood the three main elements of radiation

protection: distance, time and shielding and also tried to construct a protective shield made of aluminium wires connected to the ground. Tesla can be therefore considered the father of contemporary prevention.



Nikola Tesla at the threshold of fame in 1896 <https://bit.ly/1QuxtZO> and at the end of his life in 1943 <https://bit.ly/2XiDCHR>

An image of a leg, probably Tesla's leg, in a laced shoe in 1896. Some sources state that the leg belongs to Mark Twain, the author of "The Adventures of Tom Sawyer" <https://bit.ly/2RhYrh8>



A letter of Wilhelm Roentgen to Tesla: "Dear Sir! You have surprised me tremendously with the beautiful photographs of wonderful discharges and I tell you thank you very much for that. If only I knew how you make such things! With the expression of special respect I remain yours devoted – W. C. Roentgen."
<https://bit.ly/2XfdYnu>