

*Istorija medicine/
Medical history*

TESLA AND X-RAY DISCOVERY*

TESLA I OTKRIĆE X-ZRAKA*

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*Odlomak iz neobjavljenog rukopisa monografije
„Nikola Tesla-genije koji je obasjao svet“, autora Želka Sarića.)
Rukopis monografije uskoro izlazi iz štampe.

Ključne reči/Key words:

Tesla, pronalasci, X-zraci
Tesla, discoveries, X – rays

*This is the extract from the unpublished monograph
'Nikola Tesla – a Genius Who Lightened the World' by Zeljko Saric)
The manuscript is going to be published soon.

Požar u laboratoriji u Južnoj petoj aveniji, koji se izbio 13.marta 1895.godine, omeo je Teslu da dođe do još jednog velikog otkrića. U decembru 1895. godine prof. Vilhelm Konrad Rentgen najavio je otkriće X-zraka, a 8. januara 1896.godine objavio je članak o ovom svom otkriću. Ovi tajanstveni zraci imali su svojstvo prodiranja kroz materiju, tako da su našli odmah primenu u medicini. Nažalost, Tesla je neposredno pre požara u svojoj laboratoriji radeći sa svojim gasnim cevima i strujama visoke frekvencije ustanovio da pojedine fotografske ploče bivaju osvetljene dejstvom nepoznatog zračenja. Do ovog čudnog otkrića Tesla je došao usput, baveći se visokoučestanim strujama, pa je ispitivanje uzroka ove pojave odložio za kasnije. Pošto je Rentgen objavio svoje rezultate, Tesla je, nažalost kasno shvatio da je bio na pragu velikog otkrića. Ne osporavajući pravo prvenstva prof. Rentgenu dovršio je svoje eksperimente, a rezultate svojih istraživanja objavljivao je u časopisu "Elektrikal Rivju" od 11. marta 1896. do 11. avgusta 1897. Tesla je prof. Rentgenu poslao snimke koje je načinio u svojoj laboratoriji, a Rentgen, odajući mu zahvalnost u pismu, upitao je Teslu: "Da li biste samo hteli da budete ljubazni i da mi otkrijete način na koji ste ih dobili?" Pošto je Tesla pozitivno odgovorio Rentgenu, profesor je u saopštenju koje je izložio 9. marta 1896. godine na predavanju u Fizičko-medicinskom društvu preporučio Teslin aparat koji je sadržao kondenzator i transformator kao korisne da se postave između katodne cevi i induktora, a američki stručnjak Bek, Tesli odaje priznanje, napisavši: "Iz dela Nikole Tesle sledilo je veliko delo Rentgenovo." Naime, Tesla je u jesen 1894. godine uz pomoć Menhetenskih fotografa Tolenea i Kompanije tokom eksperimenata sa zračećom snagom fosforescentnih tela primetio da je veliki broj fotografskih ploča pokazao čudne mrlje i defekte. Edvard Hjujd, Teslin prijatelj i pronalazač svedoči da je Nikola Tesla slikao Marka Tvena ispod Gajlslerove cevi, ali na kraju to nije bila Tvenova slika već izvanredni snimak zavrtnja za podešavanje objektiva kamere." "Ni Tesla, ni Hjujd," pisao je Noel F. Buš u časopisu "Lajf" od 15. jula 1946. godine, "nisu shvatili sve do nekoliko nedelja kasnije, kada je Rentgen objavio svoje otkriće X-zraka da je Tvenova slika zapravo

The fire that occurred on March 13th 1895 in the Southern Fifth Avenue made it impossible for Tesla to create one more important discovery. In December 1895 Professor Wilhelm Konrad Roentgen heralded the x-ray discovery; on January 8th 1896 he published an article about this discovery. These mysterious rays were able to break through substance and that was the reason they could immediately be applied in medicine. Unfortunately, just before the fire in his laboratory, while he was working with his gas pipes and high-frequency currents Tesla realized that the certain photographic boards were lit by unknown radiation. He made this weird discovery accidentally so he delayed the examination of the cause of these phenomena. Unfortunately, only after Roentgen had published his results Tesla realized that he had been just about to make a big discovery. Tesla finished his experiment accepting that Roentgen had already done it before him. The results of his research were published in 'Electrical Review' from March 11th 1896 to August 11th 1897. Tesla sent the records he had made in his laboratory to Professor Roentgen who showed his gratitude and asked Tesla 'Would you be so kind to tell me the way you created this?' After receiving positive answer during a lecture at the Physical and Medical Association on March 9th 1896, Roentgen recommended Tesla's machine, which consisted of a condenser and converter, the parts suitable to be placed between cathode pipe and inductor. The American scientist Beck also showed appreciation using following words 'The achievement of Nikola Tesla led to the great achievement of Roentgen'. Namely, in autumn 1894 with the help of some photographers from Manhattan, Toler and the others, Tesla realized that the majority of photographic boards showed some weird spots and defects in the experiment with phosphorus-bodies radiation force. Tesla's friend and researcher Edward Huid claimed that Tesla had took a photograph of Mark Twain under the Gysler pipe. Later, it turned out not to be the photograph of Twain but an extraordinary record of a fastening screw used for setting the objective of a camera. 'Just after a few weeks, when Roentgen announced his X-ray discovery, Tesla and Huid realized that Twain's picture was an example of X-ray photograph, the first example that was made in the USA', said Noel F. Bush

primer fotografije rentgenskim zracima, prvi koji je napravljen u SAD-u. Takođe se i prof. Pupin bavio X-zračenjem, pa je 6. aprila 1896. godine izvestio Njujoršku akademiju nauka: "Svaka supstanca koja je izložena delovanju X-zraka postaje i sama njihov izvor", i tako je tvrdio da je pronašao "sekundarnu radijaciju", ali Tesla je pre toga javno napisao u "Elektrikal Rivju-u" 18. marta 1896. godine: "Postigao sam senke putem čisto reflektovanih zraka", i opisao je kako je isključio direktno zračenje kako bi postigao ovaj efekat. Takođe je ispitujući različite vrste metala otkrio da su najelektropozitivniji činili najbolje reflektore za rentgenske zrake. Tesla je izgleda koristio daleko napredniju opremu od one za koju verujemo da je u to vreme postojala, jer je tvrdio da pravi 40-to minutne fotografije kroz ljudsku lobanju sa 12 metara razdaljine, dok su ostali jedva uspevali da pomoću rentgenovih cevi dobijaju slabe senke ruku i nogu. Edison je pokušao da komercijalizuje rentgenske zrake i pošto je bio poznat po svojoj praktičnosti napravio je veliki broj fluoroskopa u obliku kutija s rupama za gledanje i izložio ih na Električnoj izložbi 1896. godine u Grand Central Palasu u Njujorku. Ovo je bila prva mogućnost da Amerikanci vide oblik sa sopstvenih skeleta, pa su morali dugo čekati na red, misleći da će pomoću ovog uređaja moći da vide kako im rade mozgovi. Bili su razočarani kad im ovo nije pošlo za rukom. Dame su se brinule da će beskrupulozni proizvođači prodavati dvoglede na X-zrake kojima će udvarači moći da ih skidaju dok budu šetale po nedeljnom korzou duž Pete avenije. Sve do '40-ih godina XX veka obavezno su se u prodavnicama obuće nalazili rentgenski aparati za stopala, jer su znatiželjne mušterije radije ulazile u takve prodavnice kupujući obuću. Čak se u to vreme tvrdilo da se slepilo može izlečiti rentgenskim zracima, pa su doktori prepisivali mnoge tretmane. Tesla je sam istakao da ne postoji ni jedan dokaz za lečenje slepila ovom vrstom terapije nego naprotiv, radijacija može da proizvede bleskove u oku, pa ako je suviše izlaganje i kataraktu. Tesla je pažljivo ispitivao dejsvo X-zraka i bio je ubeđen da je otkrio način da stimuliše svoj mozak, pa je često izlagao glavu zračenju. Tada je zapisao: "Obris lobanje lako se dobija eksponiranjem između 20 i 40 minuta. Jednom prilikom četrdesetominutno izlaganje dalo je jasno ne samo obris, već i očnu duplju, donju vilicu i spoj s gornjom, kičmeni stub i spoj s lobanjom, meso, pa čak i kosu." Dalje zapisuje: "Primetio sam tendenciju ka spavanju i da vreme protiče veoma brzo. Postoji opšti utisak zagrevanja i osetio sam toplotu u gornjem delu glave." Nezavisno od toga je i pomoćnik potvrdio sklonost ka spavanju i brzo proticanje vremena. U proleće 1897. godine Tesla se misteriozno razboleo nekoliko nedelja, tada je zapisao: "U težim slučajevima koža postaje tamnija i crni na pojedinim mestima, i pojavljuju se ružni, bolni plikovi; otpadaju debeli slojevi, stvaraju se otvorene rane. Snažan bol, groznica i slični simptomi prirodni su pratioci ovih pojava. Imao sam nesreću da prisustvujem jednoj jedinoj povredi ove vrste, koju je u predelu stomaka dobio dragi vredni pomoćnik – jedinoj nesreći koja se osim meni ikome desila za sve vreme mog laboratorijskog eksperimentisanja." I pored oštećenja kože Tesla je primetio da je rentgensko zračenje prouzrokovalo i osećaj toplote u telu, pa ga je ta činjenica navela na razmišljanje da bi mogla da se koristi u terapijske svrhe. Tesla je ubrzo shvatio da su potrebne mere sigurnosti od opasnih X-zraka pa je 6. aprila 1897. godine održao predavanje u njujorškoj Akademiji nauka na temu: "Lenardovi-

for 'Life' on June 15th 1946. On April 6th 1896 Professor Pupin, who also worked on X-ray phenomenon, said to the New York Scientific Academy 'Each substance that is exposed to X-ray influence becomes their emitter itself'. He claimed that he had discovered 'secondary radiation'. On March 18th 1896 Tesla wrote in 'Electrical review' 'I made shadows by using pure imaged rays' and he described that he had excluded direct radiation in order to achieve this effect. After examining various kinds of metals he found out that the best X-ray reflectors were the most electropositive ones. Apparently, Tesla used more advanced equipment than the one that existed at that time. He claimed that he could make 40-minute photograph into a human skull even from 12-metre distance unlike the other scientists who hardly managed to get pale shadows of arms and legs by using Roentgen pipes. Edison tried to commercialize X-rays. Being famous for his feasibility, he made a great number of box-shaped fluoroscope containing holes for observation and he exhibited them at the Electrical exhibition in Grand Central Palace in New York in 1896. This was the first opportunity for Americans to see the shape of their own skeleton. Consequently, they waited for a long time expecting this machine to show them the way their brains functioned. They were disappointed because it was impossible. Ladies were worried that unscrupulous manufacturers could use X-ray binoculars and strip them off during their walk along the Fifth Avenue. Until the middle 20th century all shoe shops were expected to have X-ray machine for feet which would help them to allure curious customers. Moreover, it was believed that blindness could be cured with the help of X-rays so doctors used to prescribe many treatments. Tesla himself emphasized that there was no proof for claiming that. On the contrary, he warned that radiation could cause some eye damage, in some cases even cataract. Tesla examined X-ray influence very carefully and he was convinced that he knew how to stimulate his brain so he often exposed his head to X-ray radiation. Then he wrote down 'you can easily get your skull shape after 20-minute to 40-minute exposure. Once, after being exposed to radiation for 40 minutes, he got not only the skull shape but also the eye cavity, the lower jaw and the link with the upper jaw, spine and the link with the skull, flesh and even hair'. He further wrote 'I noticed the tendency for sleeping and I also noticed that time flied. I had the impression of warming; the upper side of my head got warm'. His assistant also confirmed the same symptoms. In spring 1897 Tesla mysteriously got ill for a few weeks and then he put down 'In some cases your skin becomes darker and some parts are black; some ugly, painful blisters also appear; thick layers fall off and bad cuts are made. Terrible pain, fever and similar symptoms follow this emergence. I was unlucky to be a witness to the injury which affected the abdomen of my dear, hard-working assistant – the only accident that happened to someone else but me during the experiments in my laboratory'. As X-rays caused not only skin damage but also the sense of warming, Tesla believed that this phenomenon could be used in therapeutics. He soon realized that the protection from these rays were necessary so he held a lecture at the New York Scientific Academy on April 6th 1897. The lecture was devoted to Lenard and Roentgen rays and new machines for their production. On that occasion he showed the manufacturing and safe usage of X-ray equipment and he also warned about the danger and damage that X-rays could cause. Tesla also demonstrated the way his machine for X-ray production worked.

Rentgenovi zraci i novi uređaji za njihovu proizvodnju”. Tom prilikom je demonstrirao praktičnu izradu i bezbednu upotrebu rentgenske opreme, upozoravajući na opasnosti i štetnosti X-zračenja. Tada je prikazao i rad svojih specijalnih uređaja za proizvodnju X-zračenja.

ZAKLJUČAK

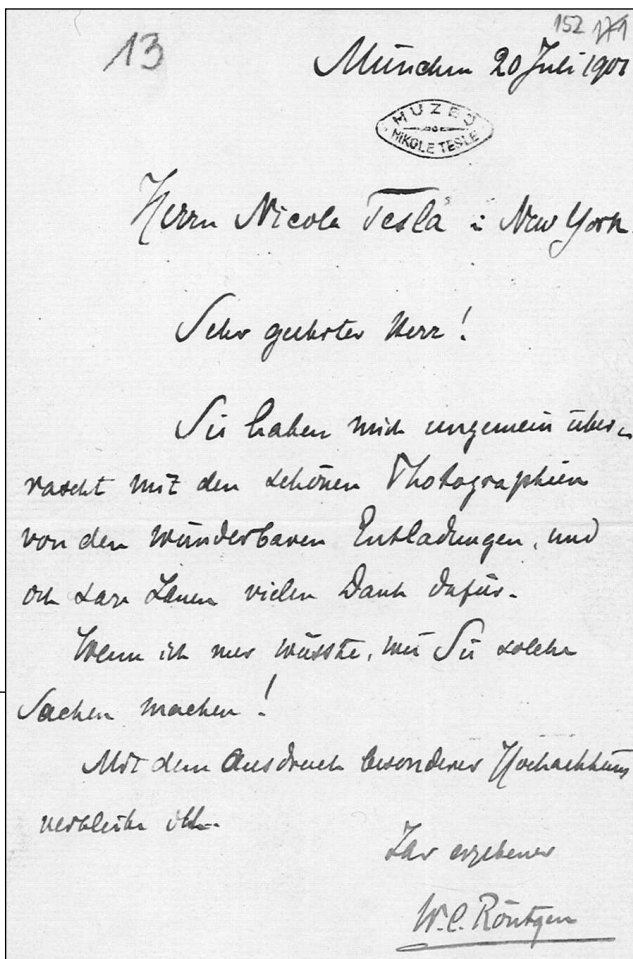
Na osnovu Teslinih istraživanja i serije članaka koje je objavio u stručnim časopisima o svojim eksperimentalnim rezultatima, može se zaključiti sledeće:

- Tesla je prvi otkrio reflektovane X-zrake
- Proizvodio je X-zrake na originalan način svojim oscilatornim transformatorom
- Otkrio je štetno delovanje X-zraka na čovekovo zdravlje posle intenzivnijeg izlaganja
- Prvi je konstruisao metalni zaklon za zaštitu lekara od X-zračenja
- Konstruisao je cev za emitovanje X-zraka sa mogućnošću automatskog podešavanja potpritiska u cevi
- Dokazao je da prirodna zračenja visoke energije emituju X-zračenje

CONCLUSION

From Tesla's research and the results of his experiments which were published in a lot of scientific magazines, we can make the following conclusion:

- Tesla was the first who discovered imaged X-rays
- He produced X-rays by using his oscillatory converter
- After an extensive exposure he discovered negative influence of X-rays on human health
- He was the first who created the metal protection for doctors
- He also created the pipe for the X-rays emission which could set its underpressure automatically
- He proved that natural high-energetic radiation emits X-radiation



Tesla's foot: made from himself snop shott with x-rays

Roentgen's letter to Tesla dated July 20th, 1901. The letter reads:

“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

(Courtesy of the Tesla Museum, Belgrade, Serbia, document no. MNT, CXLIV, 152.)

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