https://doi.org/10.56871/PED.2025.32.63.012 UDC 53(092)+537.531+615.849+614.253

Wilhelm Conrad Rentgen: the man who saw the invisible. On the 180th anniversary of his birth and the 130th anniversary of the discovery of X-rays

Inna P. Mavidi, Karina T. Abdulagaeva, Dmitriy I. Vasilevsky, Vadim M. Lazarev

Pavlov First Saint Petersburg State Medical University, Saint Petersburg, Russia

ABSTRACT

The article explores the life and scientific achievement of Wilhelm Conrad Röntgen (1845–1923), the outstanding experimental physicist who discovered X-rays and transformed the course of modern science and medicine. It traces Röntgen's path from his unjust expulsion from school and the difficulties of his early education to his later leadership of major physics institutions in Germany, where he developed into a scientist whose work shaped experimental physics for decades to come.

Particular attention is devoted to the circumstances of his November 1895 discovery of a new type of radiation capable of penetrating opaque materials and revealing the internal structure of the human body without surgical intervention. The article highlights Röntgen's meticulous experimental approach, his long days and nights of isolated work, and his determination to investigate every hypothesis in order to understand the nature of the mysterious rays that had no precedent in science.

A central theme is Röntgen's principled decision to refuse a patent for his discovery. Believing that such knowledge must serve humanity, he deliberately made the new radiation freely available, enabling its rapid adoption in medical diagnostics and ultimately saving millions of lives.

The material presents Röntgen not only as a brilliant experimenter but also as a man of exceptional moral integrity, for whom scientific truth and public good outweighed personal benefit. His legacy — an embodiment of talent, perseverance, and ethical conviction — continues to define the development of physics and medicine to this day.

Keywords: Wilhelm Röntgen, discovery of X-rays, history of science, Nobel Prize in Physics, cathode rays, X-ray image, scientific ethics, biography of a scientist

To cite this article

Mavidi I.P., Abdulagaeva K.T., Vasilevsky D.I., lazarev V.M. Wilhelm Conrad Rentgen: the man who saw the invisible. On the 180th anniversary of his birth and the 130th anniversary of the discovery of X-rays. *Pediatrician (St. Petersburg).* 2025;16(5):119–126. (In Russian). https://doi.org/10.56871/PED.2025.32.63.012.

Submitted: 12.11.2025 **Accepted: 23.12.2025** **Published online: 30.01.2026**

https://doi.org/10.56871/PED.2025.32.63.012 УДК 53(092)+537.531+615.849+614.253

Вильгельм Конрад Рентген: человек, который увидел невидимое. К 180-летию со дня рождения и 130-летию открытия рентгеновских лучей

И.П. Мавиди, К.Т. Абдулагаева, Д.И. Василевский, В.М. Лазарев

Первый Санкт-Петербургский государственный медицинский университет имени академика И.П. Павлова, Санкт-Петербург, Россия

РЕЗЮМЕ

Статья посвящена жизни и научному подвигу Вильгельма Конрада Рентгена (1845–1923), выдающегося физика-экспериментатора и первооткрывателя Х-лучей, которые стали одним из величайших достижений мировой науки. В работе прослеживается путь Рентгена — от несправедливого изгнания из школы и трудностей раннего образования до руководства крупнейшими физическими институтами Германии, где он сформировался как ученый, определивший направление развития экспериментальной физики на десятилетия вперед.

Особое внимание уделено обстоятельствам открытия в ноябре 1895 года нового типа излучения, способного проникать сквозь непрозрачные материалы и впервые в истории позволившего увидеть внутреннее строение человеческого организма без операции. Подробно рассматриваются экспериментальные поиски Рентгена, его многодневная работа в изоляции, стремление проверить каждую гипотезу и установить природу лучей, которые на тот момент не имели аналогов в науке.

Отмечается принципиальная позиция ученого, категорически отказавшегося патентовать свое открытие, поскольку он считал, что подобное излучение должно служить всему человечеству. Его решение открыло путь к стремительному развитию медицинской диагностики и спасло миллионы жизней по всему миру.

Материал позволяет увидеть в Рентгене не только гениального экспериментатора, но и человека высочайших моральных принципов, для которого научная истина и общественное благо стояли выше личной выгоды. Его наследие, олицетворяющее соединение таланта, упорства и этики, продолжает определять развитие медицины и физики и сегодня.

Ключевые слова: Вильгельм Рентген, открытие рентгеновских лучей, история науки, Нобелевская премия по физике, рентгеновский снимок, научная этика, биография ученого

Как цитировать

Мавиди И.П., Абдулагаева К.Т., Василевский Д.И., Лазарев В.М. Вильгельм Конрад Рентген: человек, который увидел невидимое. К 180-летию со дня рождения и 130-летию открытия рентгеновских лучей. *Педиатр.* 2025;16(5):119–126. https://doi.org/10.56871/PED.2025.32.63.012.

Рукопись получена: 12.11.2025 **Рукопись одобрена: 23.12.2025** **Опубликована online: 30.01.2026**

Genius may be nothing more than a fleeting opportunity.
Only hard work and determination can bring it to life and turn it into glory.

Albert Camus

Throughout history, some people have been born with the ability to perceive the world differently. They see it from a unique perspective, discern what remains hidden from others, and shed light on what still lies in darkness. These individuals are key contributors to progress; thanks to them, humanity has evolved into a civilization, and science continues to make new strides every year. It seems that fate itself guides such people: every encounter, every event comes together to form a path leading to a great discovery (Fig. 1).

It was precisely such a person who was born on March 27, 1845, in the small town of Lennep to Friedrich Conrad Röntgen and Charlotte Constance. The boy was named Wilhelm Conrad. His mother came from the ancient Frowein family, which lived in Holland, and his father belonged to a respected merchant dynasty whose roots stretched far back into the lands along the Rhine.

In 1848, the French Revolution erupted, its echoes reaching as far as Prussia. Röntgen's father sold the family home and moved with his family to the Netherlands. Thus, three-year-old Wilhelm unexpectedly became Dutch. Nevertheless, as he began a new life in a foreign land, he forever kept the house in Lennepe in his heart: he recalled every corner of it with particular tenderness and sadness, where he had spent the most carefree years of his childhood.

In 1850, the Röntgen family settled in Apeldoorn, in a house that came to symbolize their love and hopes. They engraved the name of their five-year-old son, Wilhelm, on the south wall. This touching gesture speaks volumes about parents' feelings: they were not simply furnishing a home, but creating a space where their only and dearly beloved son could grow up to be a decent person.

Fig. 1. Portrait of Wilhelm Conrad Röntgen. 1900 (Photograph. Public domain)

Рис. 1. Портрет Вильгельма Конрада Рентгена. 1900 г. (Фотография. Общественное достояние)

Wilhelm Röntgen spent fourteen years in this house, while attending the school of Martinus Hermanus van Doorn. In 1862, the family moved to Utrecht. At nearly eighteen years old, Wilhelm Conrad moved in with Dr. Hanning, a Utrecht chemist who taught at both the university and the technical school.

The Utrecht Technical School accepted boys aged 14 to 18, training them to become future managers of factories and enterprises. At first, a quite predictable path lay ahead for Röntgen as well. He would continue the family business and get involved in textile manufacturing. But fate had other plans. In early 1865, his mentor, Dr. Jan Hanning, was appointed professor of chemistry in Amsterdam. This was a turning point for the young Wilhelm: he increasingly realized that he was drawn to natural sciences.

Röntgen was a gifted student and easily mastered most subjects, except for physics. It was taught by Ger Patterson, a man who disliked Wilhelm from the very beginning, and the feeling was mutual. The story ended in a sad misunderstanding: one of his classmates drew a caricature of the teacher on a piece of paper, but the blame fell on Röntgen. He did not reveal the real culprit and paid a high price for his silence — at the age of seventeen, he was expelled from school [1].

Wilhelm Röntgen weathered this stroke of fate with his characteristic nobility and fortitude, even though the lack of a high school diploma hindered his admission to university. His father supported his son: "It's all right; three generations of men in our family have been cloth manufacturers, and you will make an excellent cloth maker".

But Röntgen decided not to give up; his innate tenacity and determination prevailed. He began preparing himself for exams to Utrecht University. However, due to a cruel twist of fate, his math exam was proctored by none other than Ger Patterson, who was filling in for a professor who had unexpectedly fallen ill. And he failed the exam.

It is no surprise that after such trials, Röntgen viewed exams with a touch of irony for the rest of his life. In 1920, he wrote to Mrs. Boveri, the daughter of his friend, the biologist Theodor Boveri, whose ideas anticipated modern mutation theory: "Student exams, as a rule, do not reveal true aptitude for a subject. Unfortunately, they are a necessary evil. The true test of aptitude for a profession comes only in adulthood".

However, Wilhelm Röntgen did not give up this time either. Four days after his failure, he enrolled in the

philosophy department, which accepted students without strict high school diploma requirements. However, philosophy alone was not enough. He was too drawn to natural sciences. In 1865, by a stroke of good fortune, the Polytechnic Institute opened in Zurich, where one could enroll without a high school diploma, simply by passing exams in mathematics, Ancient Greek, and Latin. Röntgen was admitted, exempted from the language exams as his exceptional knowledge of mathematics impressed the examiners. Thus, the twenty-year-old young man became a student at the institute that would shape his scientific destiny.

During his student years, Röntgen and his friends would gather in the evenings at the "Green Glass" café. There he met Bertha Ludwig, the daughter of the café's owner. Seven years later, this meeting culminated in their marriage.

His acquaintance with Professor August Kundt proved no less significant. After hiring Röntgen as his laboratory assistant, Kundt once asked him a question that would prove fateful: "What do you really want to do with your life?" This question compelled Röntgen to finally define his path in science.

Not receiving a precise answer, the professor advised: "Start doing science — it's never too late". For Röntgen, Kundt was not merely a mentor, but a true guide into the world of physics. He managed to instill in the young researcher a love for experimentation, patience in his work, and the ability to build instruments on his own. It was alongside Kundt that Röntgen got a taste of genuine scientific inquiry and finally found his calling to become an experimental physicist [2].

In 1870, August Kundt was appointed to the University of Würzburg, and invited his loyal assistant, the young Wilhelm Röntgen, to join him. There, Röntgen began work on his dissertation, but the university dean rejected it for unknown reasons. These difficulties were temporary: soon Kundt was transferred to the Imperial University of Strasbourg, and Röntgen, of course, followed him. There, in 1874, Röntgen was appointed a private lecturer at the Institute of Physics.

The young scientist's career continued to advance. Thanks to a recommendation from Heinrich Weber, a former professor at the academy, Röntgen was appointed professor of physics and mathematics at the Agricultural Academy in Hohenheim. However, as early as 1876, he returned to Strasbourg to take up a position as a lecturer in physics. Although Röntgen had to teach theoretical physics, it was his years in Strasbourg that revealed his true calling. His research at that time was distinguished by a clear formulation of problems, the elegance of his experimental techniques, and a rare ability to analyze results with clear-headedness and depth.

From that point on, Wilhelm's circle of acquaintances expanded; he met the biologist Georg Gafki, an outstanding German physician and bacteriologist, a close associate of Robert Koch, and the surgeon Rudolf-Friedrich Krenelin, one of the pioneers of appendectomy in Europe and a surgeon who developed and refined his own technique for gastric resection. Getting to know such outstanding scientists significantly broadened Röntgen's scientific horizons and had a beneficial influence on his work.

But Röntgen never forgot about his family. Although the couple had no children of their own, they adopted Bertha's niece, Josephine Ludwig. Wilhelm was a caring husband and became a true father to the girl [3].

While in Giessen, he wrote a number of papers, one of which was titled "On the Electrodynamic Force Caused by the Movement of a Dielectric in a Homogeneous Electric Field". Röntgen demonstrated that free charges located at the interface of an electrically polarized dielectric, namely on the surface of the insulator within a capacitor, also generate an electric current during mechanical motion and are surrounded by a magnetic field. For this purpose, he caused the dielectric to rotate between the plates of a charged capacitor and was thus able to experimentally prove the validity of Maxwell's first equation.

This work aroused particular interest among scientists of the time. Ludwig Zender, a research associate at the Massachusetts Institute of Technology, wrote: "This discovery by Röntgen was valued by theoretical scientists such as Lorentz, Sommerfeld, and others almost as highly as his discovery of X-rays" [4].

On October 1, 1888, Röntgen received an offer to take up a professorship in Würzburg, succeeding the renowned physicist Friedrich Kohlrausch (1840–1910). Thus, he returned to where his journey had once begun. But now Röntgen was returning not as a student, but as a recognized scientist and an outstanding experimenter. He had reached this pinnacle through his own hard work and talent. During this period, he began studying the effect of pressure on various properties of liquids. Based on the anomaly of water (the presence of maximum density at 4 °C), he concluded that water consists of two different molecular structures: a more voluminous ice structure and structures of smaller volume that are formed only at higher temperatures.

Wilhelm Röntgen was a strict and demanding mentor, both to himself and to his students. He disliked formal exams and preferred to assess his students' genuine depth of understanding. This approach often put those who were accustomed to rote memorization, rather than a true grasp of science, in a difficult position.

Despite his numerous responsibilities, Röntgen actively pursued scientific research. From 1888 to 1894, he published 50 papers on how pressure affects the properties

of liquids. At the same time, his attention was drawn to cathode rays in gas discharge tubes. The scientist believed that this phenomenon had not been sufficiently studied and devoted a great deal of time to its investigation. By the end of 1895, he was conducting experiments with a modified gas-discharge tube located directly beneath his apartment as he did not like to waste time. At that time, he did not yet know that he was on the verge of his greatest discovery [5].

The history of science is full of examples where the greatest discoveries arose from chance. Such was the case with Wilhelm Röntgen. On the evening of November 8, 1895, he was about to have dinner with his family when, after closing the curtains and covering the cathode tube with cardboard, he absentmindedly failed to turn it off. Turning around at the doorway, he noticed a strange glow: a sheet of paper with barium salt was glowing green, even though there was no light source nearby. The scientist instantly realized — he was facing a phenomenon of unknown nature. Röntgen returned to the laboratory and no longer allowed anyone to enter; he instructed his wife to bring food only and leave it outside the door. He decided to dig up the truth, working day and night, resting only a couple of hours a day. For 50 days, no one saw the scientist, and he experimented with the rays, passing them through all the objects in the laboratory (Fig. 2). “Having learned of an entirely new type of rays, I naturally began to investigate what they would do... Soon, the tests revealed that the rays possessed a penetrating power of a previously unknown degree”, wrote Wilhelm Röntgen [6].

Fig. 2. Artistic illustration: Wilhelm Conrad Röntgen in his laboratory at the moment of discovering X-rays. Late XIX – early XX century (public domain)

Рис. 2. Художественная иллюстрация: Вильгельм Конрад Рентген в лаборатории во время открытия Х-лучей. Конец XIX — начало XX века (общественное достояние)

Fig. 3. The first X-ray image — the hand of Anna Bertha Ludwig with a ring on her ring finger. W.C. Röntgen, 8 November 1895. Physical Institute of the University of Würzburg (public domain)

Рис. 3. Первая рентгенограмма — кисть Анны Берты Людвиг с кольцом на безымянном пальце. В.К. Рентген, 8 ноября 1895 года. Физический институт Вюрцбургского университета (общественное достояние)

The great immunologist Louis Pasteur said: to restrain oneself and not announce a discovery until all hypotheses have been tested is a difficult task. These words describe Wilhelm Röntgen very accurately. Immersed in the study of the mysterious rays, he worked late into the night, sacrificing sleep and his health.

His wife was worried about her husband’s health, as he hadn’t seen daylight for many days. “How long will this go on?” she asked him. “As long as it takes”, Röntgen replied. After seven weeks of experiments, he called his wife into the laboratory and took an X-ray of her hand. Seeing the image of her own bones on the plate, Bertha cried out in horror: “I have seen my own death”. It was the world’s first X-ray [7].

On January 5, 1896, a sensation shook the readers of the Viennese newspaper Die Presse. The front page reported that on November 8, 1895, a certain Professor Röntgen had discovered a new type of radiation capable of penetrating opaque materials and even allowing one to see through the human body. But how did the story get into the newspaper? During a discussion evening, Professor Franz Exner (Röntgen’s colleague and friend) brought a special edition of Röntgen’s work, as well as a photograph of a human hand in which the bones, joints, and even a ring on the ring finger were clearly visible (Fig. 3).

Soon, the whole world heard about Röntgen’s great discovery. Everyone was stunned, except the scientist himself, who was convinced that sensationalism was merely a “pastime of vanity”, whereas true science

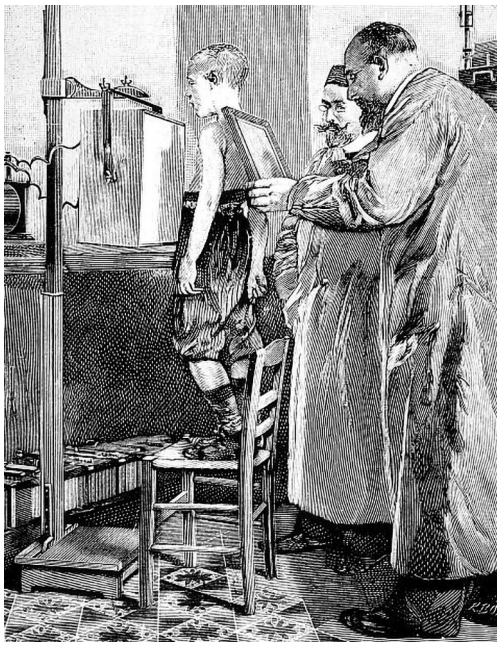

Fig. 4. Artistic engraving: Wilhelm Conrad Röntgen demonstrating the use of X-rays to examine a young boy. Late XIX century (public domain)

Рис. 4. Художественная гравюра: Вильгельм Конрад Рентген демонстрирует применение Х-лучей для обследования мальчика. Конец XIX века (общественное достояние)

requires modesty. He refused to patent the discovery, declaring: "My discovery belongs to the people!" The significance of X-rays proved to be enormous: for the first time, medicine gained the ability to look inside the human body without surgical intervention, and soon the first radiology laboratories appeared, including in Russia [8].

Since ordinary people knew absolutely nothing about the nature of the rays, a very funny incident occurred. Once, Wilhelm Röntgen received a letter from a sailor who asked the scientist to send him some X-rays so he could locate a bullet in his chest, to which Röntgen replied: "Unfortunately, sending the rays would be difficult, but there is an easier way: send me your chest, I will find the bullet and send it back to you" [9].

Röntgen categorically refused to allow the military use of his discovery. When asked to use the rays for military purposes, he replied to the Kaiser himself, Wilhelm II: "It is impermissible and inhumane to use for military purposes a means that is needed by sick people". Ironically, the Kaiser fell down the stairs and sprained his leg; for this reason, he had to agree with Röntgen's opinion and use the invention for medical purposes.

Wilhelm Röntgen was a man of rare nobility and humanity: he dedicated all his work to serving science and people, believing that a scientist's mission is "to make the world a better place" (Fig. 4). He shunned fame, disliked interviews, and rarely left his home, as if ashamed of the public attention that had descended upon him following his discovery. In 1900, Röntgen moved to Munich, where he took up a professorship at the university and headed the Munich Institute of Physics [10].

In 1901, Wilhelm Röntgen became the first recipient of the Nobel Prize in Physics. However, being a modest man, he declined to give a public speech and refused honorary titles, so the prize was sent to him by mail. The Nobel Prize Committee's letter stated: "In recognition of his extraordinarily important contributions to science, manifested in the discovery of the remarkable rays subsequently named in his honor".

He also declined an honorary position at the German Academy of Sciences, and shortly thereafter, the noble title "von". Whenever someone addressed him as Dr. von Röntgen, the scientist would correct them indignantly: "Since I have not yet submitted a special application and do not intend to do so, it is not proper for me to bear the prefix 'von'".

Munich became the final stop in Wilhelm Conrad Röntgen's life. In 1900, he became head of the physics department at Ludwig Maximilian University. In 1903, a young Russian scientist, Abram Ioffe, came to him for an internship; he soon became Röntgen's assistant and one of his few close friends. Their collaboration marked the beginning of joint research and became an important chapter in the lives of both scientists [11].

World War I had a severe impact on Röntgen's life. He donated all his savings, including his Nobel Prize money, to his country, lived extremely modestly, and traveled by train in third class. After his wife's death, he was left completely alone.

In 1923, the scientist fell ill. The doctor who examined him was struck by the modesty of the patient, whose name was known throughout the world. The irony of fate was that his diagnosis, colon cancer, was made using his own discovery, X-rays.

Fig. 5. Wilhelm Conrad Röntgen. Photograph. University of Würzburg, late XIX century (Würzburg University Library Archives, public domain)

Рис. 5. Вильгельм Конрад Рентген. Фотография. Университет Вюрцбурга, конец XIX века. (Архив библиотеки университета Вюрцбурга, общественное достояние)

On February 10, 1923, Wilhelm Conrad Röntgen passed away, never once compromising his moral principles. His will instructed that his scientific papers be burned, which was carried out [12].

The world lost one of the most hardworking, brilliant, and humane scientists, whose name is forever inscribed in history thanks to a discovery that changed the course of medicine and the fate of humanity (Fig. 5).

Do not look back — look life in the face,
Do not give up.
Lift your head, pay no heed to groans.
Whoever strives for a goal — do not retreat,
Do not look at backs and the past.
Look into the eyes of the light that lies ahead.
Richard von Volkmann. Berlin, 1890

ADDITIONAL INFORMATION

Author contribution. All authors made a substantial contribution to the conception of the study, acquisition, analysis, interpretation of data for the work, drafting and revising the article, final approval of the version to be published and agree to be accountable for all aspects of the study.

Competing interests. The authors declare that they have no competing interests.

Funding. This study was not supported by any external sources of funding.

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

Вклад авторов. Все авторы внесли существенный вклад в разработку концепции, проведение исследования и подготовку статьи, прочли и одобрили финальную версию перед публикацией.

Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

Источник финансирования. Авторы заявляют об отсутствии внешнего финансирования при проведении исследования.

REFERENCES

1. Beier W. Wilhelm Conrad Röntgen. Hochschulverlag AG an der ETH Zürich; 1995. 136 p.
2. Polyakova P.A., Maksimova Yu.A., Polyakova N.P. Wilhelm Conrad Röntgen: Biography, Discoveries, and Interesting Facts from His Life. In: Proceedings of the XIX International Scientific and Practical Student Conference, Petrozavodsk, 2020. P. 37–43. (In Russian).
3. Reinberg S.A. Wilhelm Conrad Röntgen. *Grekov's Bulletin of Surgery*. 1939;57(1):3–20. (In Russian).
4. Sushkova N.V., Subbotina V.G., Emelina I.S. Landmark Dates in Medicine: 125 Years Since the First X-ray Image. In: Proceedings of the IV International Scientific and Practical Conference. Petrozavodsk; 2021. P. 180–185. (In Russian).
5. Shevchenko E.V., Korzhuev A.V., Khlopenko N.A. Röntgen, the History of the Discovery of Radioactive Radiation, and Its Use in Medicine. *Sibirskii meditsinskii zhurnal (Irkutsk)*. 2014;(3):95–99. (In Russian).
6. Lednev S.A., Razuvaeva Yu.Yu., Ledneva V.S. Nobel Laureate Wilhelm Conrad Röntgen. *Molodezhnyi innovatsionnyi vestnik*. 2021;10(52):91–92. (In Russian).
7. Rusyaeva A.V., Kuz'menko V.V. The Role of Wilhelm Röntgen in the History of Radiology. *Molodoi uchenyi*. 2019;(47):436–438. (In Russian).
8. Mufazalov F.F., Pervozvanskaya L.I. Wilhelm Conrad Röntgen: On the 115th Anniversary of the Discovery of X-rays. *Creative surgery and oncology*. 2010;(3):65–68. (In Russian).
9. Paskalev D., Lazarova M. Wilhelm Röntgen: The History of the Discovery of X-rays. *Nephrology*. 2008;12(4):96–100. (In Russian).
10. Opimakh I.V. Wilhelm Röntgen and His X-rays. *Medical Technologies. Assessment and Choice*. 2015;(4):71–75. (In Russian).
11. Borisova U.D. X-rays: History of Discovery and Their Application in Medicine. *Molodoi uchenyi*. 2023;(3):28–29. (In Russian).
12. Shevchenko E.V., Korzhuev A.V. The history of the discovery of X-ray radiation and its significance for physics and medicine (on the 120th anniversary of the great discovery). *Sibirskii meditsinskii zhurnal (Irkutsk)*. 2015;132(1):141–145. (In Russian).

ЛИТЕРАТУРА

1. Walter Beier. Wilhelm Conrad Röntgen. Hochschulverlag AG an der ETH Zürich; 1995. 136 p.
2. Полякова П.А., Максимова Ю.А., Полякова Н.П. Вильгельм Конрад Рентген: биография, открытия, интересные факты из жизни. Сборник статей XIX Международной научно-практической студенческой конференции, Петрозаводск, 2020. С. 37–43.
3. Рейнберг С.А. Вильгельм Конрад Рентген. *Вестник хирургии им. И.И. Грекова.* 1939;57(1):3–20.
4. Сушкова Н.В., Субботина В.Г., Емелина И.С. Знаменательные даты в медицине. 125 лет первому рентгенологическому снимку. Сборник статей IV Международной научно-практической конференции. Петрозаводск; 2021. С. 180–185.
5. Шевченко Е.В., Коржуев А.В., Хлопенко Н.А. Рентген, история открытия радиоактивного излучения и применение его в медицине. *Сибирский медицинский журнал (Иркутск)*. 2014;(3):95–99.
6. Леднев С.А., Разуваева Ю.Ю., Леднева В.С. Нобелевский лауреат Вильгельм Конрад Рентген. *Молодежный инновационный вестник*. 2021;10(52):91–92.
7. Русяева А.В., Кузьменко В.В. Роль Вильгельма Рентгена в истории развития рентгенологии. *Молодой ученый*. 2019;(47):436–438.

8. Муфазалов Ф.Ф., Первозванская Л.И. Вильгельм Конрад Рентген: к 115-летию открытия Х-лучей. *Креативная хирургия и онкология*. 2010;(3):65–68.
9. Паскалев Д., Лазарова М. Вильгельм Рентген: история открытия рентгеновских лучей. *Нефрология.* 2008;12(4):96–100.
10. Опимах И.В. Вильгельм Рентген и его Х-лучи. *Медицинские технологии. Оценка и выбор*. 2015;(4):71–75.
11. Борисова У.Д. Рентгеновские лучи: история открытия и применения в медицине. Молодой ученый. 2023;(3):28–29.
12. Шевченко Е.В., Коржуев А.В. История обнаружения рентгеновского излучения и его значение в физике и медицине (к 120-летию великого открытия). *Сибирский медицинский журнал (Иркутск)*. 2015;132(1):141–145.

AUTHORS' INFO

Inna P. Mavidi, MD, PhD, Associate Professor, Associate Professor of the Department of Faculty Surgery named after Prof. A.M. Ganichkin, Pavlov First Saint Petersburg State Medical University, Ministry of Health of the Russia, Saint Petersburg, Russia; ORCID: 0000-0002-8908-1833;
eLibrary SPIN: 3456-1966; e-mail: innamavidi@bk.ru

Karina T. Abdulagayeva, Student of the Faculty of Dentistry, Pavlov First Saint Petersburg State Medical University, Ministry of Health of the Russia, Saint Petersburg, Russia;
ORCID: 0009-0009-7599-7742; e-mail: Karina172517@gmail.com

*** Dmitriy I. Vasilevskiy**, MD, PhD, Dr Med Sci, Professor, Head of the Department of Surgical Diseases of the Faculty of Dentistry named after Prof. A.M. Ganichkin, Pavlov First Saint Petersburg State Medical University, Ministry of Health of the Russia; address: 6-8 L'va Tolstogo str., Saint Petersburg, 197022, Russia; ORCID: 0000-0001-7283-079X;
eLibrary SPIN: 7598-6339; e-mail: vasilevsky1969@gmail.com

Vadim M. Lazarev, MD, PhD, Associate Professor of the Department of Surgical Diseases of the Faculty of Dentistry named after Professor A.M. Ganichkin, Pavlov First Saint Petersburg State Medical University, Ministry of Health of the Russia, Saint Petersburg, Russia; ORCID: 0009-0008-5829-5258;
eLibrary SPIN: 5812-1593; e-mail: lazvad1890@mail.ru

ОБ АВТОРАХ

Инна Павловна Мавиди, канд. мед. наук, доцент, доцент кафедры хирургических болезней стоматологического факультета имени профессора А.М. Ганичкина, Первый Санкт-Петербургский государственный медицинский университет имени академика И.П. Павлова Минздрава России, Санкт-Петербург, Россия; ORCID: 0000-0002-8908-1833;
eLibrary SPIN: 3456-1966; e-mail: innamavidi@bk.ru

Карина Тимуровна Абдулагаева, студентка стоматологического факультета, Первый Санкт-Петербургский государственный медицинский университет имени академика И.П. Павлова Минздрава России, Санкт-Петербург, Россия;
ORCID: 0009-0009-7599-7742; e-mail: Karina172517@gmail.com

*** Дмитрий Игоревич Василевский**, д-р мед. наук, профессор, заведующий кафедрой хирургических болезней стоматологического факультета имени профессора А.М. Ганичкина, Первый Санкт-Петербургский государственный медицинский университет имени академика И.П. Павлова Минздрава России; адрес: Россия, 197022, Санкт-Петербург, ул. Льва Толстого, д. 6-8; ORCID: 0000-0001-7283-079X;
eLibrary SPIN: 7598-6339; e-mail: vasilevsky1969@gmail.com

Вадим Михайлович Лазарев, канд, мед. наук, доцент кафедры хирургических болезней стоматологического факультета имени профессора А.М. Ганичкина, Первый Санкт-Петербургский государственный медицинский университет имени академика И.П. Павлова Минздрава России, Санкт-Петербург, Россия; ORCID: 0009-0008-5829-5258;
eLibrary SPIN: 5812-1593; e-mail: lazvad1890@mail.ru

* Автор, ответственный за переписку. / Corresponding author.