

## **ФАРМАЦЕВТИЧНІ НАУКИ**

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### **FELIX HOFFMANN – THE INVENTOR OF THE BEST-SELLING DRUG OF THE PRESENT TIME**

When it comes to pain, fever or inflammation, all people, who prefer 2-Acetoxybenzoic acid, know where it is in their drawers and how it works. But not all the public has ever heard about the drug inventor's story – Felix Hoffmann's life. Between people, the drug is often called simply – Aspirin. What is remarkable, more than 40.000 tons of it was produced by Bayer in 2020 and this amount has to be sold for approximately \$220.000.000.000.000 (81 mg is around \$10 for a supply of 36 tablets) [1]. According to the statistics, this medicine is the most popular medicine of the century in the world.

Felix Hoffmann was born on 21 January 1868 in Ludwigsburg, Germany. His father was a manufacturer. There is no information about his mother. From early childhood, Felix was interested in pharmacy. So, after the end of school and some time of helping workers at different pharmacies, in 1881 Felix joined the University of Munich's pharmaceutical faculty. He ended it with honours. In 1893 Hoffmann earned his doctorate due to his own thesis named «On certain derivatives of dihydroanthracene» [2].

The key event of Felix's life happened a year later. Adolf von Baeyer, who would win the Nobel Prize in Chemistry for his work in synthesizing dyes soon in 1905, recommended Hoffmann to the newly established research group at «Friedrich Bayer & Co». In 1890-th Felix's father got arthritis. Besides, there is an opinion that the illness of dad formed Felix's interest in organic chemistry. Wilhelm Hoffmann was taking sodium salicylate to decrease symptoms and pain like lots of others at that time. But this method of treatment had many issues: it often irritated the stomach lining even with making ulcers, it caused severe pain and it had a very bad bitter taste. The young man was dreaming about creating a drug, which could help people avoid suffering without side effects. Father just begged the newly-minded

researcher to find an alternative. This desire brought him to action. In 1897, in a laboratory in Wuppertal, the miracle occurred due to Arthur Eichengrun (the head of the pharmaceutical division, which was responsible for developing new drugs), Felix Hoffmann (a chemist working for Eichengrun) and Heinrich Dreser (the head of the pharmacology section, which was responsible for clinical trials). As sodium salicylate irritated the stomach, Hoffmann had to synthesize a less acidic solution. It was achieved by adding extra chemical reactions which destroyed some of the chemical connections, leaving the carboxylic acid group, with an ACETYL group modifying it into acetylsalicylic acid. That is how Hoffman invented the drug in a pure and stable form [3]. Bayer described it in the following way: “Young scientist Dr Felix Hoffmann is the first to succeed in synthesising a chemically pure and stable form of acetylsalicylic acid, which becomes the active ingredient in Aspirin” [4]. The company registered the trademark in 1899.

There are two sides of every story. This saying works also in Hoffmann's story. The tremendous invention was followed by devising Heroin in a week. Actually, Heroin was created earlier, so he could only make one more stable copy of it. After a period of practical work in the laboratory, Felix moved to a pharmaceutical marketing department and became the head of it. This place was the main job until his retirement in 1928. From that time till the last day Felix spent out of the public eye even when his invention got a great worldwide success. He died on 8 February 1946 in Switzerland. He was never married and died without children. He was also granted full power of attorney, over Aspirin.

However, there is also an opinion that Hoffmann is not a real inventor of the drug. It is based on the words of Arthur Eichengrun that Felix only carried out the activities spoken by Arthur. But Bayer contradicted these rumours in their press release [5] by showing the US patent of Aspirin (granted on 27 February 1900) [6] and the laboratory notebook, which confirmed that Eichengrün was not Hoffmann's superior during the invention [7].

Aspirin can soothe migraine headaches, stop premature labour in some pregnant women and control lung inflammation caused by a common respiratory virus. It has already saved billions from suffering. It is being taken by thousands during one second at the moment. And if we cannot decrease the global quantity of such illnesses a lot, exactly Aspirin will be one of the most widely used medications in the world in the near future. Today, of course, humanity has to be grateful to Felix Hoffmann for his explorations.

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