

The participation of Polish physicians in research on the etiology and pathogenesis of malignancies at the turn of the 20th century

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Abstract: At the turn of 20th century there were two theories of carcinogenesis: the theory of local origin and the parasitic theory. Polish scientists such as Zdzisław Dmochowski, August Kosiński, Leon Karwacki, Albert Adamkiewicz and Julian Steinhaus took part in research on the etiology of malignancies.

Key words: history of medicine, neoplasm etiology, polish scientists

At the turn of the 20th century there were two theories of carcinogenesis: the theory of local origin and the parasitic theory. The father of the local theory was Rudolf Virchow, a German scientist who in the middle of the 19th century propagated the thesis that the disease is strictly associated with local disorders of the organism which have its origins in a single cell [1]. On the basis of Virchow's scientific views a number of theories of cancer local origin arose [2]: theory of epithelium increased growth (Thiersch), an embryonic theory (Cohenheim), an embryo-genetic theory (Ribbert) [3], theory of cell anaplasia (Hanseman) and theory of penetration of foreign cells into organism (Kelling) [4]. The carcinogenesis parasitic theories appeared in the 1880s and 1890s. The protozoa, bacteria and fungus were then considered as carcinogenic microorganisms [5].

Polish scientists took part in research on the etiology and pathogenesis of malignancies despite the unfavorable political and socioeconomical situation (the period of the Partitions of Poland that lasted since 1795).

In 1912 an anatomic pathologist from the Holy Spirit Hospital in Warsaw, doctor Zdzisław Dmochowski, published the theory of cell origin of malignancies. He believed that neoplasm come into being from one cell created from the union of two cells of a different variety. For Dmochowski the proof of correctness of that thesis was the process of embryogenesis, where the zygote during embryonic life underwent differentiation into particular tissues and organs. Therefore in the case

of union of two tissues – for example epithelial and connective tissue – a so called “dismikseja” occurred that initiated the neoplastic process. The benign tumour was created due to the cells of “close variety” union and malignant tumour from genetically distant cells. A compound tumours were the result of “dismikseja” process of not completely differentiated cells. The injury or inflammatory state were the conductive factors for the union and agitation of cells' interior that occurred on border places of the tissues [6].

Polish physicians also worked on the discovery of carcinogenic parasites.

In 1892 doctor August Kosiński's paper was published, where the author tried to demonstrate that vacuoles which occur in malignant cells are in fact parasites from the protozoa group. Kosiński's work referred to the earlier Virchow's observations, on the basis of which the German scientist acknowledged that the vacuole which occur in healthy cells are the place where young cancerous cells origin [7]. In 1851 he published the next paper where he described a number of vacuole morphological elements (nuclei, nucleoli) and again set forth a thesis of cancer intracellular reproduction [8]. The mentioned above Virchow's idea was replaced by neoplasm parasite origin theories.

Doctor Kosiński collected samples for neoplasm research from patients operated on cancer. He examined under the microscope properly made preparations studying the objects in cell images which he thought to be the “fisalidy”. He called “filasifora” the cells that contained the substantial vacuole. The “fisalidy” repeatedly showed the presence of typical of cells organelle, i.e. nuclei, nucleoli and cytoplasm, and within them many “sickle-shaped corpuscles” and “homogenous balls”. The scientist considered the above mentioned intracellular elements to be parasites, the protozoa from the sporozoa group [9].

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Doctor Kosiński in his article published in 1905 maintained his opinion on the occurrence of microorganisms in neoplastic cells, and in the same article he noticed that those elements could as well be saprophytes without a pathogenic significance [10].

Doctor Kosiński's observations were not confirmed by findings from other scientists' research. It can be presumed that the "fisalidy" stated in the cells were in fact the accumulation of tissue stain substances (artifacts) or the elements that appear during mitosis.

At the beginning of the 20th century doctor Leon Karwacki from the Bacteriological Laboratory at the Christ-Child Hospital in Warsaw published a paper on "malignant tumour flora". The Polish scientist collected the samples of malignant tumor from operated on patients in a sterile environment, and placed them in several fluid mediums. After two to five days from the inoculation the opacity of the medium fluid occurred. Doctor Karwacki found the explanation for that process in a small number of neoplastic microorganisms in cells, which evolved only with the cultured fluid. The obtained in different mediums objects were round in shape and yellowish-brown in colour and were similar to microorganism cultured from neoplastic tissues by other scientists (Sanfelicego, Plimera). According to the that time knowledge those objects were numbered among yeast. Microorganisms which evolved in some of the mediums had the shapes of staphylococcus and streptococcus grain, and seemed to be identical to microorganisms cultured by French scientist Doyen who supplied them to the Polish researcher. Doctor Krawacki believed that the "grains" were malignant tumor complications which played a significant part in poisoning patients suffering from cancer organisms. Thus, the scientist did not agree with Doyen's and other researchers opinion on the "grains" oncogenic role. According to doctor Krawacki, the examined microorganisms – staphylococcus and streptococcus – passed through blood into the pathologically changed tissues causing infectious reactions and, at the same, influencing the course of the neoplastic disease [11].

Doctor Krawacki announced the results of his next research at the international physician congress in Lisbon in 1906 and published them later in medical periodicals. The scientist tried to answer the question: in what way immunizing against the "grains" influence the neoplasm growth. In order to do that he vaccinated 20 patients suffering from cancer with 0.5 to 3 ml dead staphylococcus suspension (given 3 times a week for 4 months and later once a week). On the ground of the conducted experiments the Polish scientist rejected again Doyen's theory on parasite etiology of cancer and suggested the possibility of obtaining positive effects in cancer treatment with vaccines and serums [12].

A theory that gained some recognition was Professor Albert Adamkiewicz's hypothesis on neoplasm etiology based on his own research on rabbits. The results announced in 1890 stated that neoplasm tissues produced a toxin that given to ex-

perimental animals caused death through the central nervous system paralysis [13]. Two years later Adamkiewicz set forth a thesis that the most wanted neoplasm parasites were in fact the neoplasm cells themselves and that they showed to be protozoa which produced toxic substances [14]. During the next few years the Polish scientist tried to force through this opinion, yet lack of strong evidence in favor of his hypothesis resulted in many doubts and accusations. A climate of distrust forced the scientist to leave the city of Cracow, where he worked as a professor of anatomic pathology, and move to Vienna.

Doctor Julian Stienhaus, Professor Adamkiewicz's science assistant and the head of the laboratory and prosectorium of the university clinic in Warsaw, became Adamkiewicz's scientific adversary. In his article published in *Surgical Review* in 1893 he wrote, "Critics of Adamkiewicz's theory does not cause much trouble [...]. Adamkiewicz never troubled himself to study cancer histogenesis or read works on the topic".

Doctor Steinhaus studied neoplastic cells histomorphology. In 1889, during the observation of salamander small intestine epithelium he believed to discover coccidia, the first intratesticular parasite [15]. That supposed Polish discovery inspired professor Thoma to make a statement that intracellular and intratesticular objects observed in neoplastic cells could in fact be parasites [16]. Few years later Steinhaus, on the basis of his next research works, made a thesis on a degenerative genesis of objects found in neoplastic cells and excluded its parasitic character. He presented those revised opinions at the International Hygienists Conference in Budapest in 1894. He also demonstrated that the efforts to confirm the theory of a parasite character of intracellular objects in cancer failed [17]. Based on his own research conducted in Warsaw and in Brussels (since 1907), Steinhaus entirely excluded the possibility of existence of cancerous parasites. The crowning achievement of the scientist's work in this field was a comprehensive paper published in 1911, where he described the structure, metamorphosis and transformation in neoplastic cell nuclei and cytoplasm, and the processes taking place during its mitotic division [18].

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