

nection with the carcinogenesis by roentgen-rays is not only vague, but that it is also insufficient even in the presence of an individual predisposition for a cancerous response. The quality of the "irritative" action is the important part for Bloch. Bécélère noted that the theory of non-specific chronic irritation as the cause of roentgen-cancer was not any more convincing than it was in relation to cancer in general. Schürch concluded that the roentgen-cancers do not develop simply on the basis of a chronically injured skin, but follow upon the appearance of special developmental conditions brought about in the tissues by the rays. Similar negative opinions in this matter were expressed by Flaskamp and Wintz.

Wyss (1906, 1908) proposed an ischemic theory of roentgen-carcinogenesis. This investigator pointed out that the circulatory disturbances, produced in the irradiated skin by the intimal proliferative and medial hyalinizing processes in the cutaneous vessels and by the production of scar tissue, result in an insufficient nutrition of the epidermal cells, which by such changes are more or less excluded from the union with the body and therefore assume an independent existence as cancer cells.

A similar conception was advanced by Wolbach, who contended on the basis of his own histological observations and those of Wyss and Unna, that the epidermis is the least radio-sensitive part of the skin, and that any neoplastic reactions originating in the epidermis are secondary to and conditioned by the primary progressive degenerative lesions of the vasculo-connective tissue causing an interference in the blood supply reaching the epidermis. It was claimed by Wolbach that the epithelium preserves its normal reparative and proliferative ability, and that the gradual acquisition of malignant qualities by these cells is attributable to a constant excessive demand for regeneration. Ledoux-Lebard expressed a similar opinion concerning the cancerizing effect exerted upon the epidermis by the pathological changes in the connective tissue produced by the rays. The reasoning of Wolbach is accepted apparently also by Cole, who stated that the malignant changes in roentgen-skin resulted from the efforts of the epidermal cells proliferating infiltratively into the corium in search for adequate nourishment and becoming parasitic in the end. A prolonged nutritional deficiency of the epidermis caused by the sclerosis of the corium was incriminated by Daels and Baeten for the production of biologically modified epithelial cells which finally assume lytic qualities enabling an invasive growth.

Upon close inspection it is evident that the theories advanced by Wyss, Wolbach and others are the morphological equivalents of the biochemical theory of cancerigenesis proposed more recently by Warburg. However, this anoxemic theory of malignancy has been shown to be unsound not only from a biochemical standpoint, but also from a morphological one. Hesse pointed out in 1911 that the great majority of investigators had abandoned the conception that the primary damage done by the roentgen-rays was exerted on