

lower dose remained localized, but invaded by direct extension the contents of the skull. The neoplasms formed in both animals were cornified squamous cell carcinomas displaying a high degree of irregularity in size, shape and stainability of the cells and nuclei. In addition to numerous multinucleated giant cells and giant cells with multiple mitoses, there were protoplasmic keratinizations in nucleated cells, and cellular dysplasia and dyskeratosis in parts of the tumor tissue.

The observations of Bloch were confirmed by Schürch (1930), who exposed the ears of 28 rabbits to roentgen-rays over a prolonged period and studied in detail at certain intervals the histological changes present in the exposed organs, thereby obtaining a rather complete picture of the various developmental phases of chronic roentgen-dermatitis which ultimately ended in malignancy. The time of exposure in these experiments varied from 14 days to 33 months, while the dose administered ranged from 60 r to 3,895 r. The observation time extended from 14 days to 43 months. Cancers of the ears were obtained in three rabbits, which had received a total dose of more than 1,000 r. The tumors became manifest after more than two years from the start of the experiment. The cancers originated in the margins of ulcers and were of a scirrhous type. Metastases were found in the regionary lymph nodes at the base of the ears. In addition to the malignant neoplasms, there developed massive and multiple filiform papillary excrescences near ulcerative perforations or remote from them in the irradiated ears after 27 to 31 months of treatment. The verrucous tumors were partly red and had the appearance of angiokeratomas.

In contrast to the relatively long developmental period apparently needed for causing a carcinomatous response in rabbits, Jonkhoff reported the production of experimental roentgen-cancers in the skin of mice after a minimum latency period of one and a half months (maximum latency period, 10 months, or nine months after the last exposure to the rays). Three treatments were given per week until a total of 14 treatments was administered. Of the 6 mice thus treated, four developed malignant tumors (3 spindle cellular sarcomatoid carcinomas, 1 squamous cell carcinoma) originating in the edges of ulcers and growing into massive proliferations. Pulmonary metastases were found in one mouse. Jorstad and Lane produced roentgen-burns in rats and observed folliculo-epitheliomas after 8 months, following a thinning of the epidermis appearing after 30 days of the treatment, and after a hyalinization of the subcutaneous connective tissue associated with the development of mild hyperkeratoses and marked epidermal thinning had become evident 60 to 90 days later.

The experimental production of carcinoma of the skin in animals by the action of radioactive substances has been accomplished in more recent years. Daels and Baeten obtained a cornified squamous cell carcinoma in a mouse 322 days after the implantation of a seed filled with several drops of a solution