

others had a hyperplastic marrow. There was an increased vascularity between the bone and the marrow. The sarcoma involving the humerus contained numerous multinucleated giant cells and developed after 15 months from the start of the experiment. The second sarcoma appeared in the lower end of the femur of a rabbit, which had received 6 injections of mesothorium within 11 months, and was an osteoblastic sarcoma with many giant cells.

Jentzer reported in 1936 a sarcoma from the bones of the skull of a rabbit after the application of radium. Ross, who implanted into the thoracic wall of nine young rabbits radium needles, containing 0.1 mgm. of radium screened by 0.5 mm. of platinum for obtaining an almost pure gamma radiation with little beta-radiation, produced malignant neoplasms in six animals after two years of exposure. One of these reactions was an osteogenic sarcoma of the ribs, two were spindle-cell sarcomas, one was a myxosarcoma, and two were squamous-cell carcinomas.

Bauer mentioned a spindle-cell sarcoma of the femur of a guinea pig two years after the implantation of mesothorium. Daels and Biltris introduced by trepanation into the cavity of the skull of guinea pigs a mixture of radium with paraffin, diatomaceous earth, and arsenious acid, and observed after 15 months and 30 months, respectively, in two animals the development of a tumor, one being a periosteal fibrosarcoma, and the second, a meningeal osteogenic sarcoma. Hellner produced an osteogenic sarcoma of the region of the knee in a rabbit which had received 2,480 mgmhrs. of radium over the region of the knee joint. The neoplasm was an osteoplastic, spindle-cell sarcoma with areas containing polymorphous and giant cells, and produced pulmonary metastases.

The experimentally produced osteogenic sarcomas of radioactive origin resemble histologically and biologically the corresponding tumors observed in man under occupational conditions. The latency period of the experimental sarcomas is somewhat shorter (11 to 36 months) than that of the human radium sarcomas (upwards to 60 months). The difference observed does not show a proportional relation to the difference in the normal life spans of man and rabbits.

XII. PROGNOSIS

The prognosis of radium poisoning caused by the oral ingestion of radioactive substances depends upon the amounts retained in the organs, and upon the character of the radioactive material introduced. The prognosis is not quite as serious when mesothorium is present as when radium is stored. The half-time of mesothorium is 6.7 years, that is, the radioactivity of this substance is spontaneously cut in half after the elapse of this period, while there occurs no appreciable decrease in the radioactivity of radium within the lifetime of human beings, as the half-time of radium is 1,750 years. If a radium poisoned individual survives the more acute hazards, resulting from the development of an anemia or septicemia, his ultimate prognosis is determined by the po-