

an interval of 18 months. The rapidly, infiltratively, and osteolytically growing tumor proved to be a spindle-cell sarcoma, originating from the periosteal tissue and characterized by a marked irregularity in the size and shape of the component cells. Areas of cartilaginous, osteoid, and osseous tissue were found within the neoplastic tissue.

The same investigators, using in a subsequent experiment twenty-two rabbits, placed into a small cavity, which they had chiselled into the trochanter of the femur, a plug of radioactive vaseline which contained in fourteen cases 2 to 5 micrograms of radium, and in eight rabbits similar amounts of mesothorium. The first osteogenic sarcoma in the exposed bones was observed 19 months later. A total of 5 sarcomas was obtained, that is, 31 per cent of the treated animals (22) developed tumors. Three of the sarcomas were of the osteoplastic type, while the two others were spindle or polymorphous cell sarcomas, the latter forming earlier widespread metastases than the former. There were no secondary neoplastic deposits in other bones, while ossifying and non-ossifying metastases were found in the lungs, spleen, liver, kidney, stomach, thyroid, and in numerous lymph nodes. The experimental tumors conformed therefore in metastatic respects to the osteogenic sarcomas seen in man. The metastases did not contain any radioactive material.

In a third communication, Uehlinger and Schürch reportedly obtained sarcomas in 50 per cent of the animals surviving the exposure to radioactive material a sufficiently long time. There were nine sarcomas present, four were fibrosarcomas, four were differentiated osteogenic sarcomas, while one consisted of large oval cells of rather uniform size, basophilic cytoplasm, and large oval nuclei with dust-like, chromatic nucleoli. This neoplasm had no stroma, but many necroses present in the greyish-white nodes were found in the marrow of several bones, the lung, kidneys, liver, spleen, and ovaries. The tumor was considered a reticulum-cell sarcoma of the bone marrow (Ewing's tumor).

In a subsequent report of Uehlinger and Schürch published in 1938, these investigators had obtained metastasizing osteogenic sarcomas in fourteen out of twenty-one rabbits with implantations of radioactive material into the femur. The variations in the dose (0.0001 to 0.0005 mgm. of mesothorium) used in the different animals did not influence the incidence and latency period of tumor formation. Mesothorium and radium displayed the same cancerigenic effects. The lethal period varied from twenty-one to twenty-nine months for the different animals.

Similar results were obtained by Sabin, Doan, and Forkner, who injected five rabbits intravenously with 5.1 micrograms of radium chloride weekly and four rabbits with 7.7 micrograms of mesothorium once a month. Of seven rabbits surviving for 11 to 19 months, two exhibited osteogenic sarcomas. One of the cancerous animals, which had received 14 injections, showed radioactive, brittle bones containing a gelatinous, aplastic marrow in the long bones, while