penetrating into the lungs and metastasizing into the abdomen. The third chicken had sarcomas in the irradiated area of the abdominal wall.

Special mention must be made of the production of sarcomas of the connective tissue by the experimental introduction of colloidal thorium dioxide, which is used under the trade name "thorotrast" for diagnostic visualizations of the liver, spleen, mammary glands, and brain (hepatosplenogram, encephalogram, mammogram, and ventriculogram) (Radt). The degradation products of thorium dioxide emit alpha rays, which are more penetrating than those given off by the radium series, and which are 10,000 times more injurious to tissue cells than the therapeutically used gamma rays. The amount of thorium dioxide commonly used for diagnostic purposes in man has an alpha ray activity equivalent to that possessed by 1.5 to 3 micrograms of radium (Taft; and Editorial, J.A.M.A.).

Roussy, Oberling, and Guérin injected 50 white rats intraperitoneally and subcutaneously, respectively, with a thorium dioxide solution. They found that after 10 to 17 months seven animals of the subcutaneous group had sarcomas at the sites of injection, while four survivors of the intraabdominal series of ten rats exhibited intraperitoneal sarcomas. There existed a direct relation between the dose of thorium dioxide administered and the incidence of tumors obtained: whereas 65 per cent of the animals injected with 2.5 cc. of the thorium dioxide solution developed sarcoma, 100 per cent of the animals exhibited such a result after the injection of 5 cc. of this agent. Some of the sarcomas were polymorphous-cell tumors containing cellular monstrosities, and were situated in the vicinity of thorium granules. Other intraperitoneal neoplasms exhibited the structure of fibrosarcomas containing numerous mitotic figures, and were attached to the omentum, mesentery, and wall of the intestine, that is, in regions of the abdominal cavity, where the thorium dioxide was apt to be precipitated and to settle because of its high specific gravity. The injection of 0.2 cc. of thorotrast into the nipple of nine guinea pigs was followed after three years by the development of neoplasms in four of these animals. Three of the tumors were fibrosarcomas, while the fourth was a carcinoma of the breast. Selbie injected 0.3 cc. of thorotrast subcutaneously into 60 rats and 0.1 cc. into 60 mice, repeating this procedure after two weeks. After 14.5 months there were fibroblastic tumors present in the subcutaneous tissue of 14 rats, while only two tumors (carcinomas) were found in the injected mice, one being manifest after nine months and the second 14.5 months following the injection of the radioactive agent.

IV. PHYSICAL TRAUMA

Benign Tumors: Fibroma. The traumatic genesis of solitary, benign, fibroblastic tumors (fibromas) is a controversial subject. While Würz contended that trauma is never involved in the causation of these neoplasms, Graef conceded that some of them might have a traumatic origin. Sontag and Ten-