J1C 1098 EFFECTS OF HEAVY PARTICLE RADIATION ON TUMORS AND ABNORMALLY FUNCTIONING TISSUES: CUSHING'S DISEASE. John A. Linfoot (California. Univ., Berkeley. Donner Lab.). Contract W-7405-eng-48.

The advantages of heavy particle therapy over conventional electromagnetic irradiations used in radiotherapy is being clinically investigated. Accelerator produced charged heavy particles can be focused to travel in a straight path as a beam of particles with great penetration and little scatter. By the use of adsorbers these charged particles can additionally move to stop at any depth in tissue producing greatly increased ionization at the peak of this Bragg Effect. Utilizing either the "straight-through" beam in rotational therapy or the Bragg Effect with or without rotation, much higher doses of radiation can be safely used in therapy than is possible with electromagnetic radiating such as X-ray or gamma rays. Heavy particle irradiation is being used for the irradiation of the pituitary in acromegaly, Cushing's Disease, and chromophobe adenomas of the pituitary and in metabolic disease such as diabetic retinopathy, metastatic breat and prostatic carcinoma where these are sensitive to hormal control through the pituitary or the endocrine end organs of the pituitary. Heavy particle irradiation is being used for direct tumor irradiation at other sites in the body where the tumor boundaries can be adequately delineated. Thus far they have been limited to brain and skin tumors. Heavy particle irradiation has also been used for the creation of discrete lesions in the hypothalamus for the control of kinetic disease such as Parkinson's Disease.

Endocrine assay procedures have been used and in some instances developed for the evaluation of pituitary and target end organ function and as a means of assessing the effects of pituitary destruction or suppression in the above diseases. 377 patients have had heavy particle therapy. In the series of 44 patients with acromegaly, 90 percent have had a complete amelliorization of their disease process establishing heavy particle irradiation to the pituitary as being the optimal form of treatment at the present time. Highly successful results have also been achieved in Cushing's Disease and chromophobe adenomas. The results in diabetic retinopathy are promising, but require longer follow-up for definitive evaluation.