the significance of the shape of the curves can not as yet be published. Suffice it to say that the phenomena observed are constant and easily reproducible so that the evidence at hand indicates that the electrical changes in the finger provide a new and useful method for studying circulatory changes.

Summary. The alternating current bridge offers a method of studying the peripheral circulation, and of recording changes produced by physiological and pharmacological agents.

9353 P

Leucocytic Infiltration of Irradiated Mouse Sarcoma 180.

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In tissue cultures of the Crocker Mouse Sarcoma 180 a pronounced difference was found in the numbers of blood granulocytes which migrated from explanted fragments of tumors irradiated *in vivo, in vitro,* and of untreated controls.

The tissue culture method affords a ready means of detecting the presence of leucocytes in a given tissue. The polymorphonuclear leucocytes are the first cells to migrate from the explant into the surrounding plasma medium and, if present in large numbers, form cloud-like masses extending beyond the periphery of the explant within a few hours after incubation. This method was recently used as one of the means of determining the accumulation of leucocytes in various mouse tumors which had been injected with starch.[1]

The tumors used were growths which had developed for about 10 days after subcutaneous inoculation. Their size varied from about 5 to 8 mm. in gross diameter. Sarcoma 180 is a rapidly growing tumor which spontaneously undergoes partial necrosis. In selecting fragments for tissue culture, care was taken to note whether they were from necrotic or from non-necrotic regions for comparisons with irradiated or non-irradiated specimens.

Studies were also made of a large number of histological sections of tumors removed at hourly intervals after irradiation. These were compared with untreated tumors of similar ages and also with tumors irradiated after extirpation.

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[1] Chambers, R., and Grand, C. G., *Am. J. Cancer,* 1937, **29**, 111.

Irradiation of the tumors by X-rays was done through the courtesy of the Memorial Hospital, New York City, according to the technique recently described by Sugiura.[2] Single dosages were given. They varied between 1500 to 2800 roentgen units of hard X-ray.

Untreated tumors of various ages grown in tissue culture showed very little evidence of outwandering granulocytes irrespective of whether the fragments used were from necrotic or non-necrotic regions. A similar scarcity of typical blood granulocytes was observed in histological sections of the tumors in the younger tumors, showing incipient regions of necrosis, and also in advanced tumors with extensive necrotic regions. In the necrotic regions, which were frequently extensive in the older tumors, there were clumps and scattered granules of hematoxylin-staining material, but very little of it could be definitely identified as blood granulocytes. The same was true for the marginal zones between the necrotic and non-necrotic regions. This lack of identifiable blood granulocytes accorded with the results from the tissue cultures in which only an occasional outwandering granulocyte could be distinguished around the explants of either necrotic or non-necrotic tissue.

Tumors irradiated after extirpation showed a similar scarcity of blood granulocytes.

The tumors irradiated *in vivo* were removed at hourly intervals and then daily, up to 15 days after the treatment. The tumor tissue was then either fixed for sectioning or used for tissue culture.

Very few blood granulocytes were observed in tissue cultures of tumors removed within 6 hours after irradiation *in vivo*. Those of tumors removed at hourly intervals beyond 6 hours showed a progressive increase in outwandering blood granulocytes until, in those removed 24 to 48 hours after treatment, the blood granulocytes appeared about the explant in relatively large numbers. It was also found that the longer the tumors had remained *in situ* after irradiation *in vivo*, the sparser was the outgrowth of the true sarcoma cells. The amount of sarcomatous growth was in inverse proportion to the abundance of blood granulocytes present. In cultures which showed outgrowths, both of granulocytes and of sarcoma cells, the granulocytes were more abundant in zones where the sarcomatous outgrowth was sparse and vice versa.

The increase in numbers of blood granulocytes was also observed in histological sections of the tumors. In tumors removed 12 to 48 hours or later after irradiation the granulocytes appeared in masses irregularly dispersed throughout the tumors in regions where the

2 Sugiura, K., *Radiology*, 1937, **28**, 162.

sarcoma cells were beginning to undergo pycnosis. Typical blood granulocytes were in the extensive necrotic regions, but they were most abundant in zones surrounding the necrotic regions and were also present in spaces between morphologically normal appearing sarcoma cells bordering the necrotic regions. In these necrotic regions could also be observed the irregular, hematoxylin stained material described for the necrotic regions of untreated tumors. The blood granulocytes were present in quantities throughout the degenerative changes of the irradiated tumors.

Tests to exclude the possibility that the leucocytic response was due to possible infection of the irradiated tumors were made by bacteriological agar slants. These were uniformly sterile. Moreover, the tissue cultures, in which bacterial colonies develop rapidly and very early, were sterile during their maintenance for over a week. The cultures closely resembled those of fragments of starch-injected tumors in which sterile precautions were rigorously maintained.

These findings indicate that irradiation of Sarcoma 180 induces changes which call forth an accumulation of blood granulocytes in the tumor. The question is still open whether the accumulation is the cause of or subsequent to the necrotic changes. The fact remains that granulocytic response and necrosis accompany one another in the irradiated tumors while they do not in the spontaneous necrotic changes of non-radiated tumors of Sarcoma 180.

9354 P

Rôle of Arteries in Peripheral Resistance of Hypertension.

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It seems established that arterial hypertension must be due to an increased peripheral resistance, but which part of the vascular bed is concerned in this increase is still somewhat uncertain. Evidence on the whole supports the view that it is due to arteriolar constriction, but some workers believe that the larger arteries also become narrowed in hypertensive conditions.[1]

Our observations represent an attempt to ascertain whether or not the larger arteries are involved in the production of the increased

[1] Weiss, S., Haynes, F. W., and Shore, R., *Am. Heart J.*, 1936, **11**, 402.