Research Centre for supplies of locusts and for a research studentship for one of us (D. J. C.).

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Iodine-131 Clearance-rates as an Indication of the Blood Supply of Bone

WE have described[1] the use of sodium-24 clearance studies in the experimental and clinical determination of bone vascularity. Sodium-24 has a half-life of only 15·06 hr. and in the United States is only available from Oakridge National Laboratory on one day of each week. Thus it is difficult to use it for clinical investigation if more than three half-lives have transpired since its removal from the pile. This led us to search for an isotope with a longer half-life that could be used for clearance studies. Iodine-131 is readily available in most large hospitals, where it is used for the investigation and treatment of thyroid diseases. The half-life of iodine-131 being 8·0 days, it is more suitable for clinical use throughout the week than is the short-lived sodium-24.

Iodine-131 emits beta-radiation of 0·6 MeV. and gamma photons with peaks of 0·367 and 0·080 MeV.

These gamma photons can be counted from the body surface and thus the clearance-rate from an injected site can be followed. Douglas and Meneeley[2] have used iodine-131 to measure the blood flow in skin flaps in plastic surgical procedures. The potential clearance of iodine-131 should be greater than that of sodium-24 as the latter must arrive at an equilibrium with the sodium of local tissue fluid; this is not a factor with iodine.

Animal experiments were undertaken to determine the suitability of iodine-131 injected as the sodium salt for clearance studies in dog femoral heads. The procedure used was the same as described previously[1]. A dose of 5 μc. iodine-131 in 0·1 ml. as sodium iodide was used and good readings obtained from the hip joints. The metal syringe previously described was used. With refinements of technique the dose of 50–100 μc. sodium-24 previously used has also been reduced to 5–6 μc. for human use. The results are shown in Fig. 1 for twenty-eight hips in 21 dogs. The same three groups of clearance values emerged as had been found with the sodium-24 clearance studies. Thirteen femoral heads were vascular with clearances of 30·9–72·9 per cent in 10 min. Ten femoral heads were completely devascularized with clearances less than 9 per cent. Two of these showed a slow rise in count of a few per cent, presumably due to diffusion of the iodine-131 through the dead femoral head, thus coming nearer to the surface of the bone during the counting period.

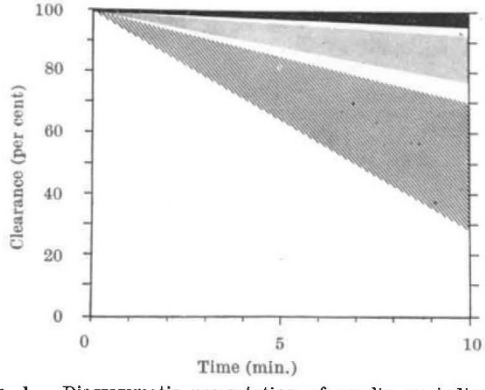

Fig. 1. Diagrammatic presentation of results on iodine-131 clearance of dog femoral heads. Black area shows avascular heads with less than 5 per cent clearance; cross-hatched area shows partially devascularized heads; and the stippled area shows the clearance in normal vascular heads

From these preliminary results there seems no objection to the use of sodium iodide-131 for the determination of the blood supply of bone in human patients. The dose of 5 μc. is small and safe and allows easy surface counting with a scintillation probe containing a 2-in. thorium-activated sodium iodide crystal. Uptake of iodine-131 by the thyroid may be prevented by pre-operative administration of iodides to the patient. Excretion of the injected sodium iodide-131 will then take place rapidly through the kidneys, thus ridding the body of the radioactive salt.

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Aqueous Humour of the Hippopotamus

THE opportunity recently arose to analyse the eye fluids of the hippopotamus (*Hippopotamus amphibius*). Specimens were chosen for analysis only from animals that had been killed instantaneously, and whose ocular fluids could be removed within a couple of minutes of death. Simultaneously, arterial blood was collected anaerobically from a suitably placed bullet wound. The average volume of fluid in the anterior chamber of the eye was 1 ml.

The fluids were analysed for potassium with a flame photometer, for total carbon dioxide by Conway's microdiffusion method, for chloride by the method of Schales and Schales. Total plasma proteins were estimated by van Slyke's copper sulphate method and corrections for the total solids of the fluids were made, so as to allow the ionic constituents to be expressed as m.moles/kgm. water. The figures in Table 1 were obtained.

The figures for carbon dioxide and chloride are in keeping with those found by Davson and Luck[1] in other animals with eyes of this size and proportion. (Average weight of globe 18·0 ± 1·8 gm. (*S.E.*) average weight of lens 0·95 ± 0·05 gm., from 4 hippopotamuses). The ratios, however, for potassium in the aqueous water/potassium in plasma water are,