TABLE 1. EFFECT OF PHENOBARBITAL (Phb) ON LIVER SIZE AND Ga-67 UPTAKE

Group		grams	% BW	% dose	% dose / g	% dose / g	adjusted†
n = 10							
Control:	mean	1.4736	0.0624	13.43	9.37		—
	sem	0.10	0.0015	0.61	0.55		—
n = 9							
	mean	1.6470	0.0765	12.03	7.46		8.45
Phb treated:	sem	0.12	0.0020	0.83	0.59		0.67
	P	>.2	<.001	>.2	<.05		>.2

* P is the probability that difference from control is due to random error.
† Refer to text.

($p < .001$) in the phenobarbital mice than in control mice. Therefore the barbiturate effect on microsomal enzymes and SER mentioned may be assumed to have occurred.

When computed, the uptake of Ga-67, measured by % dose/g, was significantly less ($p < .05$) in the treated livers than in the control livers. But if the treated liver weight is adjusted to what a similar control weight would be, using the formula:

$$\text{adjusted wt}_i = \text{treated liver wt}_i \times \frac{\text{ave. control wt.}}{\text{ave. treated wt.}},$$

and the % dose uptake/g for adjusted liver weight is then recomputed, the control and phenobarbital groups are not significantly different. This suggests that the apparent decrease in uptake could be explained by a dilution of Ga-67 binding sites. Because there is an increased concentration of liver proteins and enzymes without additional uptake of 67-Ga, a specific binding site is implicated here as in previous papers, but the subcellular binding site for Ga-67 is not the microsomal enzymes, SER, or any other cell component increased by phenobarbital treatment.

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FOOTNOTE

* Significance is measured with the Student's t-test.

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Saphenous Vein Varicosities—The Use of Tc-99m-RBC Blood-Pool Imaging for Evaluation and Followup

There are two main venous systems that channel the blood return from the lower limbs: the superficial veins in the superficial fascia immediately beneath the skin, and the deep veins, which always accompany arteries and are usually enclosed in the same sheath. Venous dilatations, or varicosities, of the superficial system are a consequence of disruption of the normal blood return and may or may not be symptomatic. The treatment possibilities for those cases in which they are symptomatic are various, including conservative, sclerosing, and/or surgical procedures. Before the physician is able to make his choice of treatment, the patient must be subjected to a thorough clinical examination, which

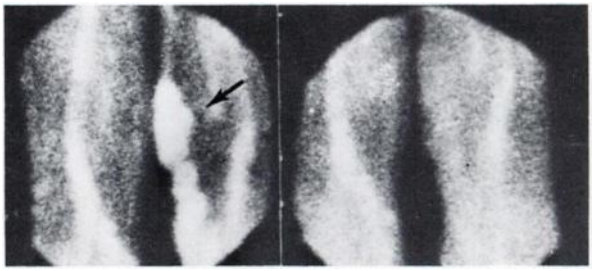

FIG. 1. Posterior view of varicose veins of right leg. Left: Immediately before sclerotizing treatment, arrow pointing to varicose vein. Right: 3 wk later; disappearance of blood pool of varicose veins is evident.

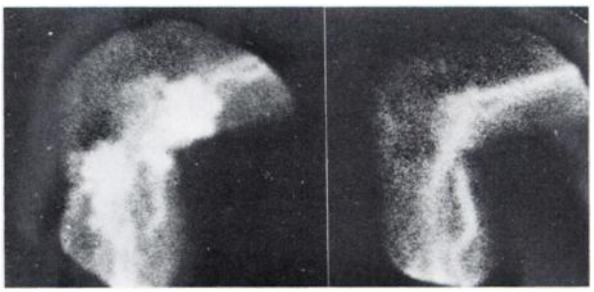

FIG. 2. Internal lateral view of severely dilated veins of right knee. Left: Before treatment. Right: 2 mo after sclerotizing injection.

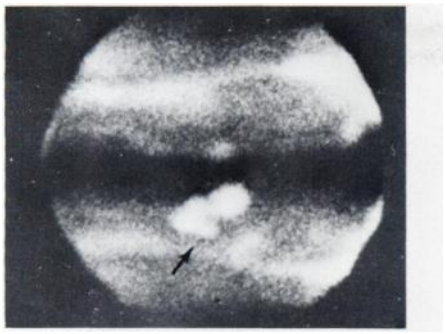

FIG. 3. Posterior view of legs 3 hr after treatment with sclerotizing agent (Variglobine) in patient with blood labeled in vivo before treatment. Induced extravasation is seen as area of markedly increased activity in left leg (arrow).

may include venography, to obtain information concerning the extent of the disease, the location of perforants, and the condition of the valvular system.

A noninvasive method for the visualization of the blood pool of the dilated superficial venous system, not accompanied by arteries, is provided by the labeling of red cells, either in vitro or in vivo, with Tc-99m.

MATERIAL AND METHODS

The study involved 16 patients with varicose veins, 14 who were treated with sclerosing agents and two who underwent stripping.

In the first eight patients, previously separated red blood cells labeled in vitro with Tc-99m were used. With this method the activity of the 15-min sample was found to be more than 93% of the injected dose, while the labeling yield (RBC activity/whole-blood activity) was 95–97%. The biologic decay was found to be biexponential, in which 40% of the activity cleared with $t_{1/2} = 3$ hr and 60% with $t_{1/2} =$ 60 hr. Subsequently the method of in vivo labeling of red blood cells described by Pavel et al. (*1*) was used, and later that of Jones et al. (*2*). In this procedure, a preparation containing 10 mg of pyrophosphate and 1 mg $SnCl_2$ is injected into a forearm vein, and 30 min later 15 mCi of sodium pertechnetate are added by a slow injection through the same route. The 15-min activity and labeling yield were not significantly different from those obtained using the in vitro kit. The biologic decay was monoexponential, with a $t_{1/2}$ of about 50 hr. Imaging was performed shortly after injection of the Tc-99m, usually with the patient standing. Serial anterior, posterior, and lateral views were obtained. A gamma camera with a 30-cm field of view was used with the multipurpose low-energy, 10,000-hole collimator, which provides 150,000 events per view in 1½–2 min. Blood-pool studies were made immediately before the treatment procedure and from 2 to 4 hr afterwards, with no need for reinjection. A followup study was also made 2 wk to 2 mo later.

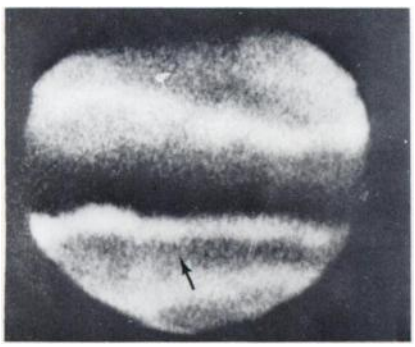

FIG. 4. Anterior view of legs obtained 2 hr after stripping of right saphenous vein in patient whose blood was labeled in vivo before stripping. Activity present in tissue surrounding vein (arrow) probably represents local bleeding in operated thigh.

RESULTS AND DISCUSSION

This noninvasive method provides a clear picture of the anatomy of the affected superficial veins and the extent of their increased blood pool. The followup studies were found to constitute an easy, objective means of determining the modification in blood pool that had taken place subsequent to treatment (Figs. 1, 2). In the obese patients, in whom it was difficult to obtain purely clinical information, this method proved to be particularly useful in visualizing the varicose veins in the different positions. In six of the 14 patients in whom sclerosing agents had been injected, the immediate posttreatment study showed areas of higher activity at the site of injection, indicating the presence of extravasated blood, probably clotted (Fig. 3). In the two cases in which stripping was performed, the immediate posttreatment study, with no reinjection, proved to be an effective method of detecting local bleeding, evidenced by the presence of high activity throughout the tissue bed of the stripped vein (Fig. 4). The latter finding is now being further evaluated in cases of bleeding of unknown origin.

Ryo et al. (*3*) have extensively discussed the use of Tc-99m macroaggregates in the investigation of venous thrombosis and stasis, and they also reviewed the reports in the literature on the use of blood-pool imaging in arterial disease. The work presented here shows that blood-pool imaging can also be useful in investigating the superficial venous system.

It is concluded that in patients with saphenous vein varicosities, blood-pool imaging is a useful diagnostic and followup procedure.

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