TABLE 1. DISTRIBUTION OF VARIOUS RADIOPHARMACEUTICALS IN TURPENTINE-INDUCED ABSCESSES*

Pharmaceuticals	% dose (×10³)/gram (mean)			Ratio (mean)	
	Muscle	Abscess	Blood	Abscess/muscle	Abscess/blood
Ga-67 citrate (3)†	1.2	7.2	20.0	6.0	0.4
Tc-99m DTPA (3)	0.2	1.5	0.9	7.5	2.1
Tc-99m pertechnetate (3)	1.1	7.4	8.6	7.1	1.0
In-111 (pre-incubated with serum) (3)	0.4	11.5	22.2	27.3	0.5
Tc-99m minimicrosphere (4)	0.4	2.0	3.7	5.5	0.5

* Abscesses were 2 days old. Results were obtained 4 hr after i.v. injection of radioactive tracers and were expressed as mean.

† Numbers in parentheses indicate numbers of experiments.

Gallium-67 Accumulation in Inflammatory Lesions

In 1969, Edwards and Hayes (*1*) noted that gallium-67 accumulated in the involved lymph nodes of a patient with Hodgkin's disease. Since then, Ga-67 has been shown to localize in a variety of tumors as well as inflammatory lesions. Earlier studies (*2,3*) have suggested that the localization of Ga-67 in inflammatory lesions is due mainly to concentration of Ga-67 by polymorphonuclear leukocytes (PMN) at the sites of inflammatory reaction. In vitro studies of Ga-67 uptake, however, have consistently revealed that PMN do not significantly accumulate Ga-67, unless the plasma membrane permeability barrier is disrupted (*4,6*). Analysis of the abscess contents also reveal that the majority of Ga-67 is in the noncellular fraction (2,500 g supernate) (*4,7*). Furthermore, Ga-67 accumulates in inflammatory lesions of agranulocytotic patients, in which no PMN are found in the circulation or the sites of infection (*7,8*). After i.v. injection, Ga-67 binds to plasma proteins, notably transferrin (*8,9*), and less than 1% is associated with cellular elements (*10*). Based on the above observations, we have proposed (*10*) that accumulation of Ga-67 in inflammatory lesions is primarily due to leakage of protein-bound Ga-67 through capillaries with increased permeability as the result of inflammation. Once in the inflammatory site, Ga-67 is preferentially bound by nonviable PMN, with lesser amounts in bacteria and viable PMN. The remainder stays in the noncellular fraction (*10*).

If the above nonspecific mechanisms account for the accumulation of Ga-67 in areas of inflammation, one would expect that other radiopharmaceuticals should concentrate similarly and, indeed, this is the case (Table 1). In this study, abscesses were induced with turpentine in the inner aspect of one thigh of rabbits. Forty-eight hours later, the radiopharmaceuticals were injected intravenously through a marginal ear vein. The results shown in Table 1 were obtained 4 hr after injection of the radioactive tracers. In all instances, high abscess to normal muscle ratios were obtained.

Why is Ga-67 used almost exclusively for the localization of inflammatory lesions? Several factors make Ga-67 suitable, though not ideal, for this purpose: a) gallium-67 remains in the circulation long enough to allow sufficient amounts of it to be delivered to the sites of inflammation; b) the concentration of Ga-67 in the blood reaches low levels after 24 hr (*10*), so that the background activity is relatively low; and c) the 78-hr physical half-life of Ga-67 makes imaging feasible 2-3 days after injection.

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Missed Testicular Torsion Demonstrated by Scintigraphy

Missed testicular torsion is the postinfarction state caused by torsion of the testicle and a subsequent delay in diagnosis. Three cases of missed testicular torsion appear in a review by Holder et al. (*1*). In all of these cases the testicular radionuclide angiogram was described as normal. The static images showed a cold round area replacing the testicle, as seen in acute testicular torsion, with a variable degree of hyperemia surrounding the testicle.

Recently we imaged a patient with missed testicular torsion,

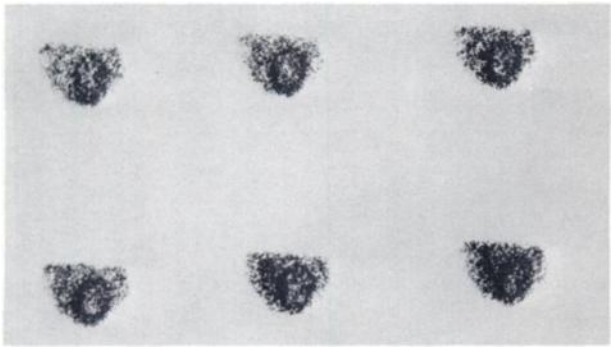

FIG. 1. Testicular radionuclide angiogram showing a halo of increased activity surrounding the left testicle.

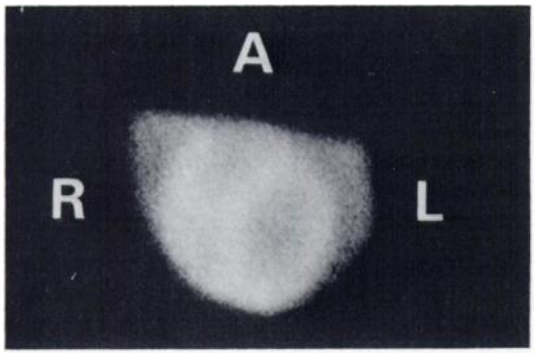

FIG. 2. Anterior static image shows a halo of increased activity in left hemiscrotum surrounding a core of decreased activity. Right testicle is normal.

who had an abnormal testicular radionuclide angiogram as well as abnormal static testicular images.

The patient was a 15-year-old white male who had a 12-day history of left scrotal swelling. Along with the swelling there was the sudden onset of nonradiating left groin pain, which subsided within 3 days. The swelling decreased but was still present at the time of our examination. No history of dysuria, hematuria, or trauma was elicited. On physical examination the left testicle was enlarged and rock hard.

[^{99m}Tc] pertechnetate scintiangiography was performed to evaluate perfusion of the left testicle. The patient was positioned supine with his scrotum supported by an inter-thigh sling and penis taped to his abdomen. The gamma-camera detector with converging collimator was placed above the patient. Ten millicuries of [^{99m}Tc] pertechnetate were administered intravenously. Dynamic images were recorded with data integrated for 5-sec intervals starting at the first appearance of activity within the field of view. An anterior static scintigram was then imprinted for 500,000 counts on completion of the dynamic study.

The dynamic image (Fig. 1) showed a striking annulus of increased activity on the left side. The anterior static image (Fig. 2) showed a similar ring of increased activity surrounding a core of decreased activity in the left hemiscrotum, as compared with the normal right hemiscrotum.

An orchidectomy was performed on the left testicle. From the clinical history, missed testicular torsion was suspected. Pathologic examination of the left scrotal contents showed marked vascular congestion and hemorrhagic infarction of the testes and epididymis. There was no evidence of a neoplasm with central necrosis or an organizing abscess that might appear similar.

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