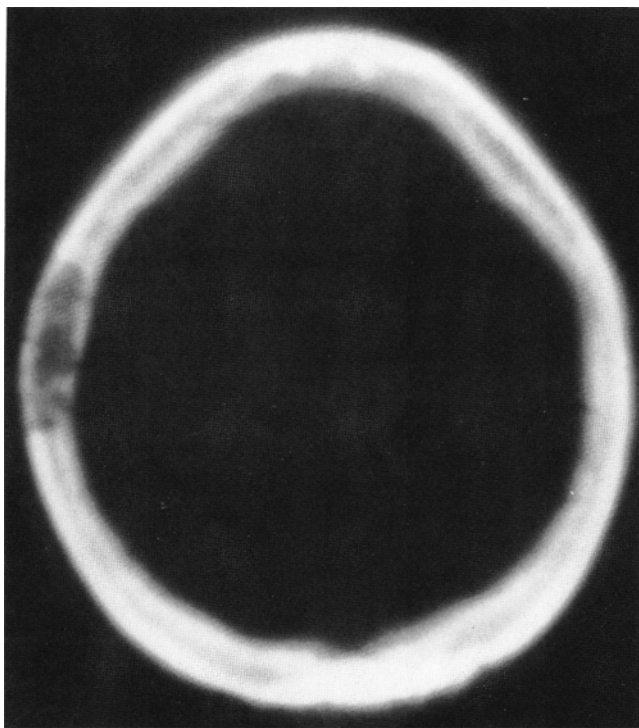


# Technetium-99m Labeled Red Blood Cells for the Detection and Localization of Cavernous Hemangiomas of the Bone

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**FIG. 1.** CT scan demonstrating the lytic lesion in the right temporal region of the skull.

Labeled red blood cells (RBCs) have already been proven useful in the detection and localization of many vascular abnormalities. One such abnormality is that of a cavernous hemangioma. Cavernous hemangiomas have a distinct circulation and have been found in many areas of the body. The ability to utilize this unique circulation is important to consider when choosing a diagnostic exam.

The following is a case report demonstrating the usefulness of labeled red blood cells for the detection and localization of cavernous hemangioma of the bone.

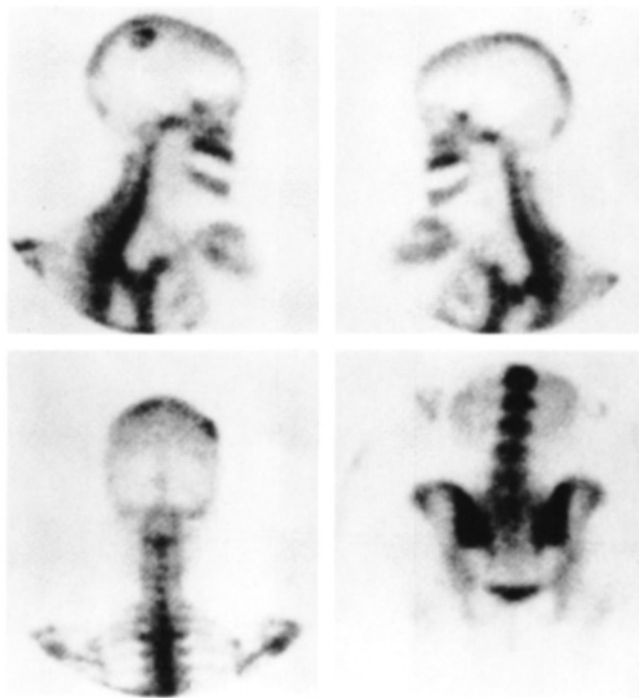
## Case Report:

A 31-yr-old female presented with a history of persistent generalized headaches for many years. About 1 yr prior to the exam, she noticed that her headaches had become more localized to the right side of her head. Physical examination revealed a palpable lump developing on the right side of her

head which was sensitive to the touch. The patient was then scheduled for a CT scan to be followed by both a bone scan and a  $^{99m}\text{Tc}$  blood-pool scan.

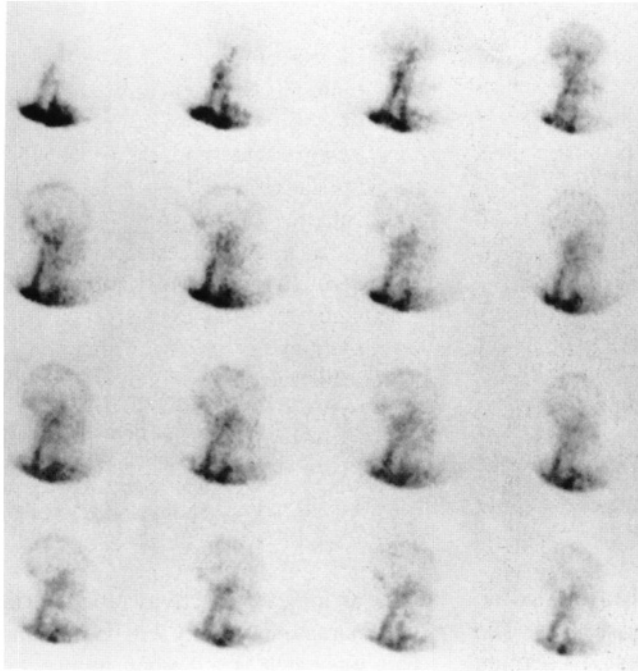
A CT scan utilizing contrast media was performed (Fig. 1). Images were obtained utilizing both bone and tissue windows. The CT scan revealed a defect described as a "lytic" lesion located within the diploic space, causing this area to expand, in addition to causing thinning and a slight inward displacement of the inner table with slight lysis of the outer table along the superior aspect of the lesion. No soft tissue component mass was seen. No other significant abnormalities were detected. The patient was also injected with 20 mCi  $^{99m}\text{Tc}$ -MDP for a bone scan, and images were obtained 3 hr postinjection (Fig. 2). The bone images demonstrated an area of increased activity in the right temporal region of the skull. The patient returned for a labeled blood-pool scan in which a sample of blood was drawn and labeled with  $^{99m}\text{Tc}$  using the Brookhaven Kit (1).

A flow study using 15 mCi  $^{99m}\text{Tc}$  labeled RBCs was performed in the right lateral position at 1.5 sec/frame for 32 frames (Fig. 3). Immediate blood-pool images (Fig. 4), 30-min (Fig. 5A), and 1-hr (Fig. 5B) delayed images were recorded.

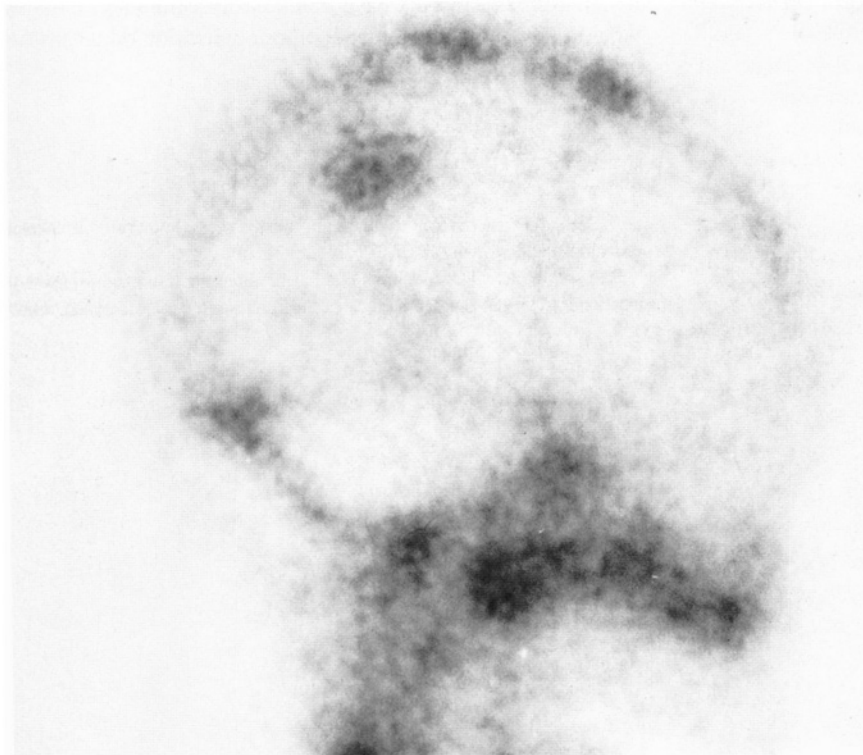


**FIG. 2.**  $^{99m}\text{Tc}$ -MDP bone scan showing an increase in activity over the right temporal region of the skull.

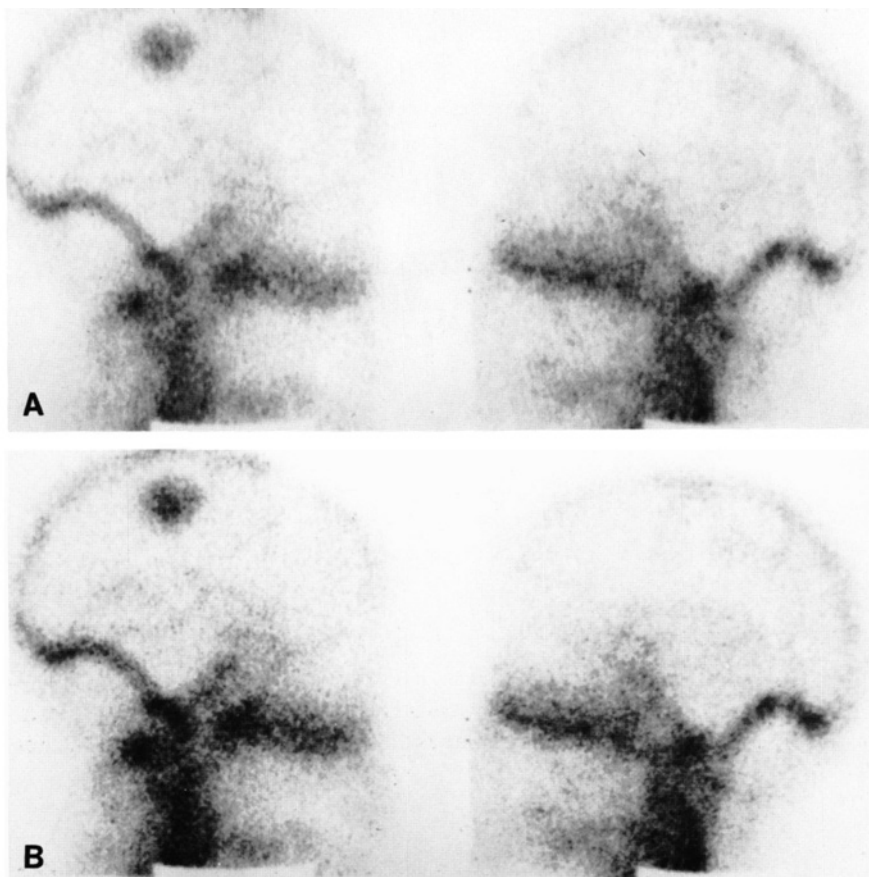
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**FIG. 3.** Right lateral flow study using  $^{99m}\text{Tc}$ -RBCs showing no focal areas of increased activity.



**FIG. 4.** Immediate blood-pool image in the same position, showing a focal area of uptake over the right temporal region of the skull.



**FIG. 5.** (A) 30-min, and (B) 1-hr delayed images demonstrating the continuous increase in intensity of the focal area of uptake (which correlates with the defects found on both the bone and CT scans).

The flow study on the labeled blood-pool scan showed no abnormalities and no focal areas of increased activity. The immediate, 30-min, and 1-hr delays demonstrated a definite focal area of increased activity in the temporal region of the skull. The defect found within the bony structure of the skull by both the CT scan and the bone scan correlated with the lesion demonstrated on the labeled blood-pool scan.

### DISCUSSION

The blood circulation of a cavernous hemangioma is consistently slower than that of normal circulation or tumor circulation. This slower circulation will reveal a normal or a decrease in flow, while the delayed images consistently demon-

strate an increase in activity reflecting the intense blood pool. This increase in activity will become more intense with time. This mismatch is a finding unique to that of a cavernous hemangioma (2). This case demonstrates the usefulness of labeled RBCs for the detection and localization of cavernous hemangiomas.

### REFERENCES

1. Smith TD, Richards P. A simple kit for the preparation of  $^{99m}\text{Tc}$ -labeled red blood cells. *J Nucl Med* 1976;17:126-32.
2. Front D, Israel O, Joachims H, et al. Evaluation of hemangiomas with technetium-99m-labeled RBCs: The perfusion—blood pool mis-match. *JAMA* 1983;249:1488-90.