

Tumor Localization in the Nasopharynx Using Radiomercury Labeled Chlormerodrin

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Various radioisotopes have been used with some success to establish the presence and position of brain tumors. These have included phosphorous 32 (1); iodine 131; iodine 131 diiodofluorescein (2); iodine 131 serum proteins (3,4), and iodine 131 antiserum (5); potassium 42 (6); arsenic 72 and 74 (7,8); and copper 64 (9). In 1960, Blau and Bender reported that radiomercury labeled Neohydrin (chlormerodrin) appeared to be an excellent agent for brain tumor localization using the mechanical scintiscanner (4). Mercury 203 and/or ¹⁹⁷Hg chlormerodrin has become the radioisotopic agent of choice for brain tumor localization. Subsequently, radiomercury chlormerodrin concentration has been recorded in neoplasms other than brain tumors (10,11). This report concerns the use of ¹⁹⁷Hg chlormerodrin in the scintiscan localization of head and neck tumors other than brain tumors.

MATERIAL AND METHOD

Thirty adult patients, 2 women and 28 men, with suspected lesions of the mouth, nasopharynx, or larynx were given brain-scanning doses (1 mc each) of ¹⁹⁷Hg chlormerodrin by intravenous injection. After a twenty-four hour wait to allow for optimal blood-background clearance of the isotope, each lesion was scanned with the patient positioned to best present his tumor to the scanning crystal. A mechanical scanner with a 3 × 2 inch sodium iodide crystal was used.¹ The thirty patients included 19 with squamous cell carcinomas, 5 with lympho-epitheliomas, 2 with reticulum cell carcinomas, 1 with juvenile angiofibroma, 1 with laryngeal papilloma and 1 with Wegener's granulomatosis. One patient subsequently proved not to have any lesion. Each patient's tumor was biopsied after the scintiscanning procedure. In addition, laryngograms or nasopharyngograms were obtained when indicated.

RESULTS

Table I lists the various tumors studied and the results of the scintiscans. Twelve of the patients with squamous cell carcinoma had positive scans while six had negative (normal) scans. One retained sufficient ¹³¹I from a previous thyroid scan to prevent proper interpretation of his ¹⁹⁷Hg chlormerodrin scan.

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Three lymphoepitheliomas concentrated enough isotope to be seen on scan and two did not. Reticulum cell carcinoma contained sufficient ^{197}Hg to yield a positive scan in one patient. The other patient with reticulum cell carcinoma presented a negative scan. The juvenile aniofibroma, a benign lesion, visualized on the scintiscan. The papilloma, the Wegener's granuloma and the normal nasopharynx each presented a normal scintiscan.

Figure 1 is an enface scan of a 16-year-old male with a lymphoepithelioma of the nasopharynx and soft palate which extends into the left retromandibular space. The central concentration of radioactivity outlines the soft palate inferiorly and extends superiorly into the nasopharynx. The retromandibular extension is to the left. Figure 2 is a scan of juvenile angiofibroma of the nasopharynx which concentrated ^{197}Hg chlormerodrin. A chlormerodrin concentrating tumor may be either a rapidly growing or a highly vascular lesion. In Fig. 3 the scan outlines a squamous cell carcinoma of the right hypopharynx and pyriform sinus. The laryngogram in Fig. 4 shows the distortion of the right hypopharynx and near obliteration of the pyriform sinus.

DISCUSSION

The employment of radioactive isotopes in the scan detection and localization of tumor tissue within the intact body is currently a part of the neurosurgeon's armamenta. The success of this technique is dependent upon localization of the radioisotope in tumor tissue in a greater concentration than is present in the surrounding tissue. Such specific localization is dependent upon

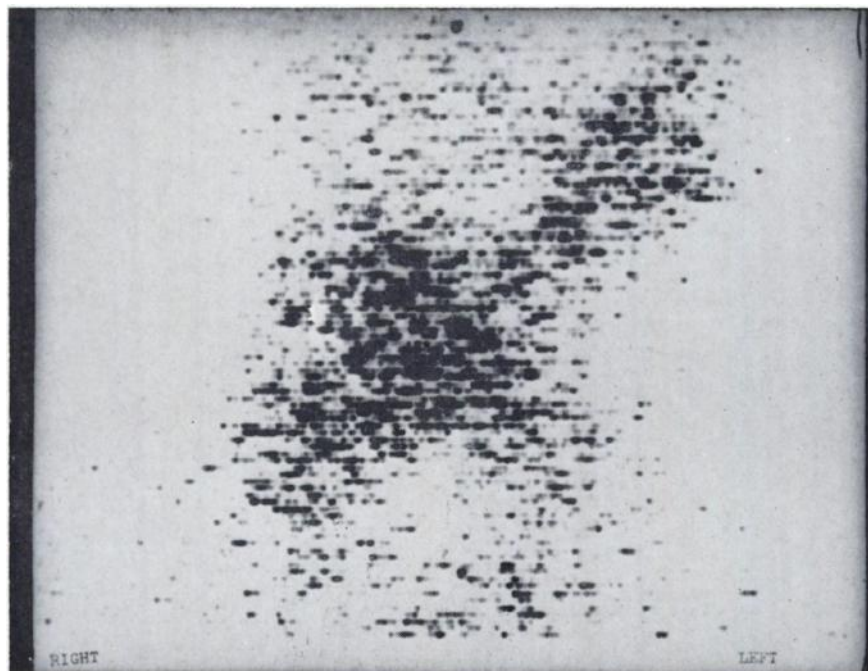


Fig. 1. ^{197}Hg chlormerodrin scintiscan of the face from the glabella to the mandibular symphysis. The patient has a lymphoepithelioma involving the nasopharynx and soft palate and extending into the left retromandibular space.

biological property of the tumor tissue which favors differential concentration of the radioactive scanning agent. Whether this isotope concentration is within or around tumor cells has not been demonstrated. The tendency for chlormerodrin to concentrate in tumor is not unique for this compound. The affinity of neoplastic tissue for porphyrins and metalloporphyrins has been described (10). Phosphorus 32 has been noted to concentrate in many types of tumors to some extent (12-15). Radioiodinated serum albumin and ^{203}Hg chlormerodrin have been markedly concentrated in varying tumors by pretreatment with hydrogen-peroxide (16). In addition to the degree of differential localization of ^{197}Hg chlormerodrin, the ability to detect a tumor by scintiscan will depend upon the size of the tumor and the proximity of the lesion to organs which concentrate the isotope as well or even better than the tumor concentrates it. Brain tumors are ideally situated away from large muscle mass, great vessels and other organs. Nasopharyngeal and laryngeal tumors also enjoy these advantages, but to a lesser degree. Chest, abdominal and extremity tumors are difficult to differentiate by scintiscanning using ^{197}Hg chlormerodrin as the agent. In the present study,

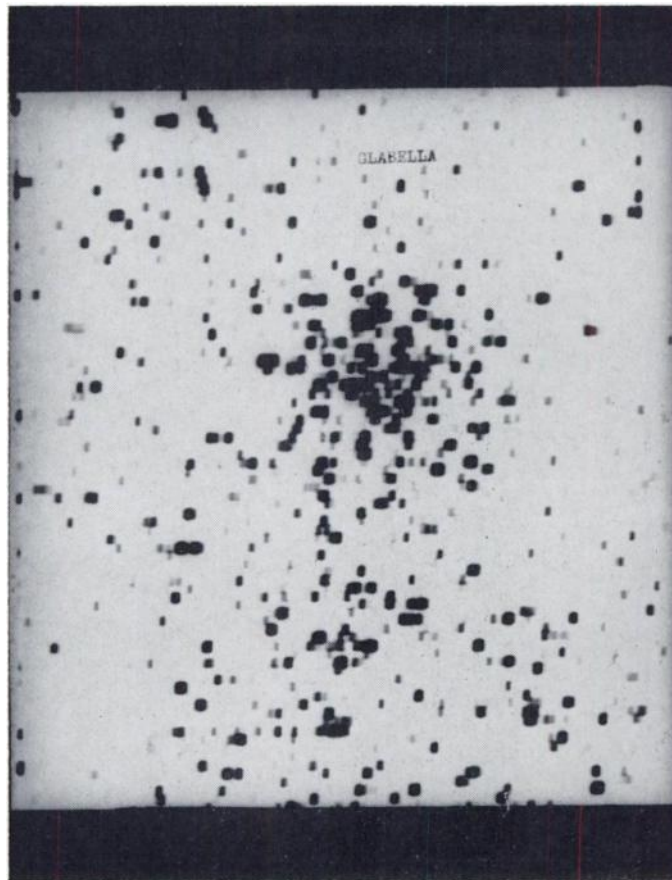


Fig. 2. A juvenile angiofibroma of the nasopharynx is demonstrated on this ^{197}Hg chlormerodrin scintiscan. This benign vascular lesion cannot be distinguished from a neoplasm by scintiscan.

well differentiated and poorly differentiated tumors were seen on scintiscan equally well. Therefore, the degree of anaplasia apparently cannot be distinguished by this technique. Some malignant tumors were not outlined by scintiscan. In addition, one highly vascular benign tumor also concentrated ^{197}Hg chlormerodrin. Scintiscan visualization cannot always be used to distinguish malignant tumors from benign lesions. However, in tumors which do visualize, the scintiscan helps provide a more accurate evaluation of the extent of the tumor (Fig. 1).

SUMMARY

Tumors of the head and neck, in addition to brain tumors, localize radio-mercury chlormerodrin and can be outlined on scintiscan. However, this technique was shown to be of limited value in determining the benign or malignant nature of a particular tumor. The degree of accuracy here in assuming the lesions with negative scans to be benign was 3 in 12 or 25 percent. In 25 malignancies, only 16 had positive scans with an accuracy of 64 percent. Except in one patient with juvenile angiofibroma, all of the tumors visualized were malignant. The scintiscan was positive in 16 of the 26 tumors ultimately shown to be malignant

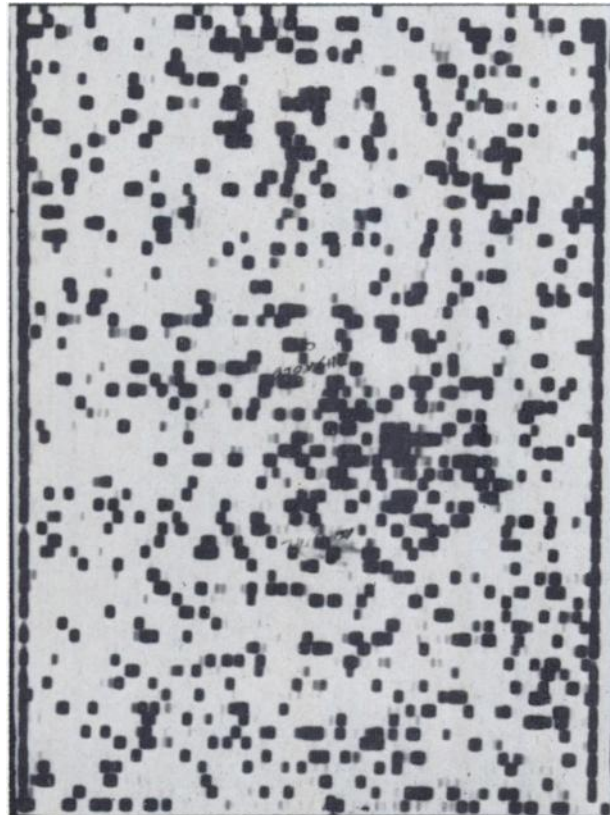


Fig. 3. This scan shows ^{197}Hg chlormerodrin concentration in a squamous cell carcinoma of the right hypopharynx extending into the pyriform sinus.

and 1 of the 4 benign tumors. One scan could not be interpreted because of interference from ^{131}I remaining in neck following thyroid evaluation. The precise mechanism of isotope concentration has not been demonstrated.

TABLE I
SCINTISCAN VISUALIZATION OF NOSE AND THROAT TUMORS

<i>Tumor Type of Biopsy</i>	<i>Positive Scans</i>	<i>Negative Scans</i>	<i>Total</i>	<i>% Accuracy**</i>
Squamous cell carcinoma	12	6	19*	63%
Lymphoepithelioma	3	2	5	60%
Reticulum cell carcinoma	1	1	2	50%
Juvenile angiofibroma	1	0	1	0%
Papilloma	0	1	1	100%
Wegener's granuloma	0	1	1	100%
No disease found	0	1	1	100%
Total	17	12	30*	67%

*Residual ^{131}I from thyroid studies made one patient's scan uninterpretable. **Assuming positive scan with malignant tumor and negative scan with benign lesion.

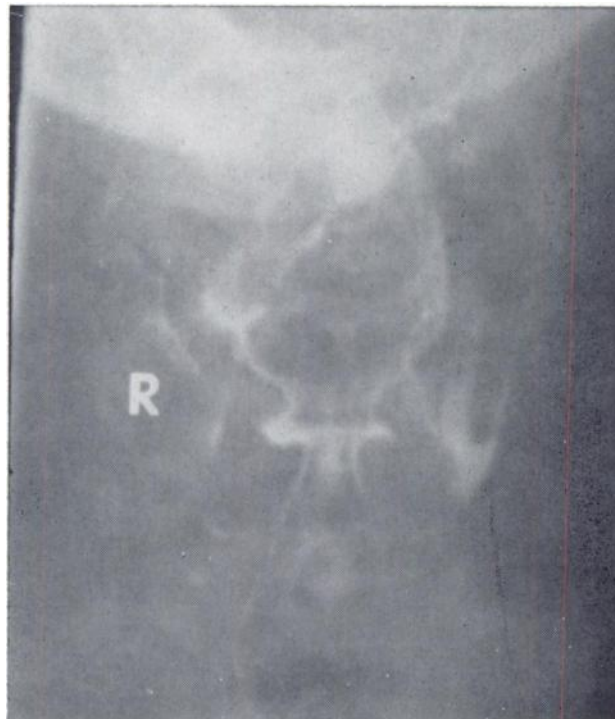


Fig. 4. This laryngogram demonstrates the same lesion outlined by the scan in Fig. 3. There is distortion of the right hypopharynx and obliteration of the right pyriform sinus.

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