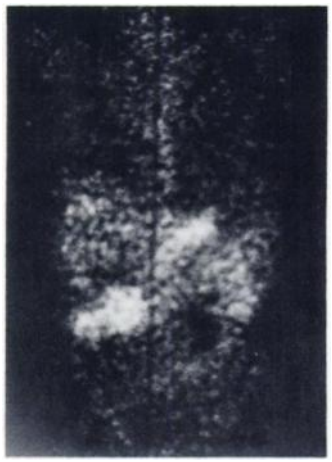

FIG. 2. Abnormal accumulation of tracer in right lower quadrant and epigastrium.

probably indicated the acute inflammatory changes secondary to Crohn's disease. The normal images 2 mo later reflect resolution of the inflammation by medical therapy. This report indicates the usefulness of Ga-67 imaging in assessing the course of inflammatory manifestations of Crohn's disease.

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Multiple Chemodectomas

Tumors of the chemoreceptor system are termed chemodectomas (nonchromaffin paragangliomas) (*1*). The paraganglion nomenclature was originally introduced to unite the adrenal medulla with extra-adrenal tissue that also reacted strongly with dichromate ions (*2*). Historically, the carotid body was included in the extra-adrenal paraganglion system. With the discovery of structures similar to the carotid body that did not react with dichromate ions, the paraganglia were subdivided according to their dichromate affinity (*3*). Those with great affinity were termed chromaffin paraganglia; those reacting weakly or not at all were termed nonchromaffin paraganglia. While only the carotid and aortic bodies have been positively identified as having chemoreceptor function, other nonchromaffin paraganglion tumors have been included in the family of chemodectomas by virtue of their histological similarity and their association with the parasympathetic components of the ninth and tenth cranial nerves (*4*).

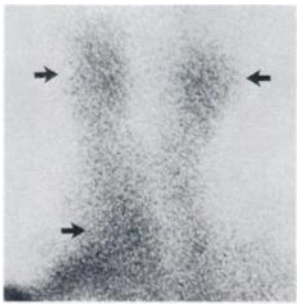

FIG. 1. Immediate postdynamic image (300,000 counts, Tc-99m DTPA) demonstrates tracer in three cervical masses (arrows).

Most chemodectomas are located in the head and neck, and are classified by their site (*5*) and ganglion of origin (*4*). Carotid-body (intercarotid paraganglion) tumors are the most common, with over 500 reported cases (*6*). Three hundred glomus jugulare and glomus tympanicum (jugular and tympanic paraganglia) tumors have been described. Other sites include the intravagal, aorticopulmonary, ciliary, and laryngeal paraganglia.

Few reports of chemodectomas exist in the nuclear medicine literature. Radionuclides cited in the investigation of chemodectomas include: Tc-99m pertechnetate, Ga-67 chloride, [^{75}Se] selenomethionine, I-131, and Tc-99m macroaggregated albumin (*7-10*). In four cases of tumor (three jugular and one intercarotid paraganglia), an abnormal flow study and early blood-pool images using pertechnetate have been demonstrated. A letter to the editor of this *Journal* referred to an instance of bilateral chemodectomas and warned of false-negative studies (*11*).

This report describes a patient with multiple chemodectomas (bilateral intercarotid and solitary right subclavian paraganglia). A 46-year-old woman was admitted to the Mount Sinai Hospital for evaluation of chest discomfort. She gave a 6-year history of progressive swelling of each side of her upper neck. On physical examination, bruits were heard over these masses. Another mass was palpated near the lower pole of the right thyroid lobe, which displaced the trachea to the left. No other abnormality was detected.

Radioangiography of the neck was performed by the intravenous injection of 12 mCi of Tc-99m DTPA into the right brachial vein. An immediate postdynamic blood-pool image (300,000 counts), centered over the patient's fully extended neck, was obtained. This image (Fig. 1) and the dynamic sequence demonstrated three regions of abnormal radionuclide concentration corresponding to the three cervical masses.

A thyroid scan was obtained by imaging the thyroid 20 min after the intravenous injection of 4.0 mCi of Tc-99m pertechnetate. The three masses are barely discernible (Fig. 2A). This contrasts with the more obvious abnormalities seen in the image obtained 20 min after the intravenous injection of Tc-99m DTPA (Fig. 2B). A gallium-67 citrate scan demonstrated increased cervical radionuclide concentration. A bone scan was normal.

Other investigations included ultrasonography, computerized axial tomography, and aortic arch contrast angiography. These identified the upper cervical lesions as intimately related to the bifurcation of the common carotid arteries, and the lower cervical lesion with the origin of the right subclavian artery. The characteristic appearance of the angiograms (well circumscribed, extensive vasculature, and location) established the diagnosis of chemodectoma (*12*). Catecholamine secretion was not associated with these tumors.

The patient described is unusual in having three chemodec-

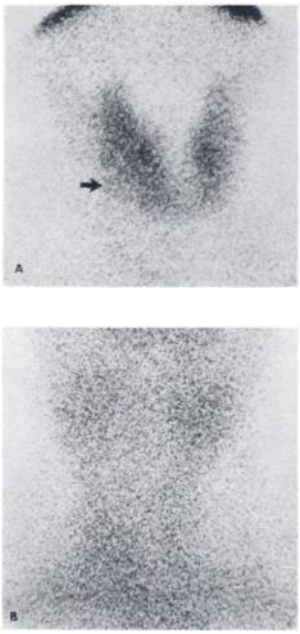

FIG. 2. A: Thyroid scan (100,000 counts) 20 min after Tc-99m pertechnetate). Thyroid is seen with right lower pole slightly indented (arrow). Cervical region otherwise is unremarkable. B: Neck scintiphoto, (300,000 counts) 20 min after Tc-99m DTPA. Activity is seen in three cervical masses.

tomas: a single right subclavian and bilateral intercarotid paraganglion tumors. An opportunity was provided to evaluate these chemodectomas with three radionuclides (Ga-67, Tc-99m pertechnetate, and Tc-99m DTPA); all successfully identified the lesions. Comparison of the images obtained 20 min after the intravenous injection of Tc-99m DTPA and pertechnetate demonstrated superior lesion visibility with Tc-99m DTPA.

These findings suggest a method of evaluating patients with possible chemodectomas. All such patients should be evaluated for multiple tumors, particularly if there is a family history of these, and those with multiple tumors should have their relatives examined for possible tumors (*11*). A radioangiogram of the cervical masses, together with immediate and delayed images, should be obtained. To exclude unsuspected additional paraganglia, the immediate and delayed images should include views of the aortic arch, skull base, and proximal upper-limb vessels. Technetium-99m DTPA is suitable for the flow study, and as compared with pertechnetate has the potential advantage of the absence of interference by thyroidal (laryngeal paraganglion detection) and salivary (jugular paraganglia detection) activity in the delayed images. It is also possible that the tumor/background ratio is superior with Tc-99m DTPA. This approach may be expected to reduce the likelihood of false-negative findings.

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Radionuclide "Dermal Backflow" in Lymphatic Obstruction

The use of radiotracers for the evaluation of the lymphatic system began shortly after World War 2. Recently, there has been renewed interest in lymphoscintigraphy because of new agents and modifications in equipment. The following case presents a radionuclide pattern demonstrated in lymphatic obstruction.

The patient is an 11-year-old boy with left-leg edema. The swelling began after an inguinal node biopsy 2 yr before the present evaluation. The biopsy specimen included several nodes and inflammatory tissue. The nodes showed reactive hyperplasia involving histiocytes, reticular fibers, and lymphatic cells. The picture was indicative of an inflammatory process. The patient's general health was always good and the physical examination was normal except for the edematous leg.

Routine laboratory analysis, roentgenograms, and venogram were normal. The patent blue foot injection demonstrated "dermal backflow" in the left leg and normal lymphatic staining in the right leg. No deep lymphatics could be demonstrated in the left leg. A Tc-99m sulfur colloid lymphogram was performed by injecting 0.75 mCi of tracer into the subcutaneous tissue of each foot (between the second and third toes). The images were obtained 2 hr after injection. The findings are illustrated in Fig. 1. The patient was treated with support stockings.

Contrast lymphography is an established technique and provides the standard for radionuclide lymphography. The classification of lymphedema into primary and secondary forms has been described previously and is accepted by most investigators (*1*). The cause of primary lymphedema is not firmly established, but most favor a developmental defect. This category is further subclassified into aplastic, hypoplastic, and hyperplastic forms (*2,3*). Some investigators, however, suggest that inflammatory changes in the lymphatics are responsible for the hyperplastic form of primary lymphedema (*4*). Consequently there are divergent classifications of lymphedema, because secondary lymphedema is traditionally thought to result from an obstructing disease process.

In our patient with lymphedema secondary to lymph-node excision, the radionuclide lymphogram demonstrated "dermal backflow" and a decreased number of nodes at the surgical site. Dermal backflow represents drainage through dermal lymphatic collaterals that are the final result of lymphatic obstruction. The