LETTERS TO THE EDITOR

TABLE. AGE, DIAGNOSIS, KIDNEY FUNCTION (GFR, RPF, FF*) AND SEPARATE RELATIVE KIDNEY FUNCTION IN SIX PATIENTS

<table>
<thead>
<tr>
<th>Patient Age</th>
<th>Diagnosis</th>
<th>GFR</th>
<th>RPF</th>
<th>FF</th>
<th>R/R + L</th>
<th>R/R + L</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. (yr)</td>
<td></td>
<td>(ml/min per 1.73 m²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>reflux (L), bilateral hydronephrosis</td>
<td>108</td>
<td>502</td>
<td>0.22</td>
<td>0.72</td>
<td>0.71</td>
</tr>
<tr>
<td>2</td>
<td>bilateral renal dysplasia large cyst L kidney</td>
<td>35</td>
<td>176</td>
<td>0.20</td>
<td>0.32</td>
<td>0.31</td>
</tr>
<tr>
<td>3</td>
<td>bilateral reflux</td>
<td>78</td>
<td>389</td>
<td>0.20</td>
<td>0.46</td>
<td>0.45</td>
</tr>
<tr>
<td>4</td>
<td>polycystic renal dysplasia</td>
<td>43</td>
<td>152</td>
<td>0.28</td>
<td>0.63</td>
<td>0.64</td>
</tr>
<tr>
<td>5</td>
<td>chronic pyelonephritis</td>
<td>20</td>
<td>85</td>
<td>0.23</td>
<td>0.01</td>
<td>0.12</td>
</tr>
<tr>
<td>6</td>
<td>nephrolithiasis and pelvic-ureteral obstruction</td>
<td>129</td>
<td>717</td>
<td>0.18</td>
<td>0.53</td>
<td>0.49</td>
</tr>
</tbody>
</table>

* GFR = glomerular filtration rate (measured with I-125 iotalamate)
RPF = renal plasma flow (measured with I-131 hippurate)
FF = GFR/RPF

FIG. 1. Comparison of relative function of right kidney in six patients determined by 125I-hippurate renography and relative uptake of 99mTc-DMSA.

for details). Gamma-camera images were recorded using a LFOV camera with a parallel-hole, low-energy collimator. A static image of 300,000 counts was digitally stored. The total count over each kidney was calculated after background subtraction. Thus the relative uptake of Tc-99m DMSA in the right kidney (R/R + L) is estimated. Data are given in the table.

The correlation between the relative Tc-99m DMSA uptake and the relative kidney function determined by 1-123 hippurate renography is presented in Fig. 1. These results show an excellent correlation (r = 0.99) between the relative function of each kidney and the corresponding relative accumulation of Tc-99m DMSA as measured in vivo. As is known, Tc-99m DMSA is a valuable tool for kidney imaging, but it also seems to have promising features for simple noninvasive in-vivo measurement of relative kidney function.

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REFERENCES


Evaluation of Acute Cardiopulmonary Toxicity of Microspheres

We read with interest the article by Allen, et al. (1) in the November issue of the Journal. They reached the conclusion that it took 2250 lung-scan doses (LSD's) of 15.8 μ particles to produce a 100% increase in pulmonary-artery pressure (PaP), but it took only 15 LSD's of 115 μ particles to produce the same effect. From a casual look at these figures, the effects, although not unexpected, are significantly large. This led Allen and coworkers to state, "We emphasize that the size and number of particles injected are the most critical factors in assessing particle toxicity and that particle size distribution in lung scanning radiopharmaceuticals should be carefully controlled."

We would like to point out that in a radiopharmaceutical preparation, if the quantity of reagents is controlled (e.g., as the amount of human serum albumin for MAA), the situation should not develop in which toxicity would result because the particles were larger than expected. The volume of a spherical particle is given by the relationship: volume $V = \frac{4}{3} \pi (\text{diameter}/2)^3$.

Number $N$ of particles in a given mass $A = \frac{A}{(V \times \text{density} \times d)}$.

If subscripts 1 and 2 indicate particles of diameter 15.8 and 115 μ, respectively:

$$N_1 = \frac{V_2}{V_1} = \frac{(115)^3}{(15.8)^3} = 385.6$$

or $N_2 = \frac{N_1}{385.6}$

Thus, 2250 LSD's of 15.8 μ particles

$$\frac{2250 \text{ LSDs}}{385.6} \text{ of } 115 \text{ μ particles}$$

are 5.8 LSDs of 115 μ particles

We agree with Allen and coworkers that the control of the
size of the particles is very important, since a preparation that had one LSD (14,000 particles/kg or about 1 million particles per human dose) of 15.8 μ particles will correspond to only 2593 particles of 115 μ diameter, which in turn would result in a completely unsatisfactory, patchy lung scan.

We conclude by saying that the control of the size of the particles is more important from the standpoint of image quality than of toxicity.

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REFERENCE


Localisation of Gallium-67 in Aspergilloma

Aspergillomas are cavities in the lung colonized by Aspergillus species, most frequently by A. fumigatus. It is commonly found in lung tissue destroyed by tuberculosis, sarcoidosis, pulmonary infarct, bronchiectasis, lung abscesses, neoplasm, lung cyst, pneumoconiosis, and histoplasmosis (1). The “fungus ball” has a characteristic appearance on chest radiograph and is confirmed by the presence of antibodies to A. fumigatus in serum. Increased concentration of Ga-67 citrate has been reported in a wide variety of pulmonary disorders and this communication reports gallium localization in an aspergilloma.

Eight years before this admission a 58-year-old man was successfully treated for atypical pulmonary tuberculosis caused by Mycobacterium Kansasii. Since admission, a chest radiograph and tomograms revealed a “fungus ball” (Fig. 1). However, tuberculosis was considered inactive. Because of persistent hemoptysis for 1 wk, he was admitted with the possible diagnosis of lung cancer. A gallium scan demonstrated increased concentration of the tracer in the right upper lobe, the same region as the “fungus ball” (Fig. 2). His right upper lobe was resected.

The surgical specimen was dissected, and tissue samples obtained from the “fungus ball,” lining of the cavity, and adjacent normal appearing lung tissue were assayed in gamma well counter. There were 417 cps per gram in the fungus, 215 in the lining of the cavity, and 83 in the normal lung tissue. Histologic examination of the “fungus ball” revealed septated branching hyphae consistent with Aspergillus species, numerous red cells, and a few inflammatory cells.

FIG. 1. Tomography of the right upper lung region demonstrating mycetoma with surrounding crescent of air.

FIG. 2. Posterior Gallium-67 citrate image showing abnormal uptake in the right upper lung field (arrow).

Localization of strontium in aspergillus infection of the lungs has been described (3,4) and has been recommended as an aid in the diagnosis of pulmonary aspergillosis (5). Rohatgi et al reported strontium uptake in other pulmonary disorders, however, and thus strontium is not specific in the diagnosis of aspergilosis. Since gallium also concentrates in a number of inflammatory diseases, it too is not specific but when increased gallium uptake is observed in a region of infiltrate on the chest radiograph, Aspergillus infection should be included in the differential diagnosis. Gallium studies may be of potential value in localizing extra pulmonary Aspergillus infection such as aspergillus cerebral abscess.

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REFERENCES


Absent Myocardial Uptake of T1-201 under Stress, in Spite of Anatomically Normal Coronary Arteries

This case report demonstrates a marked decrease in thallium-201 myocardial uptake during a severe heart attack of exercise-induced stress in a patient with normal coronary arteries.

A 48-year-old man presented with a 5-year history of progressive angina pectoris. Over the 2-mo period before his hospitalization he developed recurrent episodes of near-syncope, these being associated with angina precipitated by physical and emotional stress.

During stress thallium scintigraphy in a dedicated area within the Nuclear Medicine Department, at Bruce stage II and a heart