

Monday, Monday Can't Trust That Day With apologies to the Mamas and the Papas

TO THE EDITORS: I awoke this morning from a horrible nightmare in which I imagined that I had experienced the worst day ever at the office. On the one hand, it seemed so real, yet it obviously has no relationship whatsoever to reality. What could have caused this bizarre episode? Do I need an immediate PET brain scan?

8:20 am: Receive a call from a fellowship applicant. Grab a screening sheet and pen.

"Dr. Lear? Hi, this is Dr. Jones. My wife just got herself a job in your town and we'll be moving there around May. I was wondering about your fellowship program in nuclear medicine."

Motivation: above average

"Preparatory training? You mean medical stuff?"

Language proficiency: excellent

"Well, I did a year of surgical internship, then a year of psychiatric residency, and now I'm in an anesthesiology program."

Experience: diverse

"Now this two years, it isn't really two whole years, is it? I mean, I have a lot of previous training."

Commitment: I give up.

9:40 am: Called by receiving.

"Dr. Lear, there's a truck here from Ace shipping with a new gamma camera. Not yours? None for the past six years? Huh. Wait a minute. Oh, sorry, its for cardiology."

10:20 am: Have a conversation with a friend who is chief of nuclear medicine at a famous medical center of whom I inquire as to how they maintain referrals from certain clinical divisions.

"Jim, what we do is to sign up the interested ones for two years of credit in our program. It doesn't cost us anything since they get their faculty salary from their own department. No, they don't spend much time with us but they send patients to us and most are able to pass the boards."

Now I know why they have so many certified nuclear medicine physicians contributing to their fame.

11:15 am: The hospital director finally returns my call after 3 years.

"Great news, Dr. Lear! I think we can put that PET scanner you've been asking for in our budget within the next few years. Of course, you do realize that you'll have to switch your NIH grant from basic research to clinical PET and that your capital budget will be used up for the next 14 or 15 years."

11:50 am: Phone call is referred to me by the hospital switchboard.

"Dr. Lear? You're the chief of nuclear medicine at the University? Hi, I'm Dave Smith. I was wondering if I might spend a

few days with you to see how you do some of your studies. I'm opening an imaging office down the street and my NRC license isn't due in for another week. Nuclear medicine training? Oh, I took this mail order physics course and did my clinical preceptorship with an old retired buddy of mine over at his place in California."

12:30 pm: Get back from lunch and listen to voice mail from my wife.

"Jim, you know those radioactive rats that they sent back from the disposal site in Idaho and that you brought home because you didn't know what to do with them. Well, I was putting them down the toilet and one got jammed and what should I tell the plumber?"

1:50 pm: My chief tech needs to talk privately with me.

"Jim, sorry but I've decided to go work for Siemens as an applications specialist and I'll be starting next month. Maybe by then the hiring freeze will be over. Recent tech applicants? Well there was that person last summer, or was it the summer before? Anyway, I can go check the file; maybe he would still be interested."

3:10 pm: Receive a call regarding scheduling a study.

"Hi, this is Dr. Madison. I'm a new resident in neurology and I was wondering if I could schedule a functional brain study on one of my patients."

Finally!

"Now, on this request sheet, how do I spell 'spectroscopy'?"

4:30 pm: Receive call from our administrator regarding her briefing on the new Medicare fee schedule.

"Hi, Dr. Lear, Good news! You don't have to worry about the rate cuts in nuclear medicine. They said that you'll be able to make up the loss through increased utilization."

9:45 pm: Called at home by hospital maintenance.

"Dr. Lear? Are you the one with that big computer network room down in the basement! Good, then you're the guy I need to talk to. There was this pipe up in the first floor men's room ..."

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The Importance of a Delayed Scan in Thallium Imaging

TO THE EDITOR: I am writing in reference to the recent article by Aktolun et al. in the July issue of the *Journal*, about ^{99m}Tc -MIBI and ^{201}Tl uptake in pulmonary actinomycosis (1). The authors reported a case of pulmonary actinomycosis infection

showing high uptake of ^{201}Tl . I would like to point out that the scan was performed only 10 min after injection of thallium and no further delayed imaging was performed. According to our own experience as well as past reports, the early uptake of thallium was relatively nonspecific, since pulmonary edema and hyperemia associated with infections were known to cause high thallium uptake (2-4). In contrast to neoplastic uptake, pulmonary thallium uptake in infected foci washed out relatively fast, while that of tumors remained high relative to background (2-4). The characteristic tracer dynamics enabled us to differentiate AIDS-related Kaposi's sarcoma from other common chest infections among immunodeficient patients by performing delayed (3 hr) thallium scans (2). Similar technique of using delayed thallium scans was also reported in the past to differentiate neoplasms from other benign lesions in the lung and thyroid (3-5). One notable exception to this rule was reported by Tonami et al. who demonstrated that there was persistent thallium uptake in a single case of cerebral candidiasis in their delayed scans (6). It is still unclear whether this represented alteration of tracer kinetics because the lesion was located in the brain instead of lung. It is interesting to note a separate report by the same authors that the thallium washout rate of tumors was very different in the breast and lungs. They concluded that to evaluate lung lesions using thallium scintigraphy delayed scans had to be performed to obtain optimal results (6).

One of the advantages of using thallium instead of gallium for tumor imaging is that we can differentiate between infectious and neoplastic lesions using thallium. Gallium is avid in both. Therefore, the importance of performing delayed thallium scan cannot be overemphasized.

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REPLY: We appreciate very much the comments of Dr. Victor W. Lee on our recently published article (1). In order to get a more objective conclusion from our report, some additional

aspects of ^{201}Tl imaging for detecting inflammatory focus and tumor should be emphasized.

1. Dr. Lee pointed out that ^{201}Tl imaging 10 min after injection was too early to evaluate the uptake by a pulmonary lesion and suggested that tumors could be differentiated from inflammatory lesions through delayed scans. However, it was shown that ^{201}Tl uptake by tumors occurred rapidly, the mean time from injection to peak tumor activity being 11.9 min for lung carcinoma, 11.2 min for breast carcinoma and 11.7 min for lymphoma (2-3). In another study, the accumulation ratio between the tumor and the contralateral normal lung reached its highest level between 30 and 60 min (4). In addition, several reports on clinical application showed that early scans obtained 1-20 min after the injection could localize malignant tumors successfully (5-8). In an experimental study, Ando et al. showed that in inflammatory lesions in addition to tumor tissue quite large amounts of ^{201}Tl accumulated in subcutaneous tissue infiltrated with neutrophils and macrophages, regardless of the time after administration (9). Thallium-201 accumulation in tumors was found to decrease gradually 1 hr after administration (10). These reports reveal that it is very difficult to differentiate malignant tumors from inflammatory lesions through delayed scans.

2. Although we showed no definite mechanism to explain the unexpected uptake of ^{201}Tl by pulmonary actinomycosis in our case report, this uptake, without any experimental findings, cannot be simply attributed to pulmonary edema and hyperemia. Increased blood flow, hypervascularity, hyperpermeability, increased membrane-pore size, $\text{Na}^+ - \text{K}^+$ ATP-ase dependent pump activity, increased cellular K^+ content and metabolism should also be considered in the uptake of ^{201}Tl by tumors and inflammatory lesions.

3. In our case of pulmonary actinomycosis, we initiated ^{201}Tl imaging 10 min after injection and obtained spot, whole-body and SPECT images, all of which normally take 70-80 min. After examining all of the images, we did not find any difference of note in the activity accumulated in the inflammatory lesion.

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