■ Mile-High Preview

Annual Meeting Highlights

Busy technologists will find it easier to make full use of their time at this year's Annual Meeting in Denver, the mile-high city. Continuing education courses will begin on Saturday, instead of Monday. This eliminates the slow days between the Technologist Section committee meetings and the courses. Courses will run from Saturday, June 1 through Wednesday, June 5. Continuing education topics include quality control, basic life support, renal scintigraphy, radiopharmaceuticals, oncology, radiation safety, SPECT, PET and pediatric nuclear medicine.

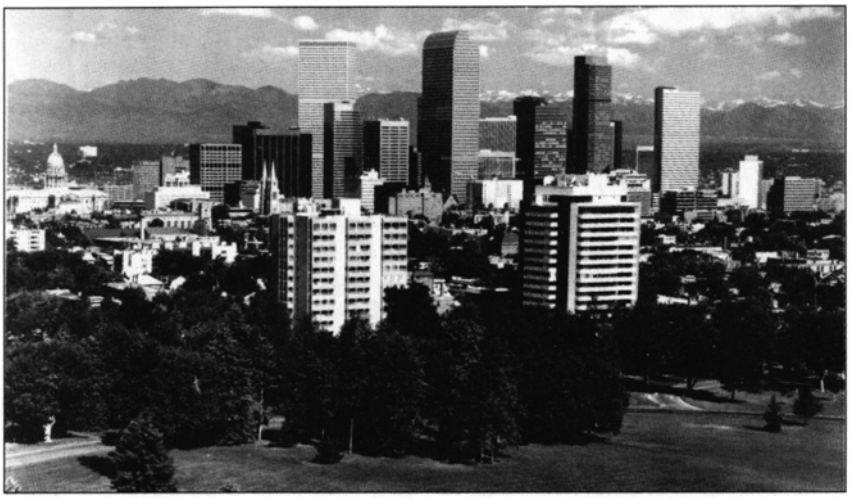


Photo courtesy Denver Metro Convention and Visitors Bureau

Denver offers SNM's 43rd Annual Meeting attendees mile-high hospitality as well as access to the splendor of the Rockies.

As in previous years, pre-Annual Meeting technologist committee meetings will be held Thursday, May 29 and Friday, May 30 at the Colorado Convention Center.

SNM's 43rd Annual Meeting will offer attendees approximately 182 continuing education hours of credit for technologists through the VOICE system. This complete nuclear medicine technology program features lectures, workshops and scientific papers. Only those properly registered will receive continuing education credits. The preregistration deadline is April 29 and costs less than on-site registration.

This year's annual meeting will include more than 1,000 scientific papers, posters and exhibits on cardiovascular nuclear medicine, SPECT, PET, NMR, computers, pediatric nuclear medicine, neurology, hematology, radiopharmaceuticals and oncology.

Details of the Technologist Section abstract sessions will be published in the June issue of *JNMT*. For this year's Annual Meeting, SNM will offer a volume of handout materials that are presented during the continuing education sessions for $10.

Once again the SNM Annual Meeting offers the opportunity to visit more than 100 manufacturers of nuclear medicine equipment, products and services. The exhibits provide the chance to see demonstrations of the latest nuclear medicine technologies. Product exhibitions will include computers, laboratory equipment, gamma cameras, film and processing equipment, image formatters, dosage calibrators, publications, radiation safety products and radiopharmaceuticals. Exhibit hall hours will be Monday, June 3 from 10:30 am to 5:00 pm, Tuesday and Wednesday, June 4-5 from 10:00 am through 5:00 pm and Thursday, June 6 from 10:00 am until noon.

Housing and Transportation

The Denver Marriott City Center, in downtown Denver, has been selected as the headquarters hotel. The Marriott offers only a limited number of sleeping rooms to general registrants. Shuttle buses will be available to all 13 of the other SNM hotels. The selected hotels are located in close proximity to the Colorado Convention Center.

United Airlines, the official carrier for the 43rd Annual Meeting, is offering discounts to all attendees. Seven-day advance reservations and ticketing are required. Refer to ID number 563-QD when you call United, at 800-521-4041, or your travel agent. World Travel Partners is the official travel agency of SNM and can be reached at 800-336-0227.

The new Denver International Airport is 24 mi, or 30 min, from downtown. The airport shuttle service, from the baggage level, offers one-way fares of $15 to downtown SNM hotels and $10 to SNM's Stapleton hotels. Taxis are available for approximately $40 and $29 one-way to downtown and Stapleton hotels, respectively.

Mark Your Calendar

The SNM Annual Meeting wouldn't be complete without opportunities to socialize with your associates. The Opening Icebreaker Reception will be held Sunday, June 2 from 7:30 to 9:30 pm. On Wednesday, June 5, the technologists will host their annual party from 8:00 pm until midnight.

For the second year, SNM offers a program of of trips and tours to entertain and educate guests and attendees. Pre- and postmeeting tours, as well as daily tours, are available for preregistration or on-site signup. The program offers a wide range of activities, including explorations of Colorado's pioneer past, Denver city highlights and shopping. An overnight trip to Vail, one of Colorado's premier resort areas, features outdoor summer sports, restaurants and shopping. Join friends and colleagues for a complimentary continental breakfast in the Companion's Lounge in the Colorado Convention Center, open Monday and Wednesday from 8:30 to 11:00 am.

For further information and preregistration and housing materials, call SNM's Meeting Services Department at 703-708-9000, ext. 229.

■ Abstracts from Japan

Contributed by Iku Burns, CNMT

For the first time, U.S. and Japanese technologists are creating an opportunity to exchange articles between *JNMT* and the *Japanese Journal of Nuclear Medicine Technology (JJNMT)*. Translated abstracts and articles from the Japanese journal will be published in *JNMT* as a regular feature and each year the *JNMT* paper awarded the Outstanding Paper Award will be translated into the *JJNMT*.

Keisuke Kanao (left), Chair of the Board of Trustees, Japanese Society of Nuclear Medicine Technology, has worked to develop an exchange of Japanese and U.S. articles. Iku Burns will coordinate and translate "Abstracts from Japan" in the U.S.

This project is being made possible by the efforts of Keisuke Kanao, Chair of the Board of Trustees, Japanese Society of Nuclear Medicine Technology (JSNMT), and Chief Technologist, Sumitomo Hospital, Osaka, Japan and Iku Burns, CNMT, Sue Weiss, CNMT and Susan Gilbert, CNMT. We are hoping this project will open doors for technologists world wide to communicate with each other for the advancement of nuclear medicine.

Every country has its own rules, customs and regulations for establishing a society of nuclear medicine. Articles from Japan may be better understood with a knowledge of the trends and present status of the JSNMT. The following summary of the JSNMT was provided by Kanao.

The JSNMT was established in 1980 with 965 members, 13 directors, 62 council members and seven local branches. Its activities include the publication of a quarterly journal, an annual scientific meeting and many technical seminars. The current membership fee is approximately $80.00 in U.S. dollars.

In Japan, radiological technologists (RTs) cover a wide range of work, including nuclear medicine, radiography, digital subtraction angiography, MRI, CT, ultrasound and radiation therapy. RT certification requires a degree from a three- or four-year professional junior college or university and a passing grade on the national RT examination. Currently there is a total of 38,000 RTs in Japan and, among these, 2800 (7%) are engaged in nuclear medicine. Japanese NMTs consist of RTs (67%), medical technologists (11%), pharmacists for in vitro tests (5%) and all others including researchers (17%).

In Japan, NMTs elute the ^{99m}Tc from a ^{99}Mo generator, prepare radiopharmaceuticals, acquire and process data, conduct in vitro assays, perform quality control of instruments, measure radiation dosage and manage radioactive waste. Blood collection is not allowed and intravenous injection is limited.

According to a survey in 1992, the number of nuclear medicine instruments in Japan included: 531 planar gamma cameras; 968 SPECT gamma cameras; 20 PET cameras; 1021 data processors, including 134 workstations; and 288 other instruments. The frequency of in vivo examinations was: 24.7% bone imaging; 14.1% tumor imaging; 12.2% myocardium imaging; 7.3% brain perfusion imaging; 4.4% thyroid uptake and imaging; 37.3% all others including cardiac wall motion, renograms, and lung and liver procedures.

The number of nuclear medicine procedures in Japan is increasing gradually. The annual total of testing was 1.5 million in 1982, when SPECT was not available. This had increased to 1.65 million in 1992, with 280,000 SPECT procedures. The trend of nuclear medicine facilities in Japan favors in vivo procedures. The number of in vivo facilities increased from 885 in 1982 to 1176 in 1992, while in vitro facilities decreased from 937 to 443. The most common in vitro tests are CEA, CA19-9, CA125, alpha-feto protein, TSH, T3 and T4.

The authorized NMT approval system is being established with difficulty. However, the JSNMT is making an effort to work with other Japanese and international societies for worldwide development. Recognition at an annual meeting confers 1000 authorized units. The system of the authorizing unit is:

Technical meeting attendance	20 units
Presentation	15 units
Technical seminar attendance	10 units
Continuing educational program attendance	10 units
Dissertation authorship	30 units
Co-authorship	10 units
Business unit full time	1 unit per mo

The JSNMT's objectives are to advance nuclear medicine technology research and study to enhance medical practice in society, improve the abilities of the members, and promote communication and friendship among members. The JSNMT has committees on planning, editorial, scientific, educational, awards, future design, overseas training, publication, election and the society's general and financial affairs.

A translated Japanese article will be in the next issue of *JNMT*. Active involvement of technologists is encouraged to promote nuclear medicine globally. Your comments, questions and suggestions are welcome. In Japan contact: Mr. Keisuke Kanao, Chief Technologist/General, Sumitomo Hospital, 5-2-2 Nakanoshima Kita-ku, Osaka, 530 Japan; Fax 81-6-4473049.

In the U.S. contact: Ms. Iku Burns, 264A 11th Ave., San Francisco, CA 94118.

■ ACNP Proficiency Testing Program Update

Contributed by Sharon Surrel, CNMT
ACNP Program Director

Imaging departments must respond to the renewed emphasis on quality assurance and documentation to survive the new era of managed care. Refining and maintaining the skills required to achieve an acceptable level of performance are necessary components of developing true proficiency in nuclear medicine imaging technique and diagnostic performance.

The Proficiency Testing Program of the American College of Nuclear Physicians (ACNP) produces phantoms twice each year for assessing practice proficiency. The 1995 Proficiency Testing Program has proven to be educational and productive for all participants. The ACNP is pleased to announce 459 phantoms were sold in 1995, representing a record-breaking year. For those of you who have not already participated and are unfamiliar with the benefits of this program, here are some of the results of the 1995 Proficiency Testing Program Exercises.

The 1995 IM-A SPECT Quality Control Exercise

This phantom was designed to measure uniformity, linearity and resolution. The phantom evaluates not only instrumentation but also acquisition protocols, reconstruction software and attenuation algorithms. This gives subscribers a clear determination of the fidelity of their entire SPECT imaging process.

The cylindrical SPECT phantom was divided into three segments: (a) an object-free space which, when filled with radioactivity, could be used to determine uniformity; (b) an orthogonal hole plate, with hot circular regions, to demonstrate linearity, uniformity of spatial resolution throughout the imaging volume, the ability of the imaging system to reproduce the shape of an object, and the effect of attenuation on object contrast between regions from periphery to center; and (c) two large, triangular test objects cut at a 45° angle so the maximum width could be measured in the sagittal and coronal planes.

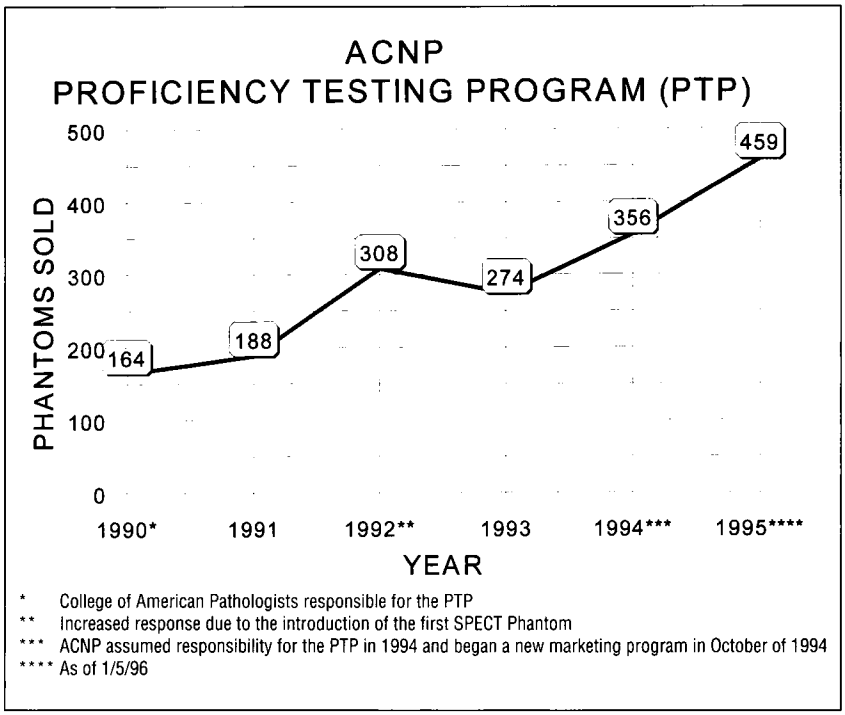
Quality Control Exercise Conclusions and Recommendations

The daily and weekly quality control procedures performed by the subscribers varied greatly in both technique and results. Total counts collected for planar flood field uniformity ranged from less than five million to more than thirty million. The variations in counts collected were at least partially dependent on whether the participant used a high-count acquisition suitable for a correction matrix or a low-count collection for daily quality control purposes. Many of the respondents were not able to attain the expected level of reconstructed integral flood field uniformity due, possibly, to the number of counts collected per projection filter and cutoff used, attenuation correction and/or inherent nonuniformity in the imaging system. Since participants retain the phantom, they can gain additional educational benefits by revisiting and monitoring integral reconstructed flood field uniformity as a continuing activity of their department's quality assurance program.

The orthogonal hole plate provides a number of parameters, such as number, shape and size of holes as well as object contrast. The majority of respondents correctly identified the number of holes but the circular shape of the holes was not easily identified. The majority of subscribers overestimated actual hole width. This can be attributed to a lack of sufficient contrast at the hole edge which is a widely understood phenomenon associated with imaging hot lesions. The participant discovers first-hand a facet of practical clinical value to both technologist and physician.

An interesting observation is object contrast in the orthogonal hole plate. The contrast between the highest count in the hot regions and the lowest count in the space between two consecutive hot regions does not seem to be significantly dependent on whether the hot region is at the center of the orthogonal hole plate or at the periphery.

The orthogonal hole plate also provides an opportunity to determine lin-



* College of American Pathologists responsible for the PTP
** Increased response due to the introduction of the first SPECT Phantom
*** ACNP assumed responsibility for the PTP in 1994 and began a new marketing program in October of 1994
**** As of 1/5/96

ear spacing. Again, wide variations were observed in the responses. This measurement involves knowledge (or measurement) of pixel size, a parameter with which many of the respondents were not familiar. Pixel size is especially critical for measurement of small distances, such as the center to center hole distance and the width of the central hole.

The calculation of the maximum width of the triangular test objects involved the same problems observed in the measurement of the linear spacing in the orthogonal hole plate. However, the largest number of responses were in the correct range.

The visual examination of images was of significant educational value. Image quality of five different processings of the object-free (uniform volume) segment showed that the uniformity was evaluated as being best when attenuation correction was added. The high count obtained with the performance acquisition was also important, as was using a filter that smoothes the data. Spatial linearity and uniformity of spatial resolution were also dependent on a high-count acquisition for best visual assessment. In the lower count clinical acquisition, the addition of attenuation correction greatly improved visualization of image uniformity and spatial resolution, as well as mitigating the effect of attenuation itself.

The 1995 IM-A SPECT Quality Control exercise differs considerably from previous exercises. Rather than evaluating proficiency of acquisition and interpretation using a well-known procedure, this exercise presents the subscriber with a number of challenges that are seldom performed in the clinical setting. This exercise gives the participant variations in both acquisition and processing to demonstrate the advantages and limitations of different parameters, such as: (a) using different filters and cutoffs; (b) using attenuation; (c) determining pixel size; (d) identifying hot versus cold lesions; (e) determining the number of counts collected per projection; (f) using contrast between areas of targets as a method of system function; and (g) determining the effects of reconstruction on the shapes of objects.

The wide variation of responses to the various measurements requested have identified several areas in which many participants need additional information. These areas include the following subjects:

1. *Filters*. The Nuclear Medicine Imaging Committee (NMIC) expected that ramp and Hamming filters would be available on all camera systems, however, nomenclature and terminology differ among manufacturers. The accessibility of the parameters was also difficult for many participants.

2. *Pixel Size*. This parameter was expected to be similar since the majority of participants use a large field of view and the same matrix. Actually large variations were reported and the procedure for measuring pixel size was not successful. While correct measurements of object size were reported by some, a large number of participants were not able to obtain satisfactory results with their computer systems. Participants can obtain information on determining pixel size from their individual vendors.

3. *Attenuation*. These procedures are not accessed easily in many of the computer systems, resulting in less of a difference between periphery and center objects than expected. Since the phantom is retained by the program subscriber, it is expected that all of the parameters employed in this exercise can now be studied with individual protocols that can examine single-parameter variations in a much simpler context. It is the SPECT reconstructed flood field uniformity, linearity and resolution that determine the quality of clinical images.

The 1995 IM-B Spinal Bone Exercise

This emission imaging simulator was designed to allow participants to measure the ability of their system and acquisition/processing protocol to detect three cold lesions of varying dimensions located within a phantom that simulates the five vertebrae (L1--L5) of the lumbar region of the spine. The phantom was designed to reflect the essential features of an actual clinical case study provided on film by a member of the ACNP NMIC. Lesion size and placement were adjusted to permit subscribers to test their system's ability to detect lesions of varying sizes using different systems and acquisition/processing/display protocols. The phantom was constructed to permit subscribers to acquire images using both SPECT and planar techniques. In addition, subscribers were asked to compare images obtained using their own standard clinical bone SPECT protocols with an alternative set of images acquired using a baseline protocol employing a Butterworth filter with an 80% Nyquist cutoff frequency and a power factor of 5. Respondents were allowed to send in multiple submissions (up to a maximum of six), which permitted individual institutions to perform additional cross-system and cross-protocol comparisons of interest. For each set of images obtained, participants were asked to identify the locations of any lesions and to indicate the clinical interpretation that would be most consistent with the lesions visualized and the symptoms reported by a hypothetical patient.

The study results indicate several variables were associated with better subscriber performance in terms of visualizing all three cold lesions, including: (a) age of gamma camera used; (b) availability of a low-energy, high-resolution (LEHR) or low-energy, ultra-high resolution (LEURHR) collimator; (c) use of a Hamming or Hann filter to process the images; and (d) the total counts acquired in the study.

Interpretation of these results should be made with caution. The sample is limited to only 106 subscribers who provided at least one set of results to the ACNP. In addition, the positive results on the use of the Hamming/Hann filter variable reflects, in all likelihood, the benefits of different levels of facility experimentation and expertise in processing and displaying images using a variety of filters and parameter settings, rather than an effect that can

be attributed to the use of a specific filter in a clinical bone SPECT protocol.

Spinal Bone Exercise Conclusions and Recommendations

The 1995 IM-B Spinal Bone Study provided data to the NMIC about several important aspects of SPECT imaging performance that is of interest to the nuclear medicine community :

1. *Multiple-Detector Cameras.* Half of the 1995 IM-B subscribers now use one or more multiple-detector cameras. While obtaining an equivalent number of total counts with a single-detector camera is feasible for exercises such as this one, albeit over a longer period of acquisition time, it may not be possible to do so consistently in a clinical setting. Given the two constraints of the maximum appropriate length of time for which an individual patient can be imaged and the demands of the overall facility patient load, multiple-detector cameras appear to offer an important vehicle to ensure acquisition of an adequate (or better) number of total counts for clinical studies. Total counts remain the most important single determinant of subscriber performance across the entire series of ACNP imaging proficiency studies.

2. *Collimators.* In both the 1995 IM-A and IM-B studies, access to a LEHR or LEUHR collimator emerged as an important determinant of successful performance. While individual facilities that do not have access to these collimators have been able to achieve adequate results, the probability that any given subscriber can correctly visualize lesions of relatively small size is greatly enhanced by access to a high-resolution collimator.

3. *Pixel Size.* While subscriber performance in reporting credible values for pixel size improved from the level observed in the previous 1995 IM-A study, there were still many participants who reported pixel sizes that are not consistent with their responses on the field-of-view dimensions and matrix size questions. This is troubling because correct knowledge of pixel size is essential for measurement of any feature appearing in the displayed image. Part of the purpose of the Proficiency Testing Program is to provide an educational tool for participants. In the subscriber's final critique, the NMIC recommends a preferred method of determining pixel size and a useful check to eliminate errors in measurement.

4. *Use of Filters.* The 1995 IM-A and IM-B studies have highlighted the prominent role that filter selection and image display parameters play in obtaining superior quality images. In the spinal bone exercise, participants who selected a protocol other than that specified in the instructions did somewhat better on average than those who opted for the default protocol provided by the NMIC. This does not indicate that a single protocol is preferable to another but underscores the importance of participants working to increase their experience with using different types of filters and varying the image display parameters that they currently use. It is through this testing that subscribers can either confirm the adequacy of their present protocol or determine that an alternative procedure produces better results.

1996 Proficiency Testing Program

Quality assurance focuses on three areas: the scope of patient care, the measurement of image quality and lesion detectability. The ACNP Proficiency Testing Program addresses these important aspects of quality in nuclear medicine. If you did not have the opportunity to participate in the 1995 program, there is still time to join the 1996 program. This year SPECT and planar techniques will be used for the Spring IM-A Exercise to look at stress/rest myocardial perfusion imaging and the Fall IM-B Exercise to look at renal imaging. Complete descriptions and order forms are available through the ACNP Program Director by calling 202-857-1135.

■ News Brief

RSNA Makes Leadership Announcements

The Radiological Society of North America (RSNA), of Oak Brook, IL, recently announced its new board of directors chair, board members and president. David B. Fraser, MD, was installed as the chair of RSNA's board of directors. Fraser is head of the Department of Diagnostic Radiology at Victoria General Hospital, Halifax, Nova Scotia. Fraser has been a board member since 1990 and has served the RSNA as liaison for publications and Scientific Exhibits Committee chair.

RSNA named Ernest J. Ferris, MD, as its 81st president. Ferris chairs the Department of Radiology at the University of Arkansas for Medical Sciences in Little Rock. Michael Sullivan, MD, associate chair and program director, Department of Radiology, Ochsner Clinic and Ochsner Foundation Hospital, New Orleans, LA, was named president-elect. Peggy J. Fritzsche, MD, clinical professor of radiology at Loma Linda University School of Medicine, Loma Linda, CA, was selected to a six-year term on the RSNA board of directors. Other 1996 board members are: Seymour H. Levitt, MD, Minneapolis, MN, liaison for annual meeting arrangements; C. Douglas Maynard, MD, Winston-Salem, NC, secretary-treasurer; Jerry P. Petasnick, MD, Northbrook, IL, liaison for education; and Derek C. Harwood-Nash, MD, DSc, Toronto, Ontario, liaison for publications.