



Eighth Asia and Oceania Congress of Nuclear Medicine and Biology, October 9–13, 2004, Beijing, China

The Eighth Asia and Oceania Congress of Nuclear Medicine and Biology (AOCNMB) was held October 9–13 in Beijing, China. Of the 456 participants, 230 were from China, and the remaining 226 represented more than 30 other countries. Twenty-three exhibitors participated in the technical area of the congress. The congress featured 384 presentations (141 oral and 243 posters). The major contributing country was China, with 198 presentations (50%), followed by India with 24 (6%), Korea with 19 (5%), Japan with 17 (4%), Taipei with 15 (4%), Pakistan with 14 (4%), Kuwait with 12 (3%), the United States with 10 (3%), Iran with 10 (3%), Serbia and Montenegro with 10 (3%), Bangladesh with 8 (2%), the Philippines with 6 (2%), and 43 (11%) from other countries, including Australia, Vietnam, Sri Lanka, Thailand, Armenia, Finland, Hungary, Poland, the United Kingdom, Austria, Bolivia, Canada, Cuba, the Czech Republic, Germany, Indonesia, Italy, Macedonia, Malaysia, Mongolia, Romania, Russia, and South Africa. Two satellite meetings held in Shanghai and Hong Kong, October 15–17, also met with exceptional success (see Newsline, page 6).

A delegation from the Society of Nuclear Medicine, led by SNM President Mathew Thakur, attended the 8th AOCNMB, where they were welcomed with warm collegiality by their Chinese hosts. Chengmo Zhu, MD, a member of the congress scientific committee, forwarded this report outlining various topics addressed in presentations during the 5-day event to Heinrich Schelbert, MD, editor-in-chief of The Journal of Nuclear Medicine. We are pleased to include it for the readers of Newsline.

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Editor, Newsline*

The 2004 AOCNMB saw an increase in the percentages of papers in oncology, basic nuclear medicine, radiotherapy, radiochemistry, and nuclear instrumentation over the percentages for these presentations at the previous congress in 2000. At the same time, there was a significant decrease in the numbers of presentations on general nuclear medicine and smaller decreases in nuclear cardiology and neurology. Among the 86 oral presentations on oncology, PET and SPECT were almost equally represented. Among 44 papers classified as PET presentations 52% were on stand-alone PET, 25% were on PET/CT, and 23% were on molecular coincidence detection (MCD) SPECT, indicating a growing increase in the use of PET/CT in Asia. Clinical applications of PET or PET/CT covered a wide range of topics, including diagnosis of malignant tumors, tumor staging and restaging, differentiation between tumor recurrence and necrosis, and cancer screening. ^{18}F -FDG was reported on as a tracer in pulmonary solid nodules, lymphoma, nasopharyngeal carcinoma, and brain, head and neck, thyroid, breast, esophageal, skin, digestive, and gynecologic tumors. A few papers dealt with the use of ^{11}C -choline for brain, bone, soft tissue, head and neck, and lung cancers; ^{11}C -acetate for meningioma; and $^{13}\text{NH}_3$ for astrocytoma and pituitary diseases.

A 10-year retrospective study of 117 patients with irradiated brain tumors showed that ^{18}F -FDG PET imaging had good predictive value, with longer survival times after negative than positive PET imaging. PET was also able to differentiate between recurrence and radiation necrosis and inflammation, especially when compared with CT and MR imaging (Wang and Boethus; Fig. 1). This group also suggested that PET images should be repeated within 31 weeks if recurrence is suspected.

Head and neck tumors also present imaging challenges to CT and MR because of the complicated anatomy and its susceptibility to change after surgery and irradiation. ^{18}F -FDG PET is useful in the management of head and neck cancer and was reported to detect residual, recurrent, and remote metastases with sensitivity, specificity, and accuracy of 100%, 87.5%, and 93.5%, respec-

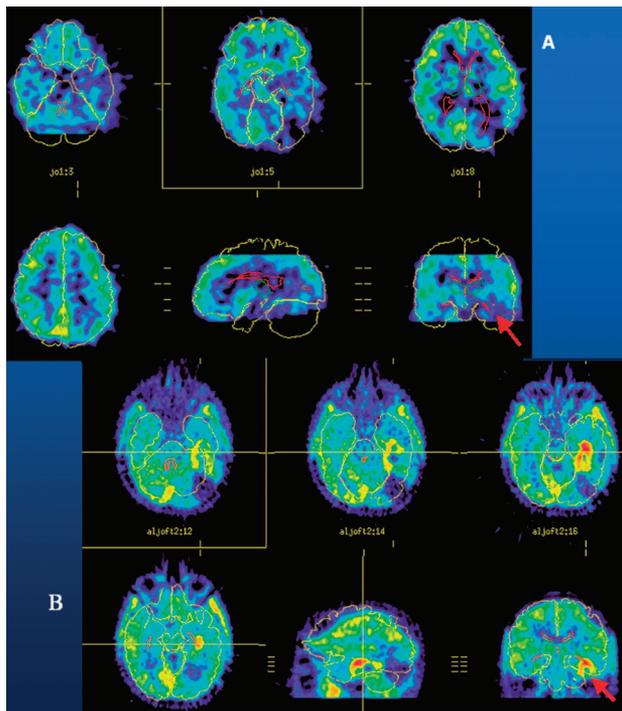


FIGURE 1. Recurrence in glioblastoma. (A) ^{18}F -FDG PET image of 46-year-old man was negative on September 8, 1999; (B) Repeat imaging on October 18, 1999, showed recurrence. Recurrence confirmed at autopsy in January 2000. Study from a 10-year summary of the efficacy of ^{18}F -FDG in assessing irradiated brain tumors reported by Shuxia Wang (Guangdong Provincial Hospital, China) and Jörgen Boethius (Karolinska Hospital, Stockholm, Sweden).

tively. Malignant lung lesions can also be found by ^{18}F -FDG coincidence imaging in suspected malignant pleural effusion or atelectasis with sensitivity, specificity, and accuracy reaching 97%, 78%, and 85%, respectively, a process that needs differentiation between metastasis and tuberculosis (Wang et al.; Fig. 2). Another group reported that concordance between ^{18}F -FDG PET and ^{111}In -antiCD20 antibody imaging may predict outcomes in radioimmunotherapy (RIT) for lymphoma. More lesions found on ^{111}In -antiCD20 imaging than in ^{18}F -FDG will have a favorable response to treatment, and ^{18}F -FDG PET in a follow-up study can be used for therapeutic monitoring in lymphoma. ^{18}F -FDG PET also was reported to have significant value in cancer screening. One group reported an excellent cancer detection rate by ^{18}F -FDG PET in 3,631 routine physical examinees, with an 80.9% true-positive rate among those identified. In another 4,803 physical examinees, thyroid incidentalomas were found as hypermetabolic areas in 60, of whom 50 were further investigated by fine-needle aspiration, showing 43 benign and 7 papillary carcinomas.

All of these disparate findings presented at the congress illustrate that ^{18}F -FDG PET is routinely and effectively used in tumor diagnosis and therapy monitoring. Currently a great emphasis is placed on PET/CT, because more lesions can be detected and localized accurately.

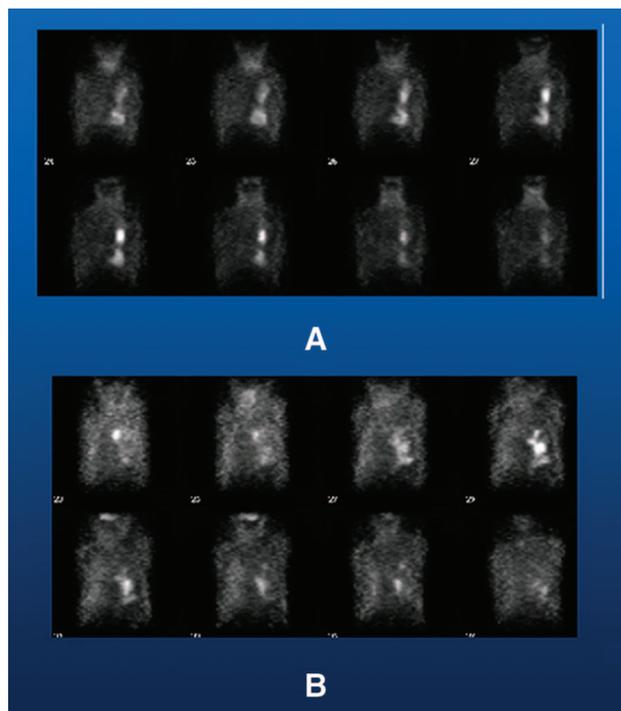


FIGURE 2. ^{18}F -FDG coincidence imaging in suspected malignant pleural effusion or atelectasis shows high uptake in lung cancer complicated by (A) atelectasis and (B) pleural effusion. Study reported by H.Q. Wang (Shanghai Pulmonary Hospital, China).

Other positron pharmaceuticals were reported on and compared with ^{18}F -FDG in specific applications. ^{11}C -choline showed higher contrast than ^{18}F -FDG in PET imaging of head and neck, bone, lung, and soft tissue tumors. ^{11}C -acetate showed higher uptake and a better ability to precisely delineate tumor margins than did ^{18}F -FDG in PET imaging of meningiomas, as well as an ability to distinguish recurrent from residual tumors (Liu et al.; Fig. 3). Another group reported on the use of ^{13}N $_3$ PET for pituitary imaging.

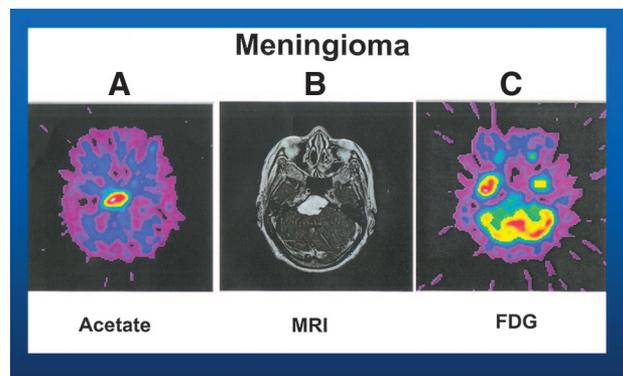


FIGURE 3. Imaging of meningioma with (A) ^{11}C -acetate PET, (B) MR, and (C) ^{18}F -FDG PET. ^{11}C -acetate PET and MR imaging yielded positive results, but uptake was not seen on ^{18}F -FDG PET. Study reported by Ren-Shyan Liu (Taipei Veterans General Hospital, National Yang-Ming University Medical School).

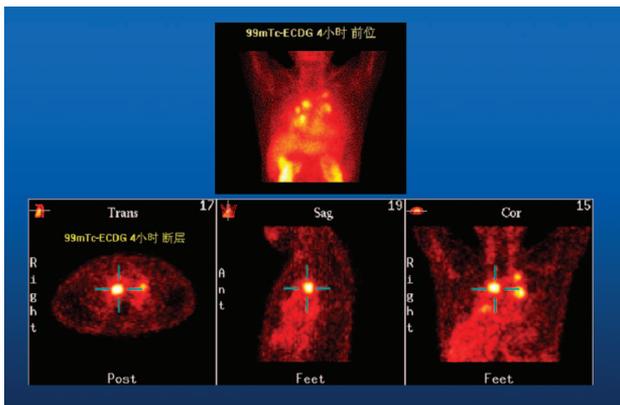


FIGURE 4. After primary application of ^{99m}Tc -ethylenediamine deoxyglucose in tumor, high uptake of ^{18}F -FDG was seen in lesions at both lung and mediastinal lymph node. Study reported by J. Tang (Second Hospital of Suzhou Medical School, China).

SPECT imaging is used routinely for tumor detection in Asia and Oceania, including high-sensitivity ^{99m}Tc -tetrofosmin SPECT imaging in breast and brain tumor and ^{99m}Tc -sestamibi in breast cancer and nasopharyngeal carcinomas and for indication of disease activity in multiple myeloma. The preliminary use of ^{99m}Tc -labeled ethylenediamine deoxyglucose SPECT in 18 patients showed satisfactory results, with the identification of 14 true-positive tumors, although differences with ^{18}F -FDG were noted, including slow blood clearance and nonvisualization of the brain (Tang et al.; Fig. 4). In somatostatin receptor-positive tumors, ^{99m}Tc -hydrazinonicotinyl-Tyr³-octreotide (^{99m}Tc -HYNIC-TOC) SPECT imaging was reported to yield a high detection rate in neuroendocrine tumors (Jing et al.; Fig. 5). However, the use of ^{99m}Tc -HYNIC-ethylenediamine pentaacetic acid seems more effective, and its use was suggested instead of ^{111}In -octreoscan or ^{131}I -metaiodobenzylguanidine (MIBG) because of its higher tumor-to-nontumor ratio and ability to

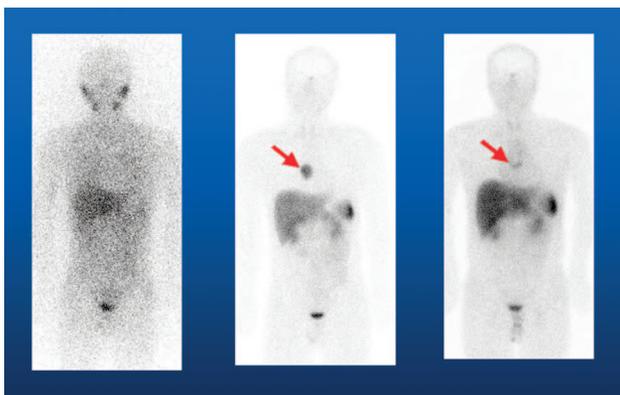


FIGURE 5. Diagnosis of somatostatin receptor-positive tumors using ^{99m}Tc -HYNIC-TOC. Clinical evaluation of pheochromocytoma in 17-year-old boy. (A) Negative ^{131}I -MIBG imaging. (B) ^{99m}Tc -TOC imaging before surgery. (C) ^{99m}Tc -TOC after surgery. Study reported by H.L. Jing (Peking Union Medical College, Beijing, China).

detect more lesions. ^{99m}Tc -sulfur colloid was reported to be useful for sentinel lymph node (SLN) detection in cancer of the cervix and ^{99m}Tc -nanocolloid was reported to be effective in detection of penile cancer, with detection rates of 100% and 94.7%, respectively. ^{131}I -vascular endothelial growth factor-165 receptor imaging for visualization of tumor angiogenesis in overexpressed vascular endothelial cell tumors, such as gastrointestinal and differentiated thyroid tumors and osteosarcoma, was reported. Sodium iodide symporters (NIS), alone or combined with thyroid peroxidase gene transfer, are being successfully studied using adenovirus or baculovirus transfection to cancer cells with low iodine uptake, with initial results showing suppression of tumor cell growth.

In cardiology, myocardial perfusion imaging (MPI) studies are used in Asia and Oceania for diagnosis of ischemia, prognostic prediction, assessment of myocardial viability, therapy monitoring, and other applications. ^{99m}Tc -sestamibi stress-rest MPI was shown to have good prognostic value in suspected coronary artery disease (CAD). As many as 65% of reversible defects identified with this technique resulted in cardiac events over a 32.25 ± 14.95 -month follow-up study. In symptomatic hypertension with recent onset of left bundle branch block, an isolated septal reversible defect identified by adenosine ^{99m}Tc -sestamibi was a valid criterion for referral to cardiac angiography and also carried a negative predictive value for CAD.

In myocardial ischemia or infarction, ^{201}Tl and ^{99m}Tc -labeled HL91 dual-isotope perfusion and hypoxia imag-

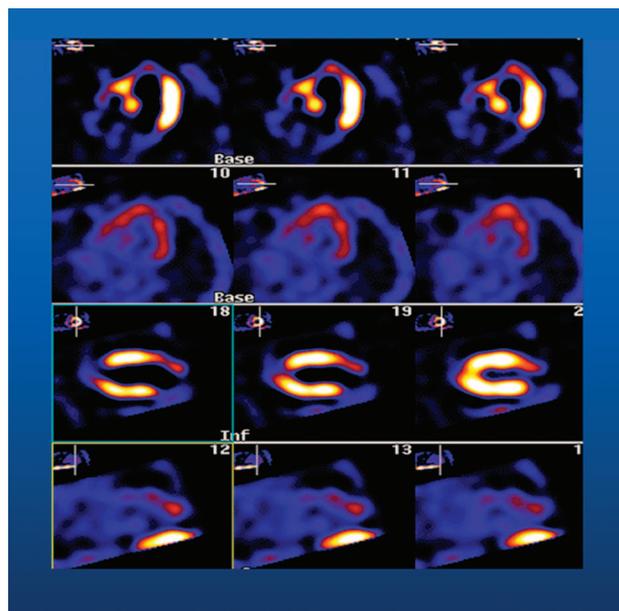


FIGURE 6. ^{201}Tl and ^{99m}Tc -HL91 dual-isotope imaging to simultaneously evaluate myocardial perfusion and hypoxia. ^{201}Tl defects on apex and septal wall were refilled by ^{99m}Tc -HL91, but those on the inferior wall were not. Study reported by B. Zhang (First Hospital of Suzhou Medical School, China).

ing can be acquired simultaneously and successfully differentiate between hypoxic but viable myocardium in ^{201}Tl defects refilled by $^{99\text{m}}\text{Tc}$ -HL91 and in nonviable old infarct areas with no refilling (Zhang et al.; Fig. 6). In addition, the use of ^{123}I -MIBG myocardial receptor imaging was reported in differentiation among Parkinson disease, pure autonomic failure, and multiple system atrophy, with nonvisualization of the myocardium and decreasing heart-to-mediastinum ratio in the former 2 but normal visualization and normal heart-to-mediastinum ratio in the last.

Another report focused on $^{99\text{m}}\text{Tc}$ -antisense oligonucleotide molecular imaging of atherosclerotic plaques in hyperlipidemic rabbits. In these rabbits, the abdominal artery could be seen immediately after injection of the $^{99\text{m}}\text{Tc}$ -labeled antisense oligonucleotide, and the atherosclerotic plaque was visualized in *ex vivo* imaging, but not in *c-myc* sense oligonucleotide, *bel-2*, or *c-myc* control groups. Another experimental study evaluated myocardial preconditioning and adenosine effects in cardioprotection of rat hearts with ischemic perfusion injury using $^{99\text{m}}\text{Tc}$ -glucarate imaging. Cardiac protection from ischemic perfusion injury could be simulated by adenosine receptor A1 agonist cyclopentyladenosine or blocked by antagonist sulfophenyl theophylline, with the conclusion that $^{99\text{m}}\text{Tc}$ -glucarate is quite valuable for detecting the effects of protection.

In neurology and psychiatry, cerebral perfusion imaging using $^{99\text{m}}\text{Tc}$ -ethylcysteinate dimer (ECD) or $^{99\text{m}}\text{Tc}$ -hexamethylpropyleneamine oxime ($^{99\text{m}}\text{Tc}$ -HMPAO) was reported to be effective in evaluating cerebral blood flow (CBF) abnormalities in cerebrovascular diseases, dementia, and alcohol or nicotine dependence. ^{18}F -FDG PET imaging also was used to evaluate glucose metabolism in cognitive impairment and parkinsonism. Adenosine-stressed cerebral perfusion imaging can raise the positive results of rest perfusion imaging from 68.3% to 92.07%. Using statistical parametric mapping analysis, regional CBF (rCBF) studied with $^{99\text{m}}\text{Tc}$ -ECD in alcohol-dependent individuals demonstrated hypoperfused rCBF in frontal, cingulate gyrus, caudate body, and cerebellum, but hyperperfused rCBF in temporal, parahippocampal and precentral gyrus, and left thalamus. In chronic tobacco users, rCBF changes were observed in frontal, temporal, parietal, and occipital regions with $^{99\text{m}}\text{Tc}$ -HMPAO imaging. Increased ^{18}F -FDG uptake was reported in verbal and figure memory Brodmann areas 4, 32, and 18 and posterior cerebellum in temporal lobe epilepsy with cognitive function impairment (Yang et al.; Fig. 7). In patients with suspected X-linked dystonia parkinsonism, ^{18}F -FDG PET imaging revealed decreased uptake in putamen and caudate nuclei. A PET study with continuous infusion of ^{11}C -raclopride demonstrated a temporal change of striatal dopamine release while and after a subject played a video game with the expectation of a monetary reward. Finally, amyloid β -peptide accumulation and the appearance of plaque in the human brain

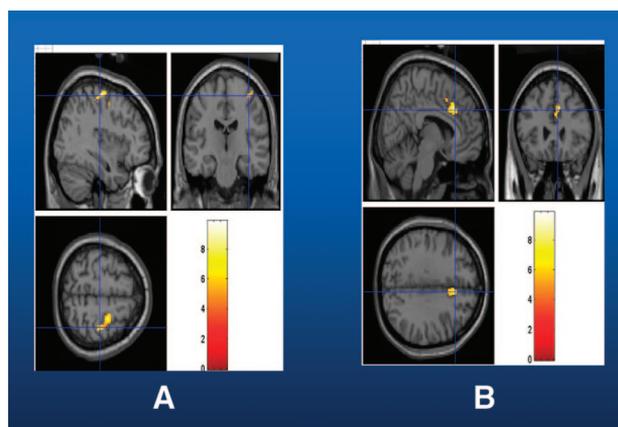


FIGURE 7. Abnormality of cerebral cortical glucose metabolism in temporal lobe epilepsy with cognitive function impairment. (A) Precentral gyrus of the right frontal lobe (Brodmann area 4). (B) cingulate gyrus of the right limbic lobe (Brodmann area 32). Study reported by B.H. Yang (Taipei Veterans General Hospital, National Yang-Ming University).

are now considered the hallmarks of Alzheimer's disease (AD). One group reported on the purification and screening of a single-chain monoclonal antibody against amyloid β -peptide 40 that has potential as an amyloid probe for AD imaging.

Reports at the meeting made it clear that general and basic nuclear medicine are also making progress. One example is in nuclear pediatrics, where simplicity and noninvasiveness, as well as utility, play important roles in continued expansion. Procedures such as furosemide renography in neonates are reliable and safe for differentiation of obstructive and nonobstructive urinary diseases and serve as a guide for surgery. Renal imaging was also shown to be effective in detection of chronic infection.

Ventilation/perfusion lung SPECT imaging can efficiently find peripheral small pulmonary embolisms in cases in which helical CT proves nondiagnostic. Skeletal SPECT/PET fusion imaging was reported to be more sensitive than whole-body scintigraphy, SPECT, or CT alone for differentiation of benign and malignant osseous lesions in the spine. A 15-mer phosphorothioate antisense oligonucleotide labeled with ^{131}I and then linked to vasointestinal peptide before injection into HT29 human colon tumor-bearing nude mice showed that vasointestinal peptide carriers greatly increase tumor cell uptake and retard growth rate.

Other reports focused on the technology of reading, displaying, archiving, and transmitting nuclear medicine data. Multimodality image archival and communication systems in nuclear medicine departments are now connected with large picture archiving and communication systems. In the institutional example presented, 3 modalities—CT, nuclear medicine, and digital mammography—could be accessed at more than 15 workstations and were reported to be effective in facilitating consulta-

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tion, postprocessing, tele- and remote evaluation, and education.

In data processing, standard uptake values of ^{18}F -FDG imaging in dual-head SPECT can also be obtained by calculation of pixel counts, although with somewhat lower values. In addition, measurement of rCBF using ^{123}I -iodoamphetamine SPECT with partial volume effect correction in single-point arterial blood samples was reported.

The fields of radionuclide therapy and dosimetry have made great strides in recent years, and experience was summarized at the meeting. In a multi-institutional study of 11,442 thyrotoxic patients treated with ^{131}I and followed for up to 25 years, 59.3% became euthyroid, 39.4% were found to have hypothyroidism, and only 1.3% remained hyperthyroid, with an average dose of 6.8 ± 1.9 mCi ^{131}I . In another study, patients with pulmonary metastatic thyroid cancer were treated with 75–150 mCi ^{131}I at intervals of 6 months. The overall 5- and 10-year survival rates reached 95% and 85%, respectively. One report also suggested that during ^{131}I therapy of differentiated thyroid cancer, that B- and T-lymphocytes, NK cells, and subsets CD4 and CD8 are all affected, but these effects are temporary and reversible. A large group of patients with bone metastases from lung, breast, prostate, and nasopharyngeal cancers were treated with ^{153}Sm -ethylenediamine tetramethylenephosphonate or $^{89}\text{SrCl}_2$, with improvement in pain relief and prolonged survival rate, with only rare occurrences of bone marrow depression.

New radionuclide therapies being applied clinically include intrahepatic arterial injection of ^{188}Re -lipiodol in hepatic cell carcinoma, with favorable results and minimal side effects, and new $^{90}\text{Sr}/^{90}\text{Y}$ β -ray applicators for treatment of benign prostate hyperplasia through the urethra or rectum, with remarkable symptom improvement and shrinkage of prostate volume. Finally, locoregional injection of ^{18}F -FDG was found to be more effective than ^{18}F -NaF in suppressing tumor xenograft growth in tumor-bearing rats, mainly because of the rapid dissipation of ^{18}F -NaF.

In dosimetry, absorbed dose calculation at the cellular level in radionuclide therapy was a focus of interest. Using FOTELP code based on Monte Carlo simulations of photon and electron transport in a 3-dimensional solid tumor model, absorbed dose histograms were derived for ^{67}Cu , ^{131}I , ^{153}Sm , ^{90}Y , and ^{188}Re . Dose calculation at the cellular level leads to better planning for radionuclide therapy.

New discoveries in radiopharmacy and radiochemistry were reported, including new methods for the production

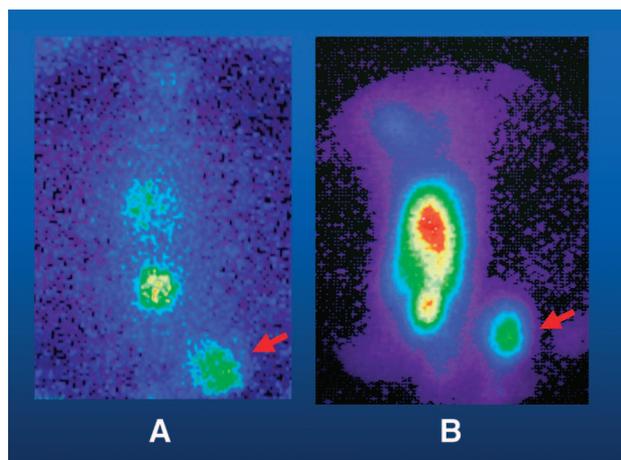


FIGURE 8. Pharmacokinetics and tumor uptake of ^{125}I -recombinant human plasminogen kringle 5. Radioactivity at tumor site in tumor-bearing nude mice at 3 hours after injection. (A) ^{131}I -rhK5. (B) $^{99\text{m}}\text{Tc}$ -rhK5. Study reported by B. Li (Shanghai Ruijin Hospital, China).

of radioactive material and experimental studies for labeling new compounds. Reports on the production of ^{65}Zn for medical and agricultural applications and the purification of ^{18}O water were presented. New radiolabeled compounds discussed included $^{99\text{m}}\text{Tc}$ - or ^{131}I -rh-kringle V (tumor angiogenesis suppressor) (Li et al.; Fig. 8), $^{99\text{m}}\text{Tc}$ -HYNIC-transferrin-chitosan conjugates (transferrin gene receptor binding), $^{99\text{m}}\text{Tc}$ -Arg-Gly-Asp (RGD) containing peptide-GY11 (ligands of integrin for angiogenesis), $^{99\text{m}}\text{Tc}$ -diethylenediamine pentaacetic acid-2SN (disulfanilamide) and ^{18}F -fluoroethylcholine for tumor imaging, positively charged lipophilic $^{99\text{m}}\text{Tc}$ -labeled N, N'-desubstituted N_2S_2 derivatives for myocardial SPECT imaging, $^{99\text{m}}\text{Tc}$ -mercaptoacetyl triglycine-2-nitroimidazole for hypoxic imaging, and ^{18}F -2-(1-[6-[(2-fluoroethyl)(methyl)amino]-2-naphthyl]ethylidene)malononitrile for senile plaque and neurofibrillary tangle imaging in patients with AD.

Conclusion

The Eighth Congress was truly a successful, fruitful, friendly, and progressive event, showing to all attendees the bright prospects for the future in nuclear medicine. We all anticipate continued leaps forward when we meet in New Delhi, India, for the ninth congress in 2008.

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