Summary of Selected PET/CT Abstracts from the 2003 Society of Nuclear Medicine Annual Meeting

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At the 2003 annual meeting of the Society of Nuclear Medicine in New Orleans, LA, more than 90 scientific abstracts focused on technical aspects or clinical applications of PET/CT imaging. A selection of these abstracts highlighting the effects of PET/CT on patient management and staging in lymphoma and head and neck, lung, gastrointestinal, breast, and gynecologic cancers is discussed.

Key Words: PET; PET/CT; image fusion

J Nucl Med 2004; 45:102S–103S

More than 90 abstracts from the 2003 meeting of the Society of Nuclear Medicine in New Orleans, LA, focused on technical aspects or clinical applications of PET/CT imaging. The selection of abstracts for this summary was subjective, and some valuable contributions may have been omitted. The selection of the included abstracts was based on the following criteria: (a) a patient population >10; and (b) impact of PET/CT on staging, patient management, lesion localization, or reader confidence as evidenced in the printed version of the abstract. Seventeen abstracts consistent with these criteria were identified. Two of these evaluated head and neck cancer, 4 focused on lung cancer, 3 on gastrointestinal malignancies, 2 on breast cancer, 3 on gynecologic cancers, and 3 on lymphoma.

HEAD AND NECK AND THYROID CANCER

Goerres et al. (*1*) compared reader confidence between PET/CT, PET and contrast-enhanced CT in 87 patients with head and neck cancer. Reader confidence for lesion characterization was higher with PET/CT than with contrast CT or PET alone. As a limitation, no results assessing the diagnostic accuracy of PET/contrast CT versus PET or contrast CT alone were provided. In addition, the abstract did not indicate whether the study was retrospective or prospective in design.

Syed et al. (*2*) retrospectively studied 24 patients with head and neck cancer and reported that confidence in localization of primary lesions improved by 50%, whereas anatomic localization at distant disease sites improved by 60% with PET/CT compared to PET alone. Thus, this study focused on lesion localization but did not report the comparative diagnostic accuracies of PET and PET/CT.

LUNG CANCER

Eighty-two patients with lung cancer were studied by Keidar et al. (*3*) using PET/CT. Thirty-eight patients underwent initial staging, and 44 were restaged. Image interpretation was affected in 37% of the initially staged and in 52% of the restaged patients. PET/CT changed patient management as determined by PET alone in 8% of the initially staged and in 27% of the restaged patients. This abstract focused on effects on management but provided no gold standard for verification of PET or PET/CT data.

Buck et al. (*4*) reported on an initial PET/CT evaluation of 63 patients with lung lesions. The accuracy of PET/CT for tumor staging was 94%, and sensitivity, specificity, and accuracy for nodal involvement were 75%, 88%, and 84%, respectively. Comparative values for PET alone were not provided. It should be mentioned, however, that the reported accuracies for primary tumors and lymph nodes were well within the range of previously reported PET data.

Mountz et al. (*5*) compared the staging accuracy of PET/CT to that of PET in 30 patients with confirmed non–small cell lung cancer. Thoracotomy or biopsy served as the gold standard. With PET/CT, tumors and lymph nodes were correctly upstaged in 6.6% of patients and downstaged in 13.3% of patients. PET/CT had a greater specificity for individual soft-tissue "lesions" than did PET alone. It is unclear whether contrast CT was used for comparison.

Antoch et al. (*6*) reported marginally improved tumor and nodal staging with contrast PET/CT when compared with PET alone. Using pathology findings as the gold standard, the accuracy for N-staging was 94% for PET/CT, 89% for PET, and 64% for CT ($P < 0.05$). PET/CT changed PET-based clinical management in 4 of 28 patients (15%).

GASTROINTESTINAL MALIGNANCIES

Sixteen patients were studied with PET/CT for characterizing pancreatic mass lesions (*7*). The sensitivity and specificity of PET alone were 63% and 87%, respectively. Five indeterminate lesions (31%) on PET alone were correctly reclassified with PET/CT. More important, the false-negative rate of PET was not reduced by PET/CT.

Received Sep. 30, 2003; revision accepted Oct. 23, 2003.
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In another study, Antoch et al. (*8*) reported similar accuracies for PET and PET/CT for monitoring treatment effects on gastrointestinal stromal tumor 3 and 6 mo after start of treatment. However, PET/CT provided a higher predictive accuracy than PET alone at 1 mo after start of therapy (81% for side-by-side PET and 90% for CT interpretation vs. 94% for PET/CT). The level of statistical significance of these differences was not provided.

Francis et al. (*9*) assessed the added value of PET/CT for lesion localization and its effect on patient management in 21 patients with colorectal cancer. PET/CT improved lesion localization and reader confidence in about 20% and had an effect on patient management in 24% of the patients. Histologic findings and clinical follow-up served as the gold standard.

BREAST CANCER

Buck et al. (*10*) reported a major impact of PET/CT on managing breast cancer patients with rising tumor markers. As a result of PET/CT findings, management was changed in 36% of patients. Similarly, Tatsumi et al. (*11*) reported that PET/CT added incremental value to PET in >30% of 60 breast cancer patients studied. Correlative imaging findings served as the gold standard for most patients in both studies.

GYNECOLOGIC MALIGNANCIES

Israel et al. (*12*) assessed the value of PET/CT for evaluating gynecologic malignancies in 57 patients with cervical cancer ($n = 38$), ovarian cancer ($n = 13$), and endometrial cancer ($n = 6$). PET/CT led to management changes in 17 patients (30%) and added value to PET alone in 50% of patients. In contrast, Cohade et al. (*13*) reported no diagnostic benefit of PET/CT over PET alone in 46 clinical patients with ovarian cancer. The accuracy of PET was 80% and that of PET/CT was 83%. The same group (*14*), however, observed a significant effect of PET/CT on the diagnosis of patients with endometrial cancer ($n = 15$). They reported that 12 of 49 lesions (24.5%) were misdiagnosed or mislocalized by PET alone.

LYMPHOMA

Schaefer et al. (*15*) compared PET/CT findings with those of contrast CT in 60 patients with lymphoma. Sensitivity and specificity for PET/CT were 90% and 97%, respectively, and the corresponding values for contrast CT were 77% and 89%. The authors concluded that CT contrast studies are not required if PET/CT is available.

PET/CT proved to be superior to conventional imaging techniques for detecting extranodal disease involvement in 38 lymphoma patients as reported by Gelaw et al. (*16*). Twelve extranodal sites were detected by PET/CT but only 3 were detected by conventional imaging. No comparison with PET alone was performed.

Comparing PET/CT with PET alone, Freudenberg et al. (*17*) found no clear advantage of PET/CT over PET alone in 21 patients with lymphoma who were restaged after treatment. Both PET and PET/CT provided diagnostic sensitivities and specificities of 90% and 100%, respectively.

CONCLUSION

Despite the obvious limitations of short printed abstracts, several conclusions can be drawn. First, PET/CT permits the localization of molecular abnormalities and enhances the confidence of readers in discriminating abnormal from normal areas of hypermetabolism. Second, PET/CT imaging has a variable impact on staging and management of cancers. For instance, PET/CT changed stage and management in 20%–30% of patients with lung cancer and in >30% of patients with breast cancer. In contrast, no significant impact of PET/CT was reported in the diagnosis and management of patients with lymphoma or ovarian cancer. Future investigations will need to identify those cancer patients for whom PET/CT offers a diagnostic and prognostic advantage over PET alone.

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The Journal of NUCLEAR MEDICINE

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J Nucl Med. 2004;45:102S-103S.

The Journal of Nuclear Medicine is published monthly.
SNMMI | Society of Nuclear Medicine and Molecular Imaging
1850 Samuel Morse Drive, Reston, VA 20190.
(Print ISSN: 0161-5505, Online ISSN: 2159-662X)

SNMMI SOCIETY OF NUCLEAR MEDICINE AND MOLECULAR IMAGING