《招待講演》

PET-CT in Clinical Practice: Experience in 1500 Patients

Richard Wahl
Johns Hopkins University
USA

PET/CT imaging entered clinical practice at Johns Hopkins University in June of 2001. A Discovery LS system has been used in approximately 1500 patients, the vast majority with known or suspected cancer. This system has a multi detector CT scanner (GE Lightspeed plus) and a dedicated BGO 2D or 3D Advance NXi scanner integrated as a single system. Both CT, PET and fused images can be produced. The PET scans can be generated with no attenuation correction or attenuation correction using either Ge-68 or CT based measurements. A number of observations have been made with the system and examples will be presented at the meeting. From a technical standpoint, Ge and CT attenuation corrected images were generated in nearly 300 patients. In brief quantitative SUV measurements using both systems are generally comparable, although there are minor differences. Differences appeared greater for lesions located in bone, with CT SUV measures slightly higher than PET. Artifacts due to the CT attenuation correction have also been observed, notably cold defects near the diaphragmatic surface and rare, but significant, mislocalization of lesions located near the hemidiaphragm. These are likely due to respiratory differences between the rapid CT AC acquisition and the longer PET emission acquisition. CT AC images can also cause mild increased apparent tracer uptake near metallic structures, which is not seen on Ge images nor on non AC images (i.e. artifactual). CT AC is most safely performed with no high density contrast present as high density oral or i.v. contrast can lead to minor or major quantitative alterations in apparent SUV. The CT AC images, however, with attention to these minor alterations vs. Ge images are routinely useful and can be obtained very rapidly, with CT attenuation maps being made in 30–37 seconds vs. 18–30 minutes with Ge. This speeds study along and is now routinely applied. Arms down or up positioning can be performed. We have found that lesion localization/fusion with PET/CT is of high quality with only rare misregistrations between PET and CT images of a tumor. Further, we observed that common normal patterns of uptake, such as “supraclavicular muscle uptake” due to tension are really often located in fat structures (USA fat). We also have determined that the CT information provided can be useful additional information unique to CT in <10% of patients. Most importantly, studies

of diagnostic localization, certainity and accuracy are showing PET/CT to be superior, in many instances, to conventional PET. Fewer equivocal localizations and fewer uncertain readings result compared with PET. Other groups with PET/CT are seeing similar findings. Full studies of diagnostic accuracy are ongoing. At present, PET/CT is the preferred method at our medical center for PET imaging of cancer and used routinely in such patients referred for PET.

Acknowledgments

The data cited in this abstract have been developed through the efforts of Dr. Christian Cohade, Dr. Medhat Osman, Dr. Yuji Nakamoto, Dr. Mitsuaki Tatsumi, and the technical staff at Johns Hopkins University. Their efforts are appreciated.