

ASNC INFORMATION STATEMENT

New reconstruction algorithms using limited angular sampling

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The recent update of the American Society of Nuclear Cardiology (ASNC) imaging guidelines for myocardial perfusion single photon emission computed tomography (SPECT) imaging, by use of a technetium 99m–radiolabeled tracer and high-resolution parallel-hole collimator, defines 3° angular sampling (60–64 projections) and a 64 × 64 reconstructed image matrix size for a standard 180° acquisition from right anterior oblique to left posterior oblique. The basis for defining a fine angular sampling is an attempt to match the linear and angular sampling rates and to avoid aliasing artifacts inherent to undersampling. The literature regarding filtered backprojection (FBP) reconstruction solidly supports these guidelines for both acquisition and processing. ASNC, through the Quality Assurance Committee, encourages the development of any technologic advance-

ment that has the potential to improve laboratory efficiency while still maintaining high imaging quality.

Iterative algorithms, with their ability to model many of the processes that affect the measured data (eg, counting statistics, photon attenuation, scatter, collimator response), have demonstrated the potential to improve accuracy in the reconstructed tracer distribution in the heart. There is a growing body of peer-reviewed, multicenter validation studies that are beginning to support this, particularly in systems using hardware-based attenuation correction.

There are also several engineering articles that have shown that iterative algorithms using statistical models may be more efficient and accurate than FBP for handling projection data that is count-poor. With direct modeling of the statistics of the detected counts in the projections, these reconstruction algorithms have the potential to handle lower count rates while maintaining the image quality of a high-count study using FBP. These algorithms may well change current imaging guidelines (eg, minimum acquisition time, required injected dose of radiotracer, sampling parameters).

ASNC is aware of proposals to decrease imaging time by as much as 50% and reconstruct images by use of advanced iterative reconstruction algorithms. Although ASNC enthusiastically encourages the evaluation of such potentially useful technologies, its position on clinical imaging must still remain conservative, and the abandonment of time-tested imaging protocols before a new technology undergoes extensive, multicenter, peer-reviewed analysis is discouraged.

Prepared by the American Society of Nuclear Cardiology (ASNC) Quality Assurance Subcommittee for Imaging Guidelines.

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