edge that contains large high-frequency components. Since the structures inside the phantom are relatively smooth, the Gibbs effect is less significant.

In most clinical situations, when a quicker SPECT acquisition is desired, the acquisition time per view is decreased while the number of views is maintained to avoid aliasing artifacts. However, for fast or dynamic SPECT, when the acquisition time per view has already been set to the minimum, the number of views must be decreased to further accelerate the acquisition. Our study suggests that, if the number of views must be decreased, it should be reduced to an odd number, for example, reduced from 64 views to 31 or 33 views, to optimize SPECT image quality. Other techniques for decreasing acquisition time, such as continuous acquisition, have also been investigated (*8*).

The results from this study can be applied to a three-head SPECT system. In a three-head system, each detector rotates 120° and the total number of views is equal to the sum of the number of views of each detector. When the number of views of each detector is odd (or even), the total number of views is also odd (or even). Therefore, the detection geometry is the same as that of a single-head SPECT system and the discussion of this study can be applied to a three-head SPECT system.

CONCLUSION

This simulation study demonstrated that in 360° SPECT without attenuation, changing an even number of acquired views by one to an odd number significantly improved reconstructed image quality. For example, the image reconstructed from a 33-view acquisition was similar to that from a 64-view acquisition. In the presence of attenuation, the improvement was clearly demonstrated, but to a lesser degree when compared to images obtained without attenuation. To take full advantage of odd view number acquisition, attenuation effects should be corrected.

In 360° SPECT, 31 or 33 views appear adequate to remove most aliasing artifacts in reconstructed images with a matrix of 64 × 64 pixels. Use of a lesser but odd number of views is an approach to perform fast 360° SPECT where minimum acquisition time is of main concern.

APPENDIX

Glossary

Angular sampling interval: The circumferential distance between two neighboring sampling points.

Angular sampling point: The angular position of the center of the detector where a line integral is obtained.

Angular step of the detector: The angular distance between sequential positions of the center of the detector where projection data are acquired.

Attenuated line integral: The continuous sum of activity intensity which is reduced due to absorption of photons in a medium.

Line integral: The continuous sum of activity intensity along a projection ray.

Uniform region: The region where true activity is uniformly distributed.

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FIRST IMPRESSIONS

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