EFFECT OF SINOGRAM FILTERING IN THE QUALITY OF POSITRON EMISSION TOMOGRAPHY RECONSTRUCTIONS

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Introduction and rationale: In the reconstruction of positron emission tomography (PET) studies, list mode data are usually aggregated into sinograms. This step is necessary for filtered backprojection algorithms and also for some statistical methods.
Several effects, such as randomness of the positron emission, scatter, positron range and non-colinearity, degrade these sinograms. The subsequent reconstruction process propagates these errors to the final images. Since filtering in the angular direction introduces non-uniform tangential blurring, sinograms are generally filtered only in the radial direction for noise reduction. This filtering, however, also degrades resolution. Several methods have been proposed to face this problem, for instance filtering in the Wavelet or Stackgram domains.

Fourier transform of a sinogram is known to show a particular shape of the spectral energy distribution. In this work, this property has been exploited to perform an adapted filtering, comparing the results with previously reported methods. Materials and methods: Data from phantoms and rodents obtained from a real PET system (rPET, SUINSA) have been used to compare different sinogram filtering techniques and to evaluate the enhancement achieved.

Results and conclusions: A comparison of different methods for noise reduction in sinograms is presented. The proposed method for filtering in the Fourier domain provided the best results in terms of efficiency, noise reduction and simplicity. It achieved a SNR increase of up to 30% with no FWHM degradation. Furthermore, this correction improves the sinogram leading a visual enhancement similar to that of scatter correction methods.