Alpaslan Koc et al., J Nucl Med Radiat Ther 2015, 6:4
http://dx.doi.org/10.4172/2155-9619.S1.003

OMICS International
conferenceseries.com

International Conference on
Medical Physics
August 03-05, 2015 Birmingham, UK

# Effect of image resampling on tumour volume estimation accuracy in positron Emission tomography images restored via the blind deconvolution method

**Alpaslan Koc**[1] and **Albert Guvenis**[2]
[1]Institute of Bioemdical Engineering, Bogazici University, Istanbul
[2]Vocational College of Health Services, Kirklareli University, Kırklareli

**Background:**Tumor delineation accuracy is of high importance in radiotherapy planning where the goal is to assess the metabolically active tumor volume . In particular, small tumor volumes are difficult to estimate due to relativelylarge voxel sizes and limited camera resolution. Image resampling is often used in medical imaging [1] in tasks such as registration where the image intensity values need to be estimated for discrete points between the initial samples. The accuracy of the resamplingprocess depends on the characteristics of the imaging system and the object to be imaged as well the type of interpolation used. We have recently investigated the effect of blind deconvolution on tumour volume estimation accuracy using several delineation strategies [2].

**Purpose:** The aim of this work was to evaluate the effect of image resampling and blind deconvolution on tumor delineation accuracy using realistic PET images. Method and Materials Realistic [18F]FDG PET images from the ONCOPET database have been used in the study [3]. These consisted of 25 image sets of 128x128x375 voxels obtained from real patient scans and reconstructed using a filtered backprojection algorithm. Voxel size was 5.0625 x 5.0625 x 2.425 mm3. Simulated tumors with diameters of 14, 10 and 7 mm and of varying target to background ratios between 2.5 and 13 have been incorporated inside the real patient volumes. A cubic interpolation method has been used for resampling the images [4].Three dimensional active contou methods have been adopted for delineation, namely. The active contour method with 50%threshold,the active contour method with edge attraction, andt he active contour method with clustering [5]. In order to restore the images blurred by the camera point spread function, the Lucy-Richardson blind deconvolution algorithm was applied. The convolution parameters were adjusted for best accuracy. The number of iterations was set to 5 [6,7].

**Results:** Initial results with blind deconvolution and resampling have been obtained. The volume estimation errors for the lesions of 14 mm diameter and target to background ratio of 10 in the lung region by 50% thresholding delineation have been found as 98.98%, 12.47 % and 0.23% respectively on the original image, the blind deconvolved image and the deconvolved and resampled image. These results depend on the type of parameters used in blind deconvolution and the interpolation method. Work is underway to assess the accuracies for different tumor dimensions and and the automated delineation methods described above.

**Conclusion:** Initial results indicate that the accuracy of estimation of metabolically active tumor volumes improve when images are deconvolved with a blind deconvolution method and then resampled. Future work will concentrate on evaluating accuracy for the cases when tumors have more complex shapes.

alenezi_ahmed@yahoo.co.uk