A new three dimensional (3D) dose measurement method is described which uses liquid scintillation (LS) solution both as a phantom material and as a dose registration medium. The method is designed to measure simultaneously the brachytherapy dose in all points of a volume. The scintillation photons emitted from the volume at multiple angles are detected by using a highly collimated image detector. The scintillation light emission density for each voxel of the solution can be estimated by using a tomographic reconstruction technique. A highly efficient and radiologically water equivalent liquid scintillation solution was developed and used in the measurements. Scintillation light images induced by a rotationally symmetric dose distribution in the vicinity of a therapeutic ^{125}I source in a cubical LS volume with a 25.4 mm side were obtained to estimate the signal to noise ratio and to test the experimental accuracy. We conclude that exposure times of 10 min./projection can provide count rate precision better than 5% per 0.4 mm image pixel for dose rates ~1 cGy/h for experimental geometry with resolution better than 2 mm in the volume center. Simulations of the detector signal for selected sample dose distributions were performed and used to verify the range of reliability for the reconstruction algorithm.

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