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With the increasing interest in the use of intensity-modulated radiation therapy (IMRT) for breast cancer treatment, patient setup becomes a critical factor that affects the accuracy of geometrical match of dose distribution to the planning target volume (PTV). 3D imaging of the external (skin) and internal (lung) boundaries is highly useful for accurate patient setup before each treatment. Such 3D information can readily be obtained through CT scans performed on the treatment machine, which may however deliver unacceptably large quantities of radiation dose to the patient. In this work, we investigate the feasibility of tomographic reconstruction from low-dose megavoltage cone-beam projections acquired with an amorphous silicon electronic portal imaging device (EPID). The strategy of few-view and/or limited-angle projection is also investigated. We evaluate the performance of an iterative algorithm based upon maximum-likelihood for transmission tomography (ML-TR) for image reconstruction from low-dose projections. By incorporating the noise and scattering model into the likelihood function, the ML-TR algorithm fits naturally into the situation of low-dose reconstruction and thus generates images with better quality than do other analytical algorithms. Perhaps even more importantly, useful structural prior information can readily be utilized in the ML-TR algorithm, which can further improve the image quality and reduce the necessary radiation dose.