The demand for rapid transmission and reduction in storage space of medical images has increased since introduction of PACS and the use of spiral CT for three-dimensional radiation therapy treatment planning. Bit Plane Encoding (BPE) have been used for lossless medical image compression, but the decompression speed (DS) is below clinical expectations (>2 s/image). With the recent developments in information sharing over the Internet, there are new lossless image compression coders available for 8-bit images (e.g. BTPC).

In this work, we present two dedicated image compression techniques for 12-bit images; one is to improve the compression ratio (CR) and the other to improve DS. CR was increased, by improving BPE. To reduce the number of bits loaded with data, we create a difference image from the original image (16-bit), decreasing the range of each pixel value. This difference image is decomposed into 12 bitplanes and each bitplane is runlength encoded for compression. For a set of CT images, CR is 2.78 with a DS of 1.8 s/image. In other approach, to improve the DS, we developed a technique where the 16-bit CT data is converted to 8-bit data. For the same image set, CR was 1.87 with DS of 0.2 s./image. For comparison, we modified BTPC coder for 12-bit data and compressed the same image set 2.45 with DS of 1.0 s./image. The results show that depending on the nature of the application, DS or CR can be improved, which translates into faster image retrieval or more storage space, respectively.