

4DCT imaging provides the 4D images of tumor motion with respect to respiration. There are two ways of data acquisition to achieve this: helical and cine. In helical acquisition, table translates at a constant speed when x-ray is ON for the duration of table translation. The longer the breathing cycle, the slower the table translates. A pitch factor of 0.115 is required for breathing cycle of 4 s. In cine acquisition, x-ray is ON for a breathing cycle plus the data duration for an image reconstruction. Once a cycle has been acquired at one position, the table moves to the next position, and the process is repeated until a prescribed coverage has been scanned. We compared the two acquisitions for 4 s breathing cycle, 20 cm coverage, and 2.5 mm slice collimation for 4- and 8-slice and 1.25 mm for 16-slice scanners.

Scan time: It is favorable for helical than for cine. There is 7 to 17% speed up from 16 to 4-slice. This is due to the table translation between steps in cine.

Dose efficiency: Cine is better than helical by 5 to 8% from 4 to 16-slice. Helical needs an additional breathing cycle time of x-ray on.

Slice thickness (Slice Sensitivity Profile): Cine produces thinner slices than helical. Helical broadens the slice thickness by 28% to 80% from 16 to 4-slice.

In summary, there are advantages in dose efficiency and slice thickness with cine. And there is an advantage of shorter scan time for helical.