Purpose: The purpose of this study is to identify whether the change of MV CBCT intensity can improve intensity based registration accuracy using predefined modification level and filtering process.

Methods: To obtain modification level, images of the cheese phantom and the deformable lung phantom which was intentionally created in the laboratory to imitate the changes of the breathing period was acquired from both kilovoltage CT (kV CT), megavoltage cone-beam CT (MV CBCT). From the cheese phantom images, the modification level of MV CBCT was defined from the relationship between Hounsfield Units (HUs) of kV CT and MV CBCT images. ‘Gaussian smoothing filter’ was added to reduce the noise of the MV CBCT images. The intensity of MV CBCT image was changed to the intensity of the kV CT image to make the two images have the same intensity range as if they were obtained from the same modality. And then deformable registration was applied.

Results: The vector differences from the result were 2.23, 1.39mm with/without modification of intensity of MV CBCT images, respectively.

Conclusions: Our method has quantitatively improved the accuracy of deformable registration and could be a useful solution to improve the image registration accuracy.