Purpose:
The overarching goal of this project is to be able to use daily CBCT images to calculate the
dose delivery for a single treatment. To calculate the dose, planning CT images can be
deformed to match the patient anatomy at the time of delivery as shown in the daily CBCT. Our
current research is looking into methods to deform the planning CT to best match the CBCT
using the commercial software MIMVista.

Methods:
The OBI (on-board imager) of a Varian Linac at Karmanos Cancer Institute was used to get a
set of daily CBCT images for a prostate patient. The images were processed in MatLab on a
voxel-by-voxel basis to enhance areas of low signal and to convert HU for the CBCT to HU for
the planning CT. Efforts were also made to decrease signal saturation in the bone through high
pixel value masking. The planning CT images were deformed to the new CBCT images using
MIMVista software.

Results:
Converting the HUs from CBCT to planning CT values followed by applying different scaling
factors gave some success in improving the deformation of the images using MIMVista.
However, the resulting deformation is clearly not yet accurate enough to be applied clinically.
Deformation was performed by aligning bony anatomy, therefore bony anatomy deformed
significantly better than tissue. Regions of low signal, variable bladder filling, and bowel gas
pockets present difficulties that still need to be resolved.

Conclusions:
While the CBCT image adjustments we have made have improved MIMVista’s ability to
deform planning CT images to CBCT images, work still needs to be done to reduce the noise in
the CBCT images so that the planning CT images will be able to be deformed accurately.