AbstractID: 10580 Title: A phantom study to characterize a Doppler ultrasound scanner for application in prostate brachytherapy

Purpose:

To characterize the Doppler modes of an ultrasound scanner, in a phantom, for potential use in prostate brachytherapy. **Method and Materials:**

A flow phantom has been designed and fabricated. The one-directional flow was generated with the help of peristaltic pump. Images of the phantom were obtained using the color Doppler (CD) and power Doppler (PD) modes. The effect of the instrument's parameters, *viz* color gain, pulse repetition frequency and wall filter, on flow detection by these Doppler modes has been studied. **Results:**

The Doppler gain has a significant effect on the flow detection in both CD and PD modes. Flow detection in the color Doppler mode is found to be affected by the pulse repetition frequency (PRF). The wall filter shows no effect on flow detection by CD mode, however reducing the wall filter to low value gives aliasing in PD mode.

Conclusion:

This study can help to identify the optimal setting for acquisition of prostate images using Doppler modes. Inappropriate setting of these parameters can either display incorrect information or can hide useful clinical information. Recognizing the flow in the prostate can help to identify regions of increased blood flow. As an increased flow in prostate vessels may demonstrate the presence of cancer; it can help to recognize the regions within the prostate gland, which could be histopathologically positive for cancer. By delivering a relatively large number of seeds to the areas of hyperflow, dose can be maximized to the cancerous region and possibly be reduced to the surrounding critical organs. This has the potential to improve the treatment outcome and reduce treatment related complications.