

Overview of Design and Needle Interaction Related to Robotic Brachytherapy

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As robots become more important and accepted in clinical use, it is important for the Medical Physicist to be aware of the characteristics of a medical, robotic system. The inherent design of the device will introduce greater control and accuracy over manual insertion. The roots of these benefits must be understood in order to utilize them effectively, however. Each device will provide unique advantages and limitations based on their design for the user and the treatment options.

This lecture will introduce basic concepts and terminology related to robotics that will aid a Medical Physicist in understanding the device. The physicist has likely never been introduced to robotic kinematics and thus a brief overview of how to model and analyze a robot is useful. Further, each robot will have various methods of needle insertion and seed delivery. A comparison of these robots related to needle deflection and tissue damage and compression is valuable both in the clinical and research settings.

It is hoped that increased knowledge of medical robotics will lead to greater clinical acceptance, safety and usability.

Learning Objectives:

1. Introduce basic terminology and concepts in robotics
2. Demonstrate the different needle insertion and seed delivery techniques using a robot
3. Demonstrate the possible effects of needle rotation, deflection, and tissue compression on the treatment outcome