Image-Guided Small Animal Radiation Research Platform (SARRP)

The Problem

• Cancer research with small animals allows detailed study of biological processes, disease progression, and response to therapy.
• Image-guided radiation therapy systems for small animals are needed to bridge “mice to men” translation.

THE SOLUTION

• Construction of SARRP which integrates imaging, radiation delivery and treatment planning capabilities:
  • Robotic system to position animal for imaging and treatment
  • X-ray source and shutter for radiation treatment
  • X-ray source and camera (or panel) for 2D imaging
  • Software package to reconstruct 2D projection images into 3D volumetric representation
  • GUI for display and manipulation of 2D/3D images

THE IMPACT

• Development of algorithms for precise small animal irradiation
• Full combinations of imaging and irradiation capabilities
• Highly localized treatment planning, dose calculation and verification
• Benchtop system allows operation within animal containment barrier

THE FUTURE

• Engineering construction, validation and calibration of the system
• Implementation of the robotic controller and cone-beam CT software package
• Gantry version for larger animals

PUBLICATIONS

Three abstracts accepted for AAPM 2006:
• The Small-Animal Radiation Research Platform (SARRP): Focused Pencil Beam Dosimetry
• The Small-Animal Radiation Research Platform (SARRP): Commissioning a 225 KVp “small-Field” X-Ray Source for Monte Carlo-Based Treatment Planning
• The Small Animal Radiation Research Platform: Benchtop Cone-Beam CT

PEOPLE INVOLVED

• Graduate Student: Babak Matinfar
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SUPPORTED BY:

• NIH R01 CA108449-01