Purpose:
To develop a portable scanner that demonstrates the principles of radiography and computed tomography (CT).
Methods:
The traditional methods for teaching the physics of medical imaging rely on lectures, followed by demonstrations on a clinical system that is not easily accessible or programmed for educational purposes. We have developed a scaled-down portable CT imaging system suitable for interactive “real time” demonstrations using a laptop computer during a classroom or lab session. Our optical system uses light rays in lieu of x-rays so that experiments can be conducted while posing no electrical or radiation hazards to instructors and students. The desk-top CT imaging device will be supplied with a learning kit of experimental test phantoms, lab manuals, instructional videos, and specialized software that demonstrate 2D radiographic and 3D CT image reconstruction methods. These approaches are relevant to imaging systems used in digital diagnostic imaging and image-guided therapy.
Results:
A low-cost portable system (< $15,000) has been manufactured (http://www.deskcat.com/) to enrich the student’s learning experience and improve the retention of fundamental imaging concepts. Students learn about spatial resolution, contrast resolution, system linearity, image artifacts and they perform quantitative measurements in 3D space, using image visualization software tools and specialized test phantoms (7.2 cm diameter x 5.3 cm long). Early reaction from instructors and students alike has been very encouraging.
Conclusions:
This learning package should prove attractive to universities with medical physics programs in Departments of Physics, Medical Biophysics, or Biomedical Engineering, as well as Medical Schools with residency training programs (Medical Imaging, Radiation Oncology). The system’s modular nature allows extensions for future coverage of related topics such as nuclear and molecular SPECT imaging. Through future developments, it may also be possible to model the dose deposition patterns from intensity-modulated radiotherapy beams using ultraviolet exposure of radiochromic gel volumes.

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