WorldCare Clinical
A ProScan Imaging Company

The WCC Note™

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A Weekly Guide To Harmonizing Clinical Trial Imaging

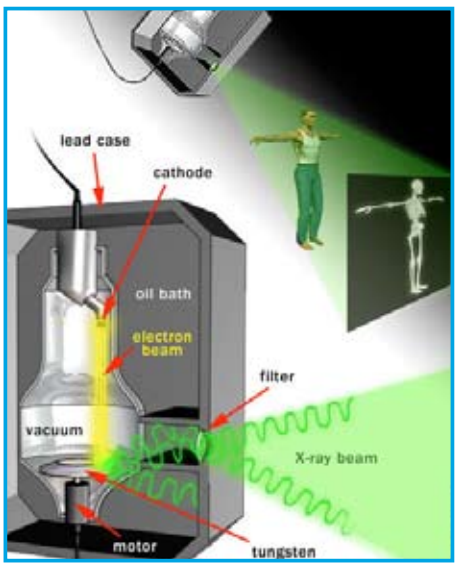
Volume 1, Number 1 – September 24, 2007

TO EDUCATE, INFORM, AND SUPPORT

WorldCare Clinical (WCC) is launching this new electronic publication with one key goal in mind: to educate, inform, and support our colleagues in the clinical research and pharmaceutical/medical device fields about advanced medical imaging. ***The WCC Mentor*** is intended for anyone interested in medical research, research procurement, or clinical trial management. Each week, we'll bring you relevant, useful information distilled down to its basic concepts. In doing so, we hope to:

- Help raise the bar for patient care and clinical research;
- Offer advice on how to harmonize your approach to using imaging technology;
- Present new ways to navigate the drug or device development pathway more efficiently; and
- Educate non-medical professionals about diagnostic imaging equipment, capabilities, and new developments.

For the next several issues, we'll present a series on the basics of each modality used in clinical trial imaging, including conventional x-ray radiography, computed tomography (CT), ultrasound, magnetic resonance imaging (MRI), and nuclear medicine. We'll also examine the scientific basis for each modality, as well as its clinical applications, strengths, and weaknesses. We hope you enjoy this first issue and we look forward to your comments, questions, and suggestions. – *Stephen J. Pomeranz, M.D., and Resham R. Mendi, M.D.*



RADIOLOGY: THE BASIC MODALITIES
Part One: X-Ray Radiography

How it works. X-rays are high-energy photons, which are created by an electric current within a cathode ray tube. The x-ray tube is aimed at a patient's body part of interest, with a film plate positioned behind the body part (*see diagram at left*). Body parts that are dense, like bone, do not allow the photons to pass through. Less dense tissue – such as muscle, fat, and air – allows the x-rays to pass through and hit the photographic plate.

The x-rays then produce a chemical reaction in the film, causing it to be exposed. When the film is developed, the exposed areas turn black (fat) and the non-exposed areas turn white (bone). The entire image then becomes a reflection of tissue density: High-density tissues are white, intermediate tissue densities are gray, and low-density tissues show up as black.

Common Clinical Indications for X-rays

- Evaluation of bones for fracture, dislocation, arthritis, etc.*
- Evaluation for foreign bodies
- Gross evaluation of lungs for pneumonia, large mass, pneumothorax, or pulmonary edema
- Evaluation of heart size
- Evaluation of bowel gas pattern for free air, ileus, or bowel obstruction

** Note: While x-ray radiography is sensitive for the evaluation of cortical bone, it's less effective for marrow evaluation.*

SOME PROS AND CONS OF X-RAYS

Advantages:

- Fast
- Cheap
- Quick
- Easy to perform
- Sensitive to detecting calcium, cortical bone, air, gas, and metal
- Produces few artifacts – flaws in the image that may lead to misinterpretation

Disadvantages:

- Exposes subjects to radiation, which can cause cumulative damage*
- Insensitive to soft-tissue abnormalities involving muscle, masses, blood, water, solid tumors, etc.
- Changes in patient positioning by the technologist can lead to moderate image-quality variability
- Analog technology makes digital image transfer more challenging

** More on this topic in next week's issue.*

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