AbstractID: 7253 Title: IVB Imaging in the Cath Lab

High quality fluoroscopic and angiographic imaging is essential for proper source selection, placement and dosimetry during IVB. Fluoroscopy is used to guide the placement of all devices within the artery. During fluoroscopy, occasional small injections of contrast must be made to allow visualization of the arterial lumen. Angiography is similar to fluoroscopy, except that a much higher radiation dose is used, and generally contrast material is vigorously injected to provide high resolution images of the coronary anatomy. Angiography is used in IVB to define the anatomy, select the brachytherapy device, and to calculate the dwell time to deliver the prescribed dose. From the angiogram the lesion length can be determined, allowing the source length to be selected. The lumen width can be determined all along the vessel, providing a baseline for comparison with later follow-up angiograms, and allowing the dose at a prescribed depth from the lumen wall to be calculated at every point along artery. Although fluoroscopy and angiography are clearly essential for IVB, they have two weaknesses: (1) they provide only a two-dimensional projection of the artery, so features such as vessel narrowing or an off-center brachytherapy source cannot be seen if they are perpendicular to the image plane; and (2) they are able to visualize only the vessel lumen and high density devices such as stents, guide wires, and opaque gold markers on catheters—not the plaque and different tissues within the vessel wall. Intravascular Ultrasound (IVUS) acquires high resolution images from within the artery using a scanning ultrasound catheter that can be slowly pulled back along the artery to produce a series of adjacent cross-sectional slices, providing a full three-dimensional view of the artery lumen and wall. The shape and size of the lumen, the thickness of plaque and media, the presence of calcium, and the position of stent wires can be visualized, providing useful information for IVB treatment planning and dosimetry. IVUS also has weaknesses: (1) it is not performed when the radiation delivery catheter is in place, and so it does not document the location of the source within the artery; (2) the disposable IVUS catheter is expensive; (3) it requires more time and is more invasive than an angiogram; and (4) interpretation of IVUS images requires special training and experience. IVB has been successful in trials both with and without IVUS imaging and precise quantitative angiography for dosimetry. Together, these two imaging modalities provide detailed and quantitative anatomic information that has not yet been fully exploited in IVB. Optimal use of this information will be a challenging area of research as IVB moves into routine clinical practice.

This Refresher Course's Learning Objectives are to enable the attendee to:

1. Appropriately apply angiography and IVUS during IVB .
2. Understand the strengths and weaknesses of each imaging modality for IVB.
3. Utilize optimal cath lab imaging methods for routine IVB dosimetry and clinical trials.
4. Develop and/or evaluate improved IVB dose delivery and verification methods using imaging.