AbstractID: 8280 Title: Radiation dose estimates for in vivo microCT studies

Purpose: Repeated scans of microCT can deliver radiation dose levels that can perturb the biological response of an animal model. The purpose of this study is to determine if a simple phantom having dimensions that approximate the size of a typical mouse can be substituted for the animal model for radiation dose measurements of microCT scans.

Method and Materials: Phantom measurements of radiation dose were performed with a hollow water-filled acrylic cylinder (OD: 25.4 mm, ID: 19.0 mm) and a lithium fluoride TLD in a PVC pouch immersed in the water compartment of the phantom. CT was performed using a microCT system (X-O™, Gamma Medica-Ideas, Northridge, CA) with an x-ray source of two settings, 75 kVp/0.325 mA and 60 kVp/0.530 mA which are typical for *in vivo* studies. CT data were acquired using 512 projections over 120 seconds of continuous x-ray exposure. For comparison, a TLD placed within the thorax of a euthanized mouse (~30 g) was exposed using the same x-ray techniques as the phantom. A total of 4 TLDs (one each with two x-ray settings for the phantom and animal measurements) were read using a Harshaw 6600 TLD reader with correction factors applied for 60-75 kVp x-ray.

Results: The TLD measurements produced dose measurements of 3.645 and 4.255 cGy in the cylindrical phantom, and 4.137 and 4.690 cGy in the euthanized animal, for x-ray techniques of 75 kVp/0.325 mA and 60 kVp/0.530 mA, respectively. The readings obtained from the phantom measurements were 9-12% lower than those obtained from the animal.

Conclusion: The radiation dose measurements using TLDs in the mouse-sized cylindrical phantom were in a good agreement with the dose measurements in the euthanized animal. This phantom, in combination with TLDs, potentially is a useful tool for estimating radiation dose for serial *in vivo* studies with microCT.