AbstractID: 11440 Title: Reduction in Breast Dose in Routine Chest CT Through the Use of Bismuth Breast Shields As Measured by DOT Dosimeters

Purpose: The goal of our research is to determine the effectiveness of commercially available Bismuth (Bi) breast shields for reduction of breast dose in routine chest computed tomography (CT) exams without having a negative impact on image quality, through the use of DOT dosimeters. **Methods & Materials:** We used a Siemens 16-slice CT scanner, an acrylic chest phantom with cork lungs and one acrylic breast (Phase I), a RANDO phantom (Phase II), Bi breast shields from AttenuRad (0.06 mmPb equivalent) with the two included ¼ inch thick foam pads, and aluminum oxide (Al_2O_3:C) DOT dosimeters. These DOT dosimeters are optically stimulated luminescent (OSL) dosimeters read by the Landauer InLight® microStar system. Each exposure was made with our routine chest protocol using Caredose4D. Five dosimeters were placed on the breast, one each at 12, 3, 6, and 9 o'clock positions (12 being superior to 9) and one central to the others. Doses were read both with and without the Bi shield to calculate the dose reduction with three time reading repetition. **Results:** Our initial study with a Radcal ionization chamber showed an exposure to the center of the breast of about 1.92 R unshielded and 1.52 R shielded (21% reduction). Results of Phase I found an average dose of 1.58 rad unshielded and 1.14 rad shielded (28% reduction). Use of foam pads between the shield and the phantom surface reduced streaking artifacts that occurred where the shield previously made direct contact. The expected increase in CT number of underlying tissues was not seen. **Conclusion:** Our results from Phase I showed a significant reduction of the breast skin entrance dose with the use of Bi breast shields. We will repeat the tests with the RANDO phantom, and investigate whether the thicker foam pads are able to further decrease image artifacts.