HHSN268201000050C (17a) University of Wisconsin School of Medicine (PI: Sean Fain, PhD)
3-month Interim Report
QIBA Research Update 1/25/12

Using the COPD Lung phantom we have produced scans under conditions of varying the pitch, the mA (by a factor a 8), the scan FOV, and the beam collimation. We also reconstructed these scans using various reconstruction algorithms that do not use edge enhancement and have performed the reconstructions with and without GE's iterative reconstruction algorithm, ASIR.

With the mA variations/ reductions and the application of ASIR we are investigating the usefulness of low dose techniques for our protocols.

We have measured effects of changing these scan and reconstruction parameters on the CT numbers of water, lung and air in the phantom, and will be looking at the effects on airway measurements. Phantom Labs will be loaning us extra sections of the interior lung material and external rings so that we can investigate the effects of scatter on the CT numbers and on airway measurements. We will position these extra sections to increase the effective width of the phantom from 5 mm to 30 mm. We will also look at the effects of positioning of the phantom and the effects of the outer ring size.

In the realm of clinical scans, we are investigating the effects of the application of ASIR to clinical lung scans for airway measurements and CT number changes.

QIBA Research Update
All of the above phantom scans have now been performed, as outlined in the following pages:

QIBA Research Scans

Each of the following tests is to be performed with the COPD Gene Lung Phantom (15cm x 25cm) using the following added rings: 25cm x 35cm (36cm DFOV), 30cm x 38cm (40cm DFOV), 38cm x 38cm (40cm DFOV). All scans are performed using a 0.5 s rotation time.

Scan using Medium and Large Scan FOV.

Each of the following tests is to be performed with the phantom centered, raised by 5 cm and lowered by 5 cm.

Perform Helical scans using a 0.625 slice thickness, a Plus recon option, and an interval of 0.5 mm using the following techniques:

Beam Collimation (mm)	Pitch	Table Speed (mm/rot)	mA Settings
40	0.984	39.37	200, 100, 50, 25
20	0.969	19.37	195, 100, 50, 25
40	1.375	55.00	280, 140, 70, 35
20	1.375	27.50	280, 140, 70, 35
40	0.516	20.62	105, 50, 25, 15
20	0.531	10.62	110, 50, 25, 15

Perform Axial scans using the following techniques:

Beam Collimation (mm)	Images per rotation	Slice Thickness (mm)	mA Settings
40	32i	0.625	240, 120, 60, 30
20	16i	0.625	240, 120, 60, 30
10	4i	1.25	120, 60, 30, 15
5	2i	1.25	120, 60, 30, 15

Reconstructions are performed w/o ASIR and w 100% ASIR, and with the standard, detail, bone, and edge algorithms.

Table Height = 125.5 with 25 cm x 35cm ring.

Table Height = 151.5 with 30 cm x 38cm ring.

Table Height = 190.5 with 38 cm x 38cm ring.

Each of the following tests is to be performed with the COPD Gene Lung Phantom (15cm x 25cm) using the following added ring: 25cm x 35cm (36cm DFOV). All scans are performed using a 0.5 s rotation time.

  Scan using Medium and Large Scan FOV.

   Each of the following tests is to be performed with additional phantom blanks all having the 25cm x 35cm rings added to the side of the above phantom. This results in a total z-extent of the entire phantom to vary from 55 cm down to 5 cm:

Additional Sections on *each* side of basic 5 cm wide phantom	Total Width of Phantoms
2 – 5 cm sections + 1 – 2.5 cm section	55 cm
1 – 5 cm section1 + 1 – 2.5 cm section	35 cm
1 – 2.5 cm section	15 cm
No additional sections	5 cm

   Perform Helical scans using a 0.625 slice thickness, a Plus recon option, and an interval of 0.5 mm using the following techniques:

Beam Collimation (mm)	Pitch	Table Speed (mm/rot)	mA Settings
40	0.984	39.37	200, 100, 50, 25
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40	1.375	55.00	280, 140, 70, 35
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Beam Collimation (mm)	Images per rotation	Slice Thickness (mm)	mA Settings
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