QAH
QUEEN ALEXANDRA
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Paediatric heads: What dose on which scanner – and then what?

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Lincoln

11th October 2018

Siemens Definition AS+

Toshiba Aquillion One

The question:

Paediatric Heads routinely on Siemens Definition AS+

What are the doses?

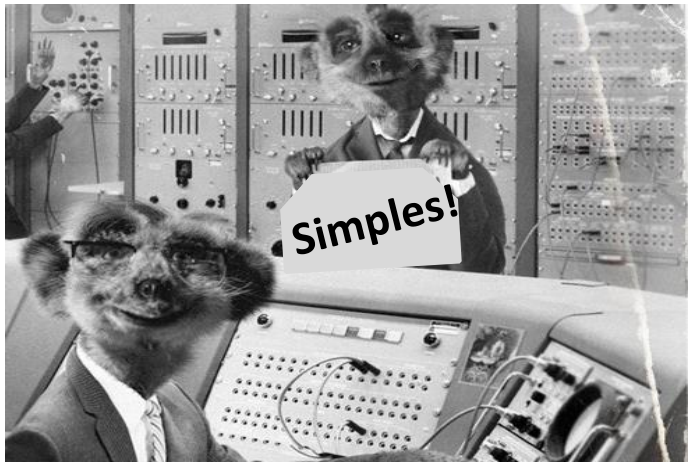
Can activity move onto the Toshiba Aquillion One?

Acquiring study & patient info – The hope

Modality

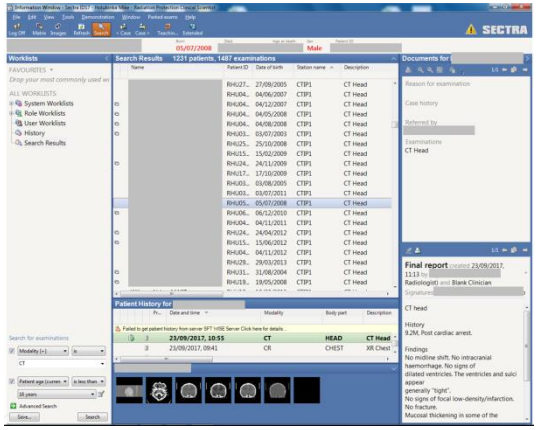
RSDR

OpenREM

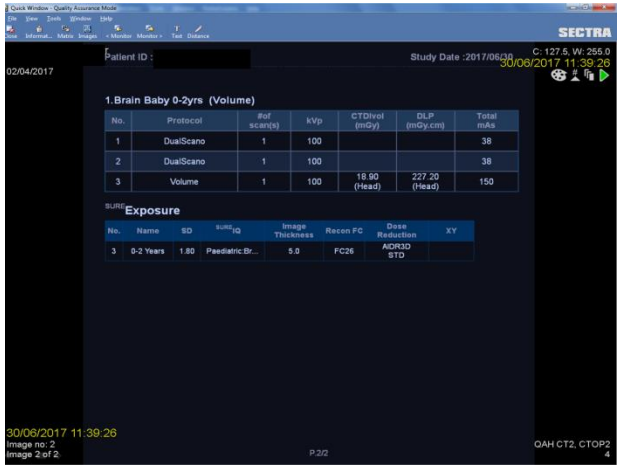


Acquiring study & patient info – The reality

Modality



PACS

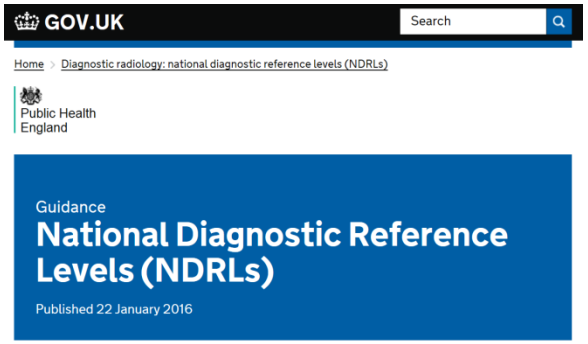


PACS search

CT Heads
All patients
Both scanners
22 month period from 1st January 2016
DoB after 1st January 2000

Siemens Definition – 152 studies
Toshiba Aquillion One – 20 studies

Criteria for general acceptability:-



2.2 Paediatric CT examinations

Examination	Clinical indication	Scan region/ technique	$CTDI_{vol}$ per sequence (mGy)	DLP per complete examination (mGy cm)
Paediatric head: 0–1 y [1]	Trauma	All sequences	25	350
Paediatric head: >1–5 y [1]	Trauma	All sequences	40	650
Paediatric head: >5 y [1]	Trauma	All sequences	60	860

Values taken from PHE-CRCE-013: Doses from computed tomography (CT) examinations in the UK (2011 Review).

PiDRL EUROPEAN DIAGNOSTIC REFERENCE LEVELS FOR PAEDIATRIC IMAGING

European Guidelines on DRLs for Paediatric Imaging

Final complete draft

Table 10.2b. European DRLs for computed tomography. EDRLs for head CT refer to 16 cm phantom and EDRLs for thorax and abdomen for 32 cm phantom. DRLs refer to a complete routine CT examination (one scan series).

Computed tomography			
Exam	Age or weight group	EDRL	
		$CTDI_{vol}$, mGy	DLP, mGy cm
Head	0-<3 months	24	300
	3 months-<1 y	28	385
	1-<6 y	40	505
	≥6 y	50	650
Thorax	<5 kg	1,4	35
	5-<15 kg	1,8	50
	15-<30 kg	2,7	70
	30-<50 kg	3,7	115
	50-<80 kg	5,4	200
Abdomen	<5 kg		45
	5-<15 kg	3,5	120
	15-<30 kg	5,4	150
	30-<50 kg	7,3	210
	50-<80 kg	13	480

So I have;

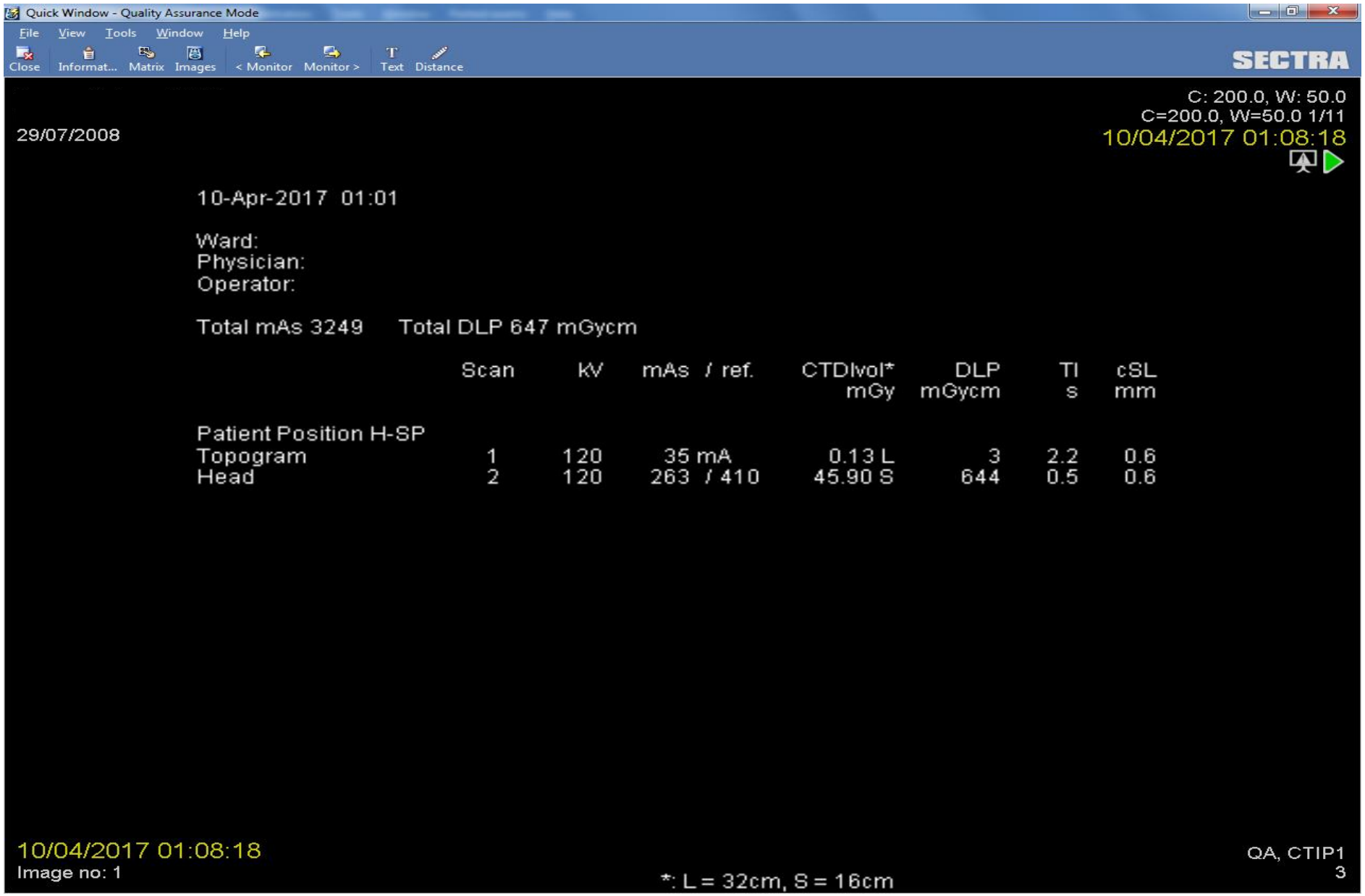
Sufficient data (?) to analyse
Benchmark dose metrics from available DRLs
Age ‘ranges’ for groupings
Dose and age data from PACS

…but still need to compare machines

Siemens Definition scan protocols

Topogram and Scan Protocol information		
	Siemens Definition AS+	
Scanogram		
Beam orientation	AP	AP
kVp	120	120
Head / Body mode topo	Head (S)	Body (L)
Scan		
Protocol names	0to6yrs_Head_Spiral	1A_SPIRAL_BRAIN
Scan options	Spiral	Spiral
kV	100	100/120
Slice thickness mm	0.5	4
Pitch	0.8	0.55
FoV mm	500	500
Scan time msec	1000	500
Filter types	Flat	Flat
Convolution kernel	H41S	H42F
Acquisition type	Spiral	Spiral
Single collimation width	0.6	0.6
Total collimation width	38.4	12
Exposure modulation type	XYZ_EC	Z_EC

Dose sheet – Siemens Definition AS+



Toshiba Aquillion One scan protocols

	Topogram and Scan Protocol information			
	Aquillion One			
Scanogram				
Beam orientation	Dual AP & Lat	Dual AP & Lat	Dual AP & Lat	Dual AP & Lat
kVp	100	100	120	120
Scan				
Protocol names	Brain Baby 0-2yrs (Volume)	Brain Child 3-5yrs (Volume)	Brain Child 6 - 12yrs (Helical)	Brain Helical
Scan options	Volume	Volume	Helical	Brain Helical
kV	100	120	120	120
Slice thickness mm	0.5	0.5	1.0	1.0
Pitch	-	-	0.656	0.656
FoV mm	240	240	240	240
Scan time msec	500	500	750	750
Filter types	Small	Small	Small	Small
Convolution kernel	FC26	FC30	FC30	FC30
Acquisition type	Sequenced	Sequenced	Spiral	Spiral
Single collimation width	0.5	0.5	0.5	0.5
Total collimation width	100	140	16	16
Exposure modulation type	AIDR3D - STD	AIDR3D - STD	2D	2D

Dose sheet – Toshiba Aquillion One

The analysis

Median spiral head 'doses' compared with EPiDRL Dose Reference Levels

Siemens Definition AS+

	CTDIvol mGy		DLP mGy.cm	
	Median of sample	EPiDRL	Median of sample	EPiDRL
0 to <3 months	17.5	24	240	300
3 months to <1 year	20.2	28	310	385
1 year to <6 years	21.4	40	360	505
>6 years	41.9	50	655	650

Toshiba Aquillion One

20 studies

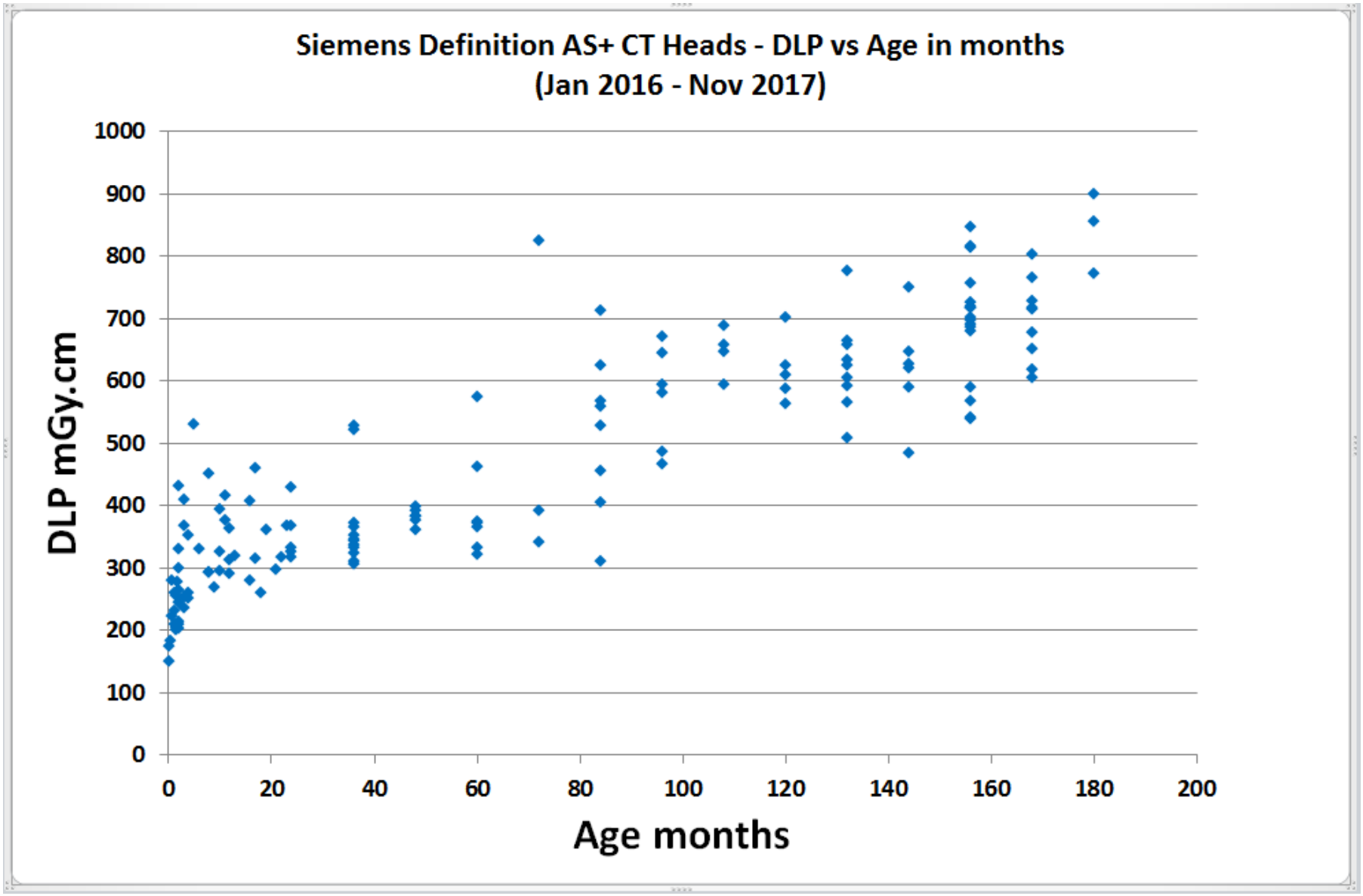
Four protocols

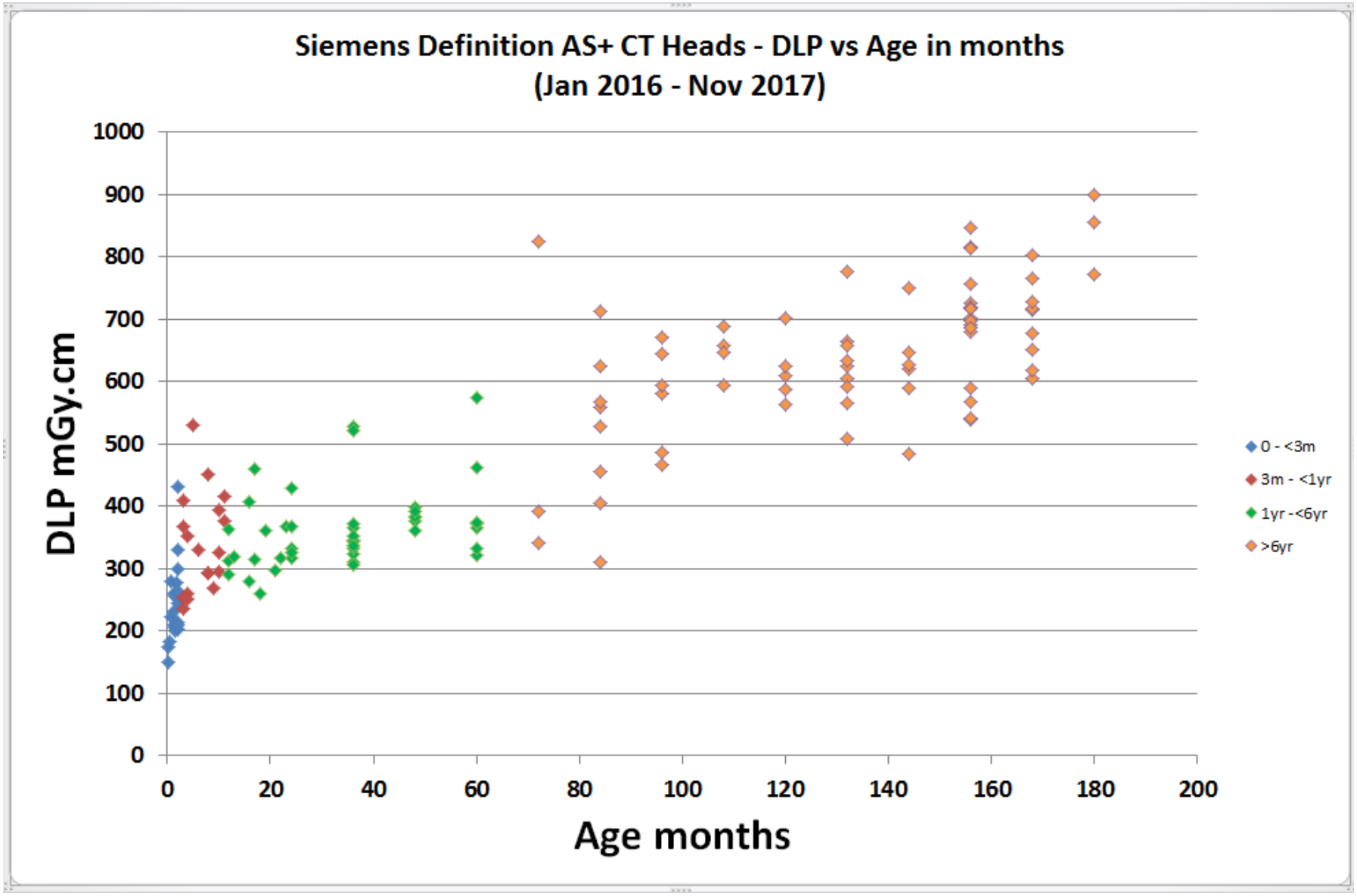
Four age ranges

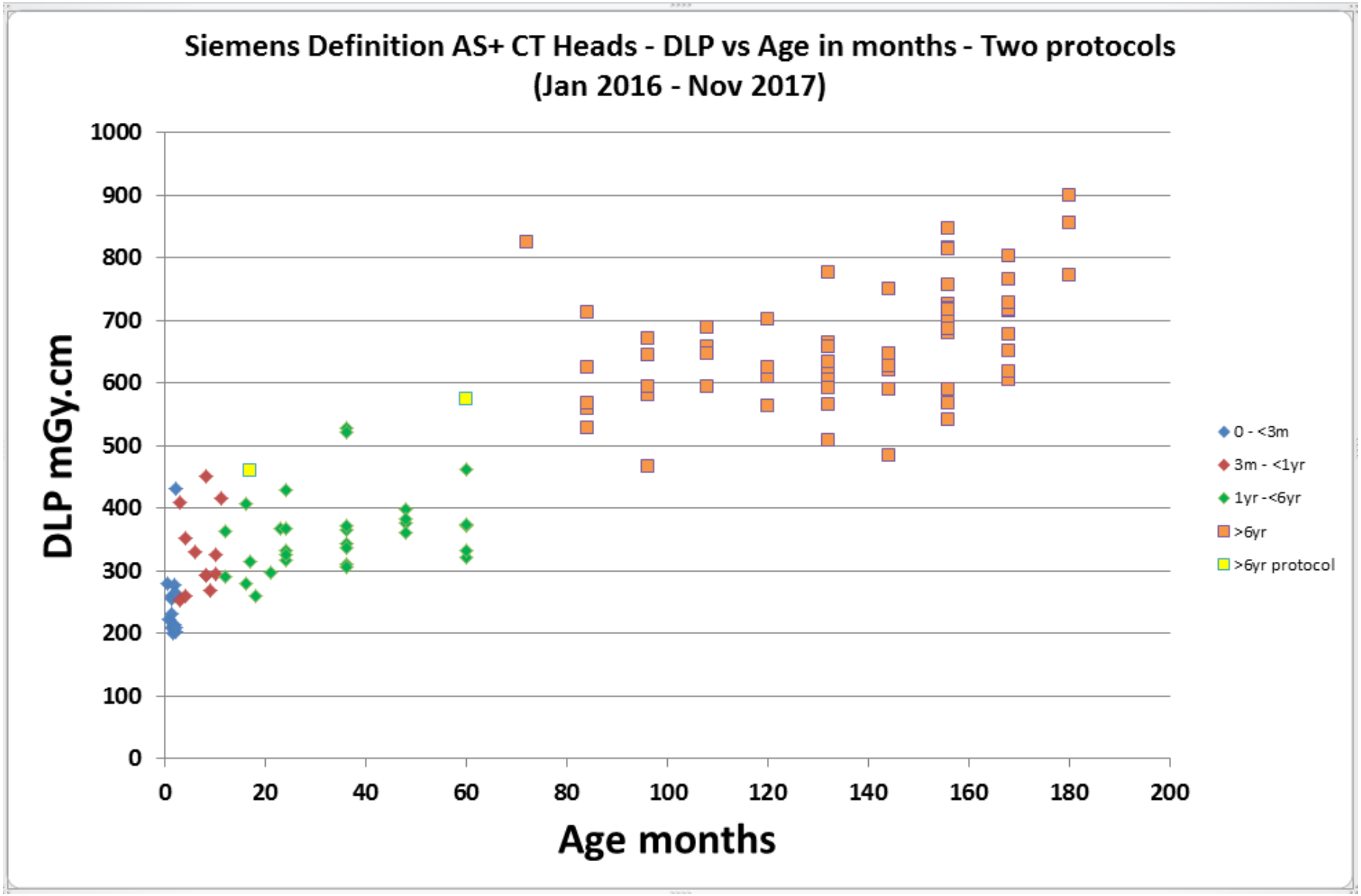
…….Not enough data

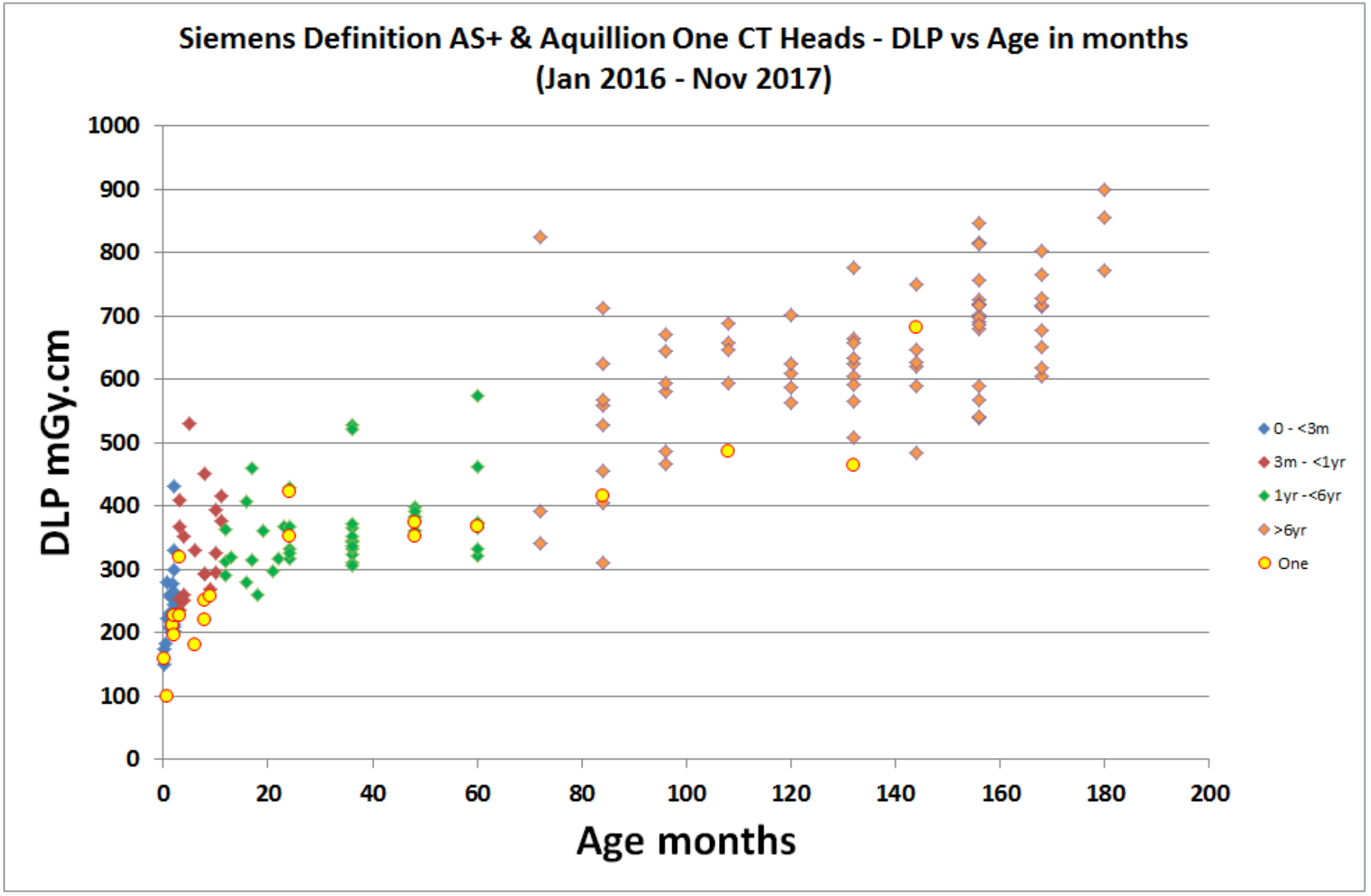
But ..how do the machines compare?

DLP


Siemens Definition AS+ CT Heads - DLP vs Age in months
(Jan 2016 - Nov 2017)
DLP mGy.cm
1000
900
800
700
600
500
400
300
200
100
0
0
20
40
60
80
100
120
140
160
180
200
Age months

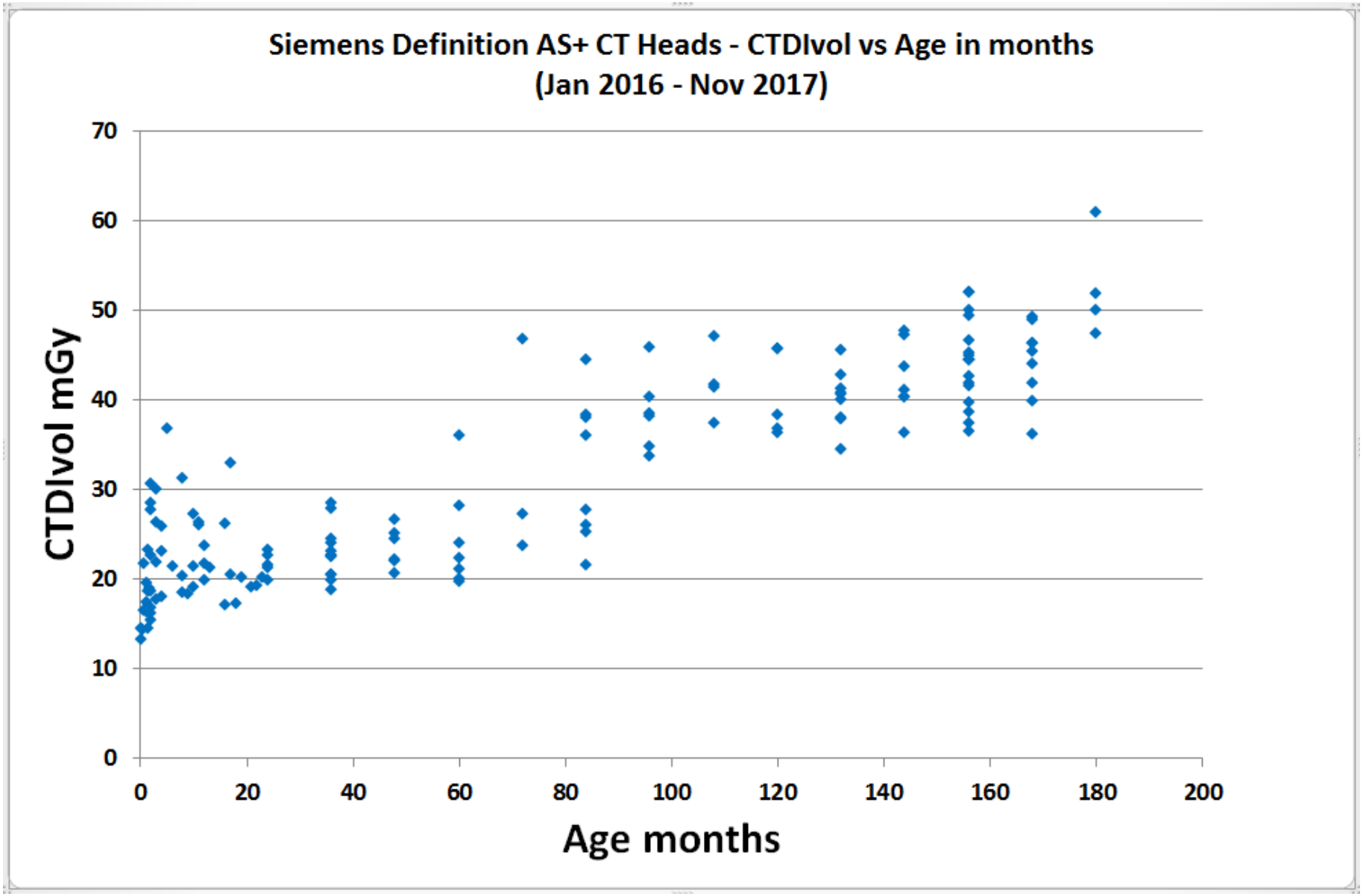

Siemens Definition AS+ CT Heads - DLP vs Age in months
(Jan 2016 - Nov 2017)
DLP mGy.cm
1000
900
800
700
600
500
400
300
200
100
0
0
20
40
60
80
100
120
140
160
180
200
Age months
0 - <3m
3m - <1yr
1yr - <6yr
>6yr

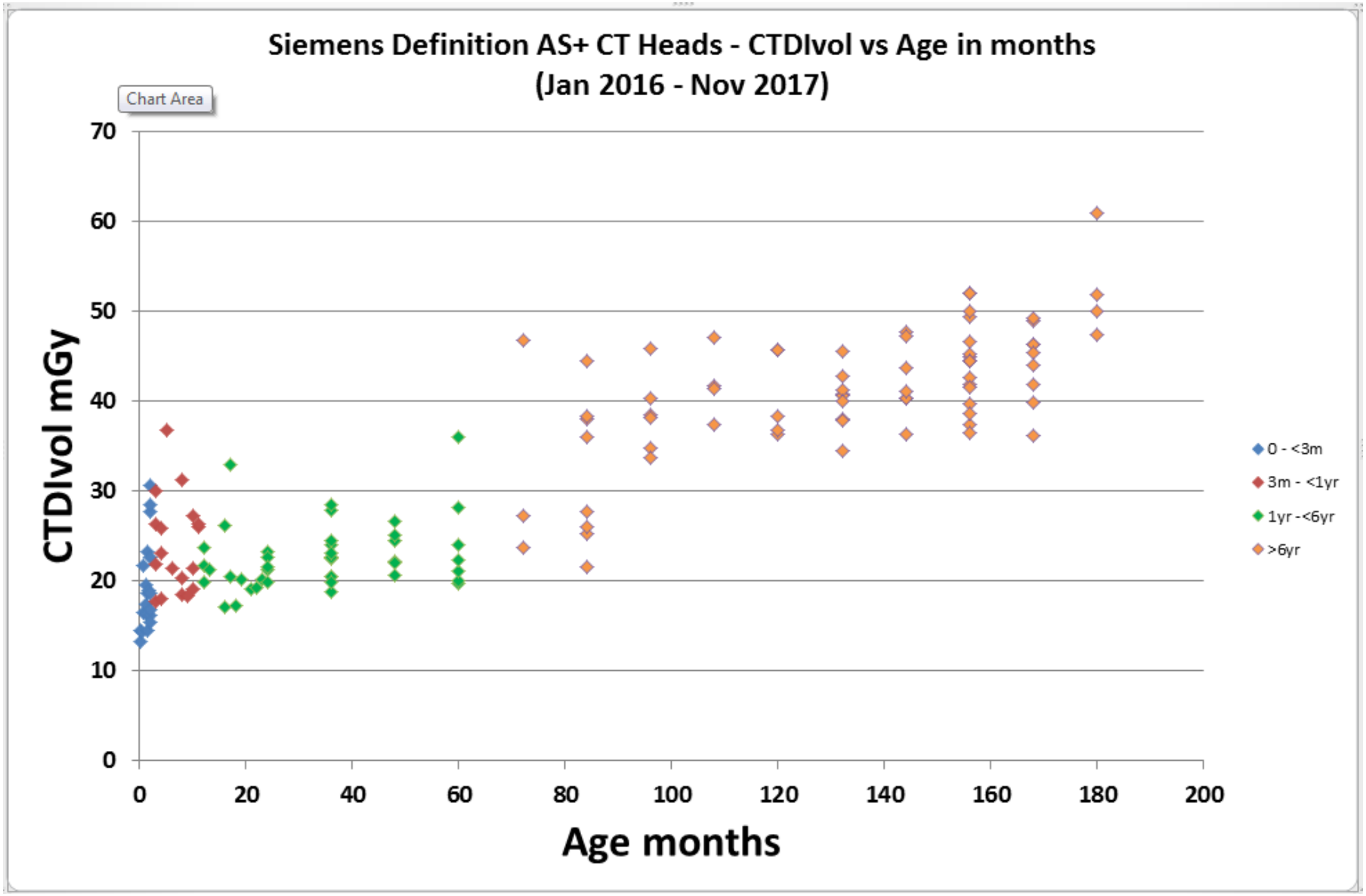

Siemens Definition AS+ CT Heads - DLP vs Age in months - Two protocols
(Jan 2016 - Nov 2017)
DLP mGy.cm
1000
900
800
700
600
500
400
300
200
100
0
0
20
40
60
80
100
120
140
160
180
200
Age months
0 - <3m
3m - <1yr
1yr -<6yr
>6yr
>6yr protocol

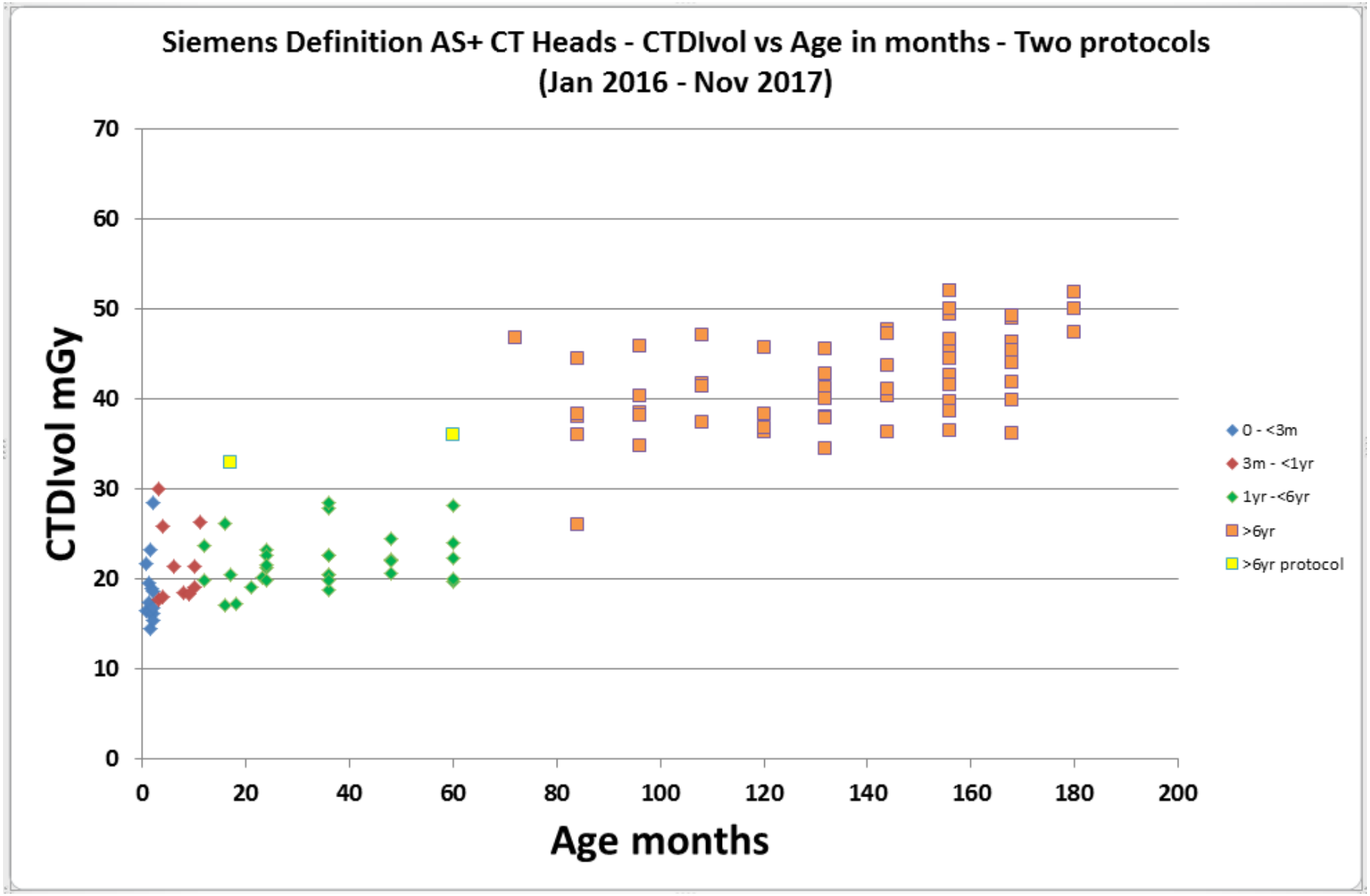

Siemens Definition AS+ & Aquillion One CT Heads - DLP vs Age in months
(Jan 2016 - Nov 2017)
DLP mGy.cm
1000
900
800
700
600
500
400
300
200
100
0
0
20
40
60
80
100
120
140
160
180
200
Age months
0 - <3m
3m - <1yr
1yr -<6yr
>6yr
One

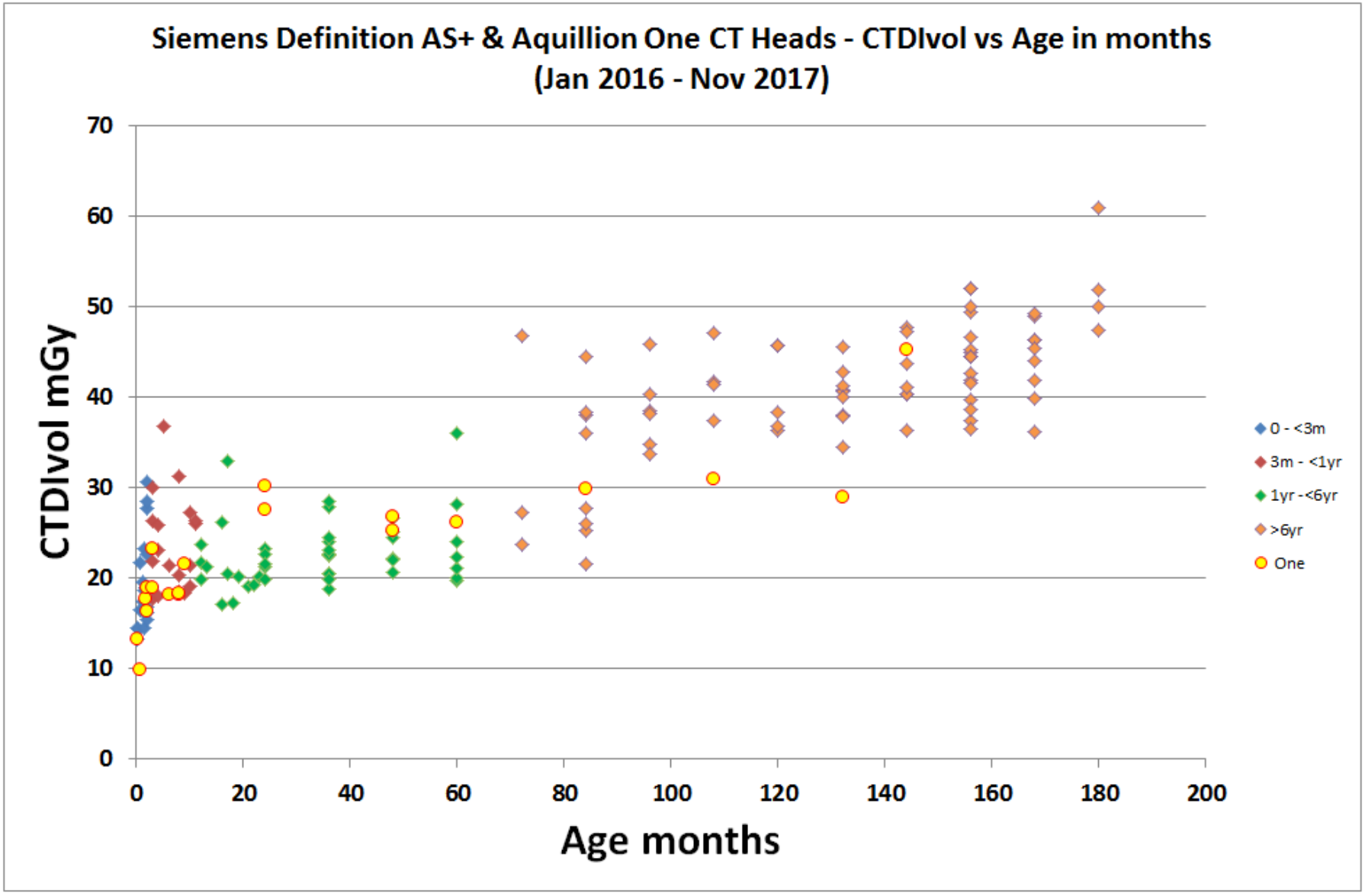
…and CTDIvol?

CTDIvol


Siemens Definition AS+ CT Heads - CTDIvol vs Age in months
(Jan 2016 - Nov 2017)
CTDIvol mGy
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
160
180
200
Age months

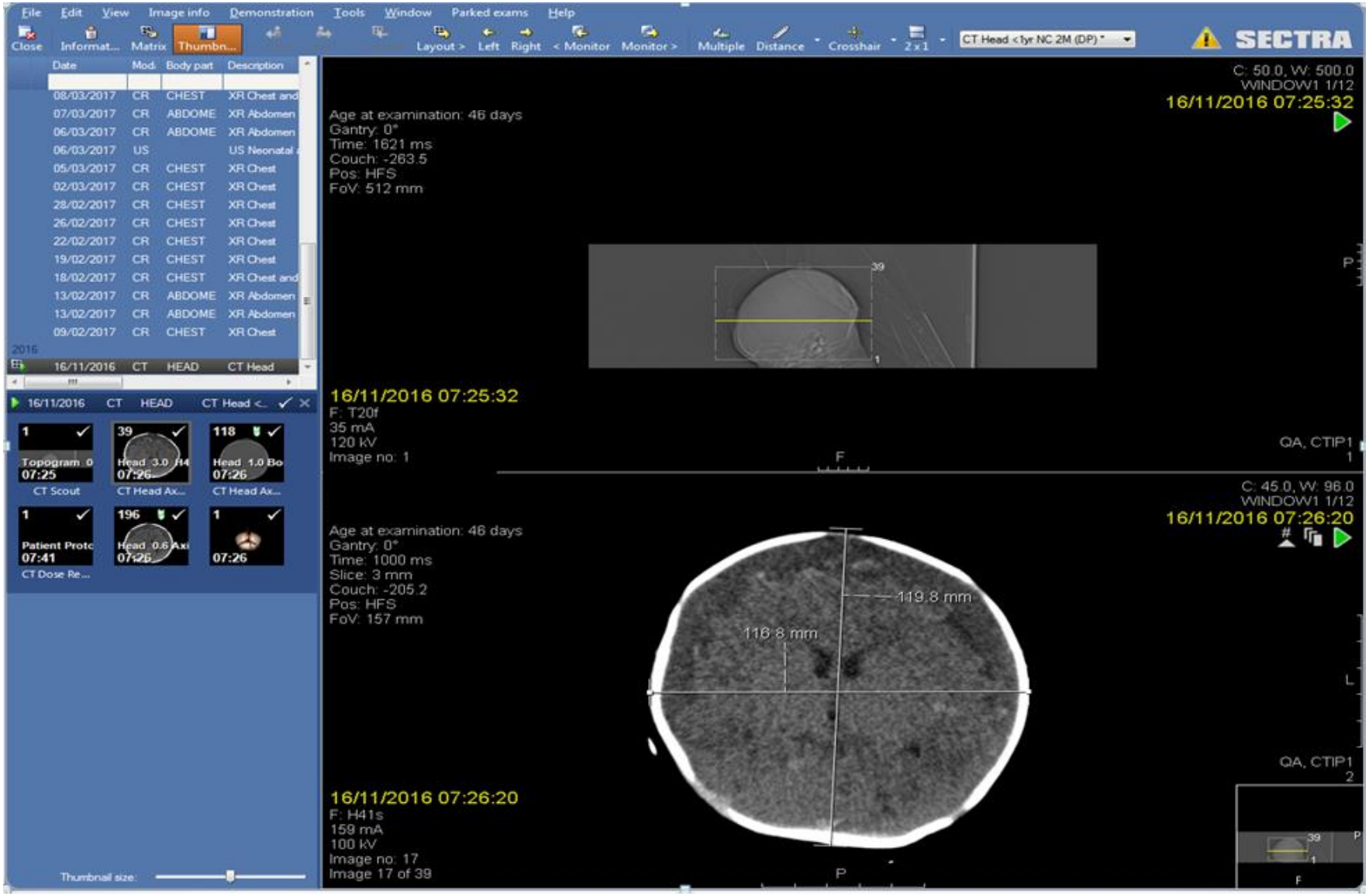

Siemens Definition AS+ CT Heads - CTDIvol vs Age in months
(Jan 2016 - Nov 2017)
Chart Area
CTDIvol mGy
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
160
180
200
Age months
0 - <3m
3m - <1yr
1yr -<6yr
>6yr


Siemens Definition AS+ CT Heads - CTDIvol vs Age in months - Two protocols
(Jan 2016 - Nov 2017)
CTDIvol mGy
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
160
180
200
Age months
0 - <3m
3m - <1yr
1yr - <6yr
>6yr
>6yr protocol


Siemens Definition AS+ & Aquillion One CT Heads - CTDIvol vs Age in months
(Jan 2016 - Nov 2017)
CTDIvol mGy
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
160
180
200
Age months
0 - <3m
3m - <1yr
1yr - <6yr
>6yr
One

Something
else going on?

CSA cm²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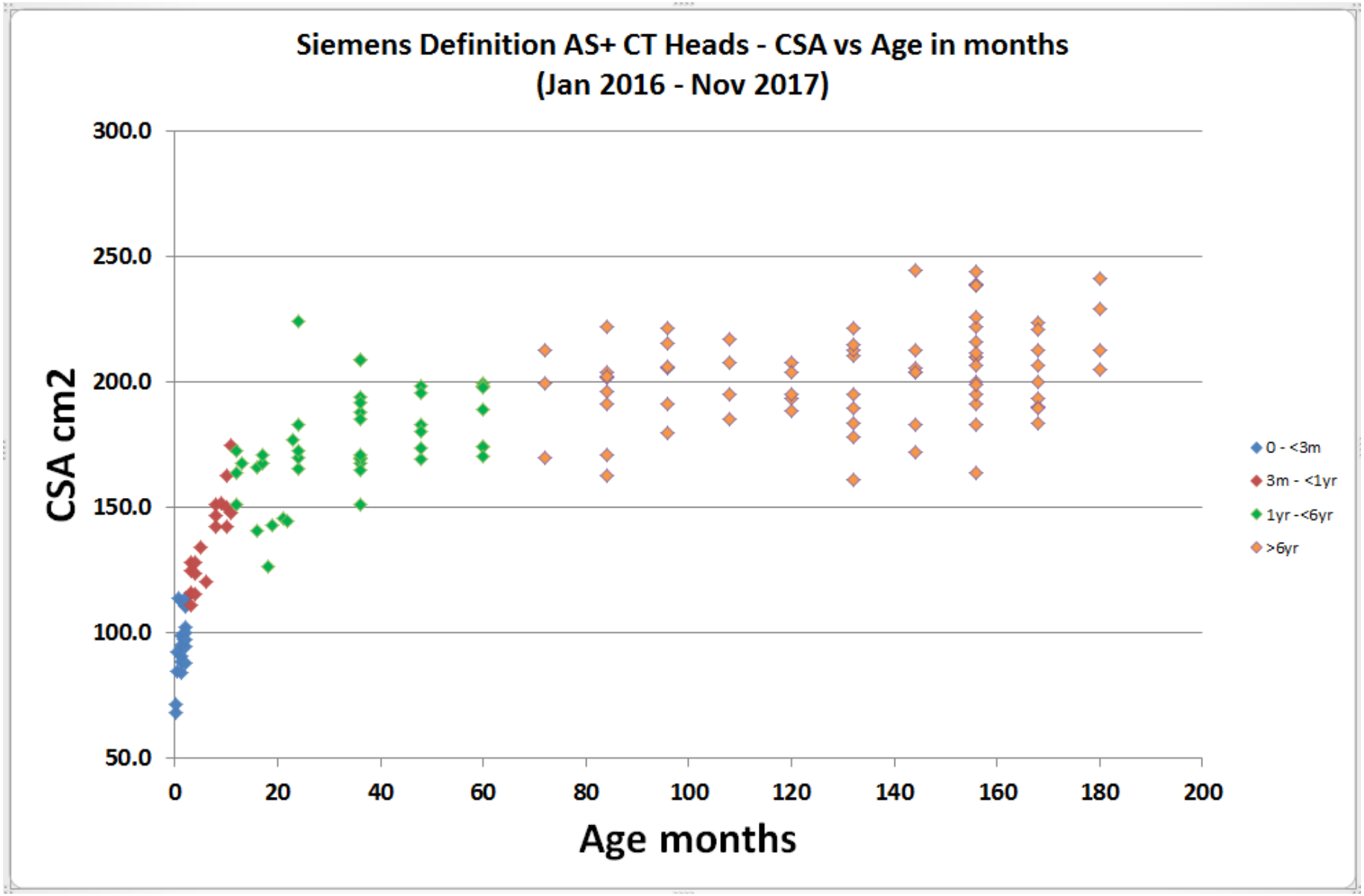
Close Informat... Matrix Thumbn... Layout > Left Right < Monitor Monitor > Multiple Distance Crosshair 2 x 1
CT Head <1yr NC 2M (DP) *
SECTRA
Date Mod Body part Description
08/03/2017 CR CHEST XR Chest and
07/03/2017 CR ABDOME XR Abdomen
06/03/2017 CR ABDOME XR Abdomen
06/03/2017 US US Neonatal
05/03/2017 CR CHEST XR Chest
02/03/2017 CR CHEST XR Chest
28/02/2017 CR CHEST XR Chest
26/02/2017 CR CHEST XR Chest
22/02/2017 CR CHEST XR Chest
19/02/2017 CR CHEST XR Chest
18/02/2017 CR CHEST XR Chest and
13/02/2017 CR ABDOME XR Abdomen
13/02/2017 CR ABDOME XR Abdomen
09/02/2017 CR CHEST XR Chest
2016
16/11/2016 CT HEAD CT Head
16/11/2016 CT HEAD CT Head <..
Topogram 0 07:25
CT Scout
Head 3.0 H4 07:26
CT Head Ax...
Head 1.0 Bo 07:26
CT Head Ax...
Patient Protc 07:41
CT Dose Re...
Head 0.6 Axi 07:26
07:26
Thumbnail size:
C: 50.0, W: 500.0
WINDOW1 1/12
16/11/2016 07:25:32
Age at examination: 46 days
Gantry: 0°
Time: 1621 ms
Couch: -263.5
Pos: HFS
FoV: 512 mm
39
1
P
16/11/2016 07:25:32
F: T20f
35 mA
120 kV
Image no: 1
QA, CTIP1
1
F
C: 45.0, W: 96.0
WINDOW1 1/12
16/11/2016 07:26:20
Age at examination: 46 days
Gantry: 0°
Time: 1000 ms
Slice: 3 mm
Couch: -205.2
Pos: HFS
FoV: 157 mm
119.8 mm
116.8 mm
L
16/11/2016 07:26:20
F: H41s
159 mA
100 kV
Image no: 17
Image 17 of 39
P
QA, CTIP1
2
39
1
P
F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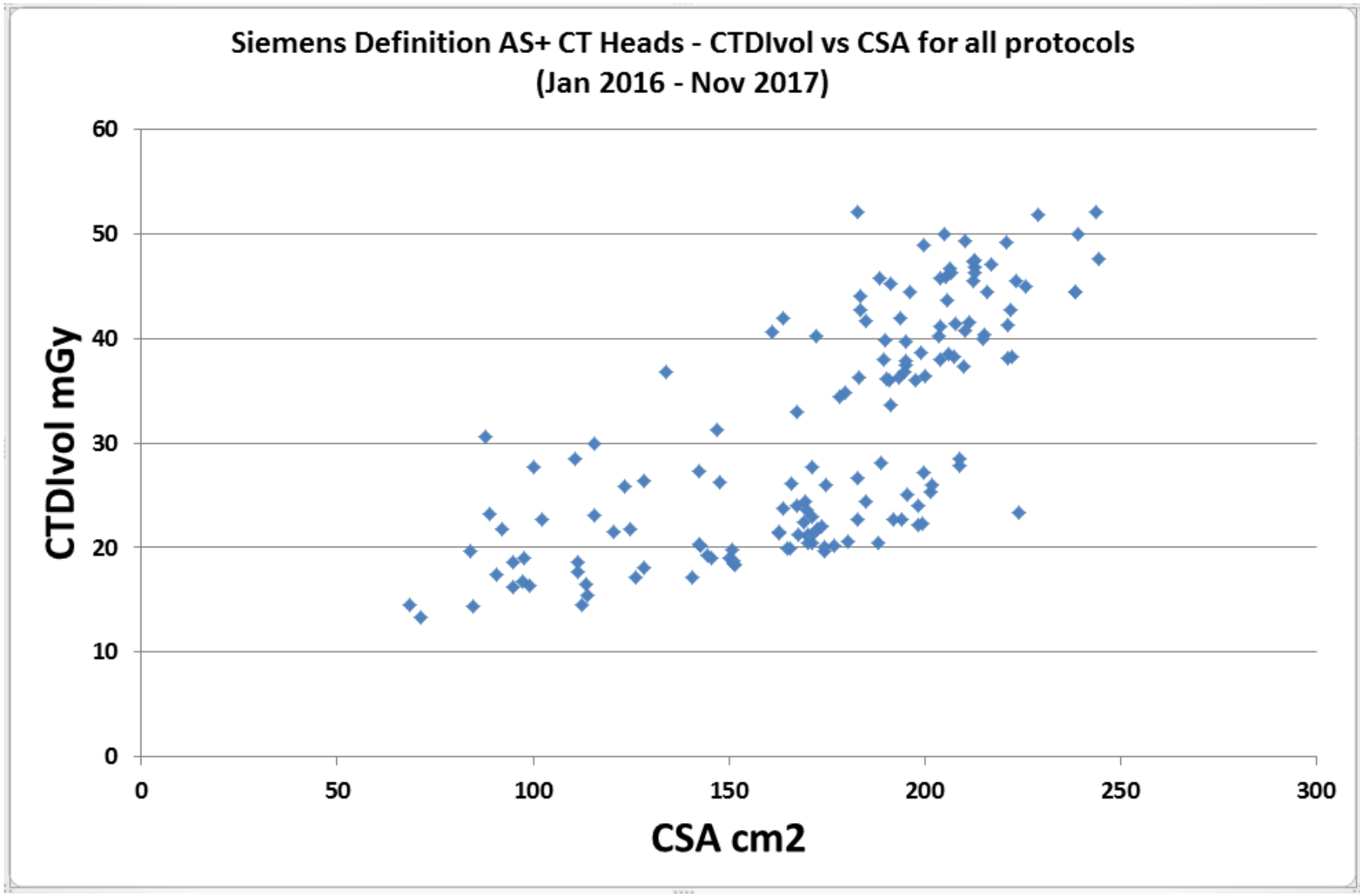
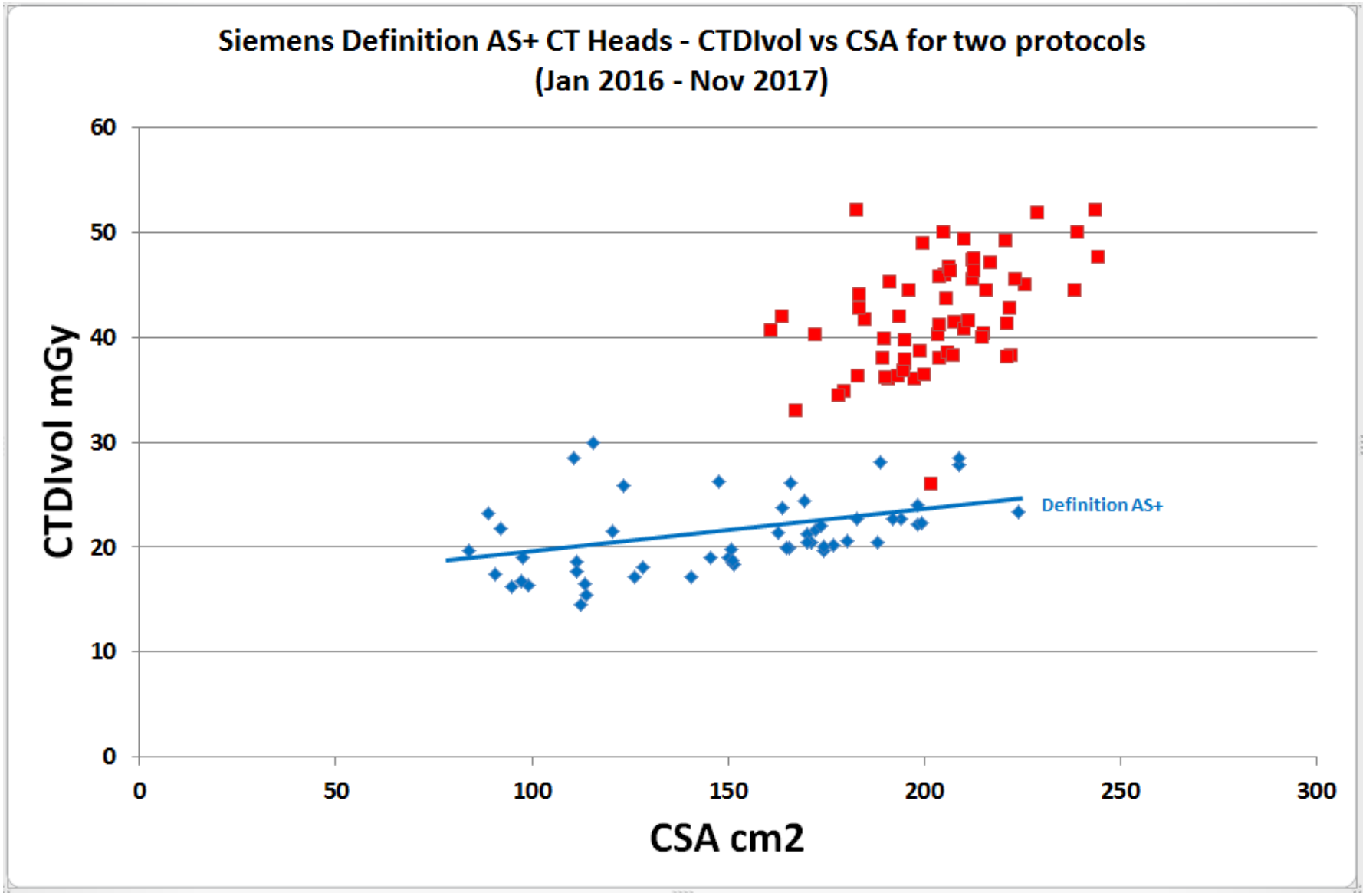
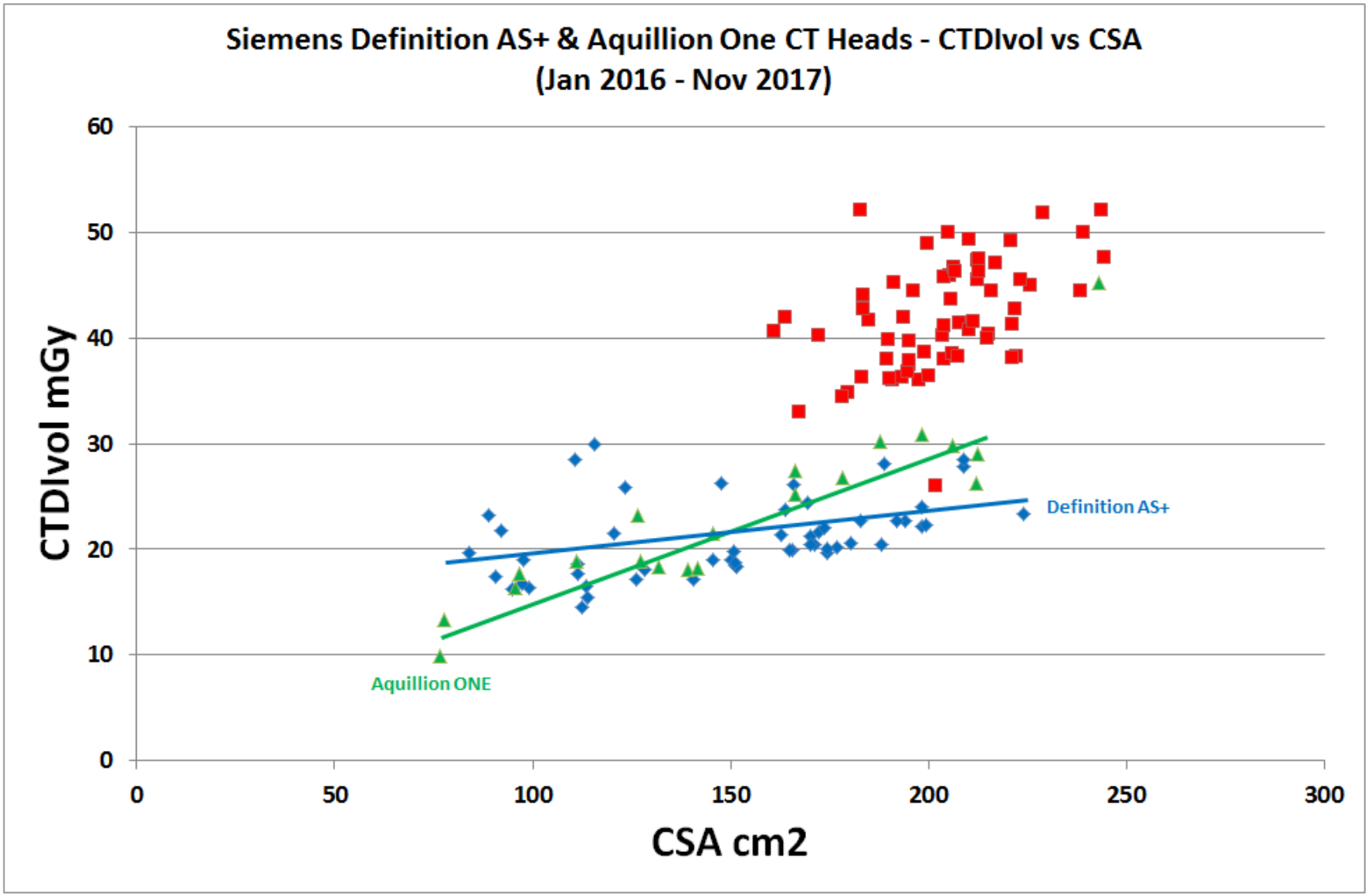
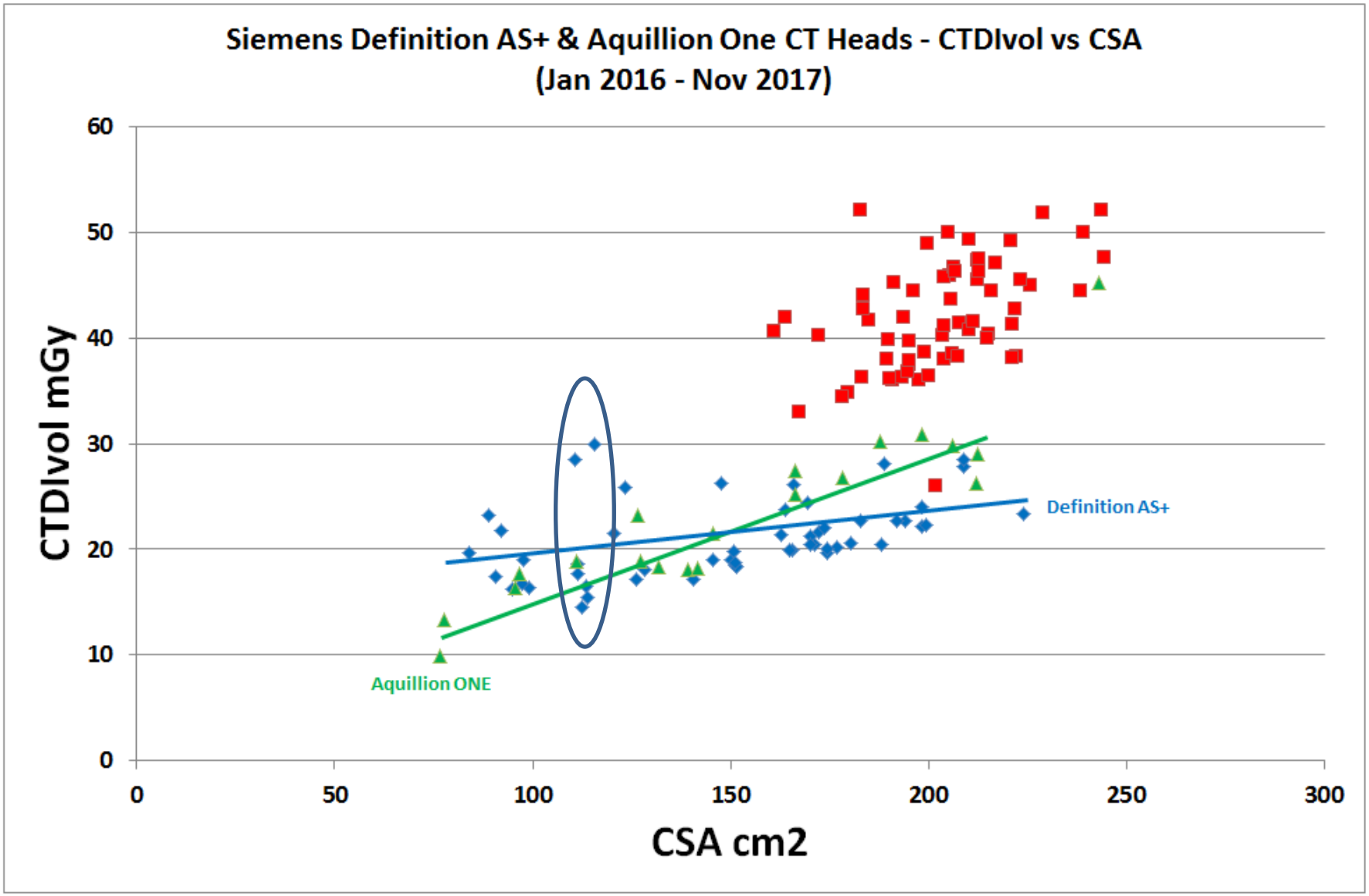
(Jan 2016 - Nov 2017)
CSA cm2
300.0
250.0
200.0
150.0
100.0
50.0
0
20
40
60
80
100
120
140
160
180
200
Age months
0 - <3m
3m - <1yr
1yr -<6yr
>6yr


Siemens Definition AS+ CT Heads - CTDIvol vs CSA for all protocols
(Jan 2016 - Nov 2017)
CTDIvol mGy
60
50
40
30
20
10
0
0
50
100
150
200
250
300
CSA cm2


Siemens Definition AS+ CT Heads - CTDIvol vs CSA for two protocols
(Jan 2016 - Nov 2017)
CTDIvol mGy
60
50
40
30
20
10
0
0
50
100
150
200
250
300
CSA cm2
Definition AS+

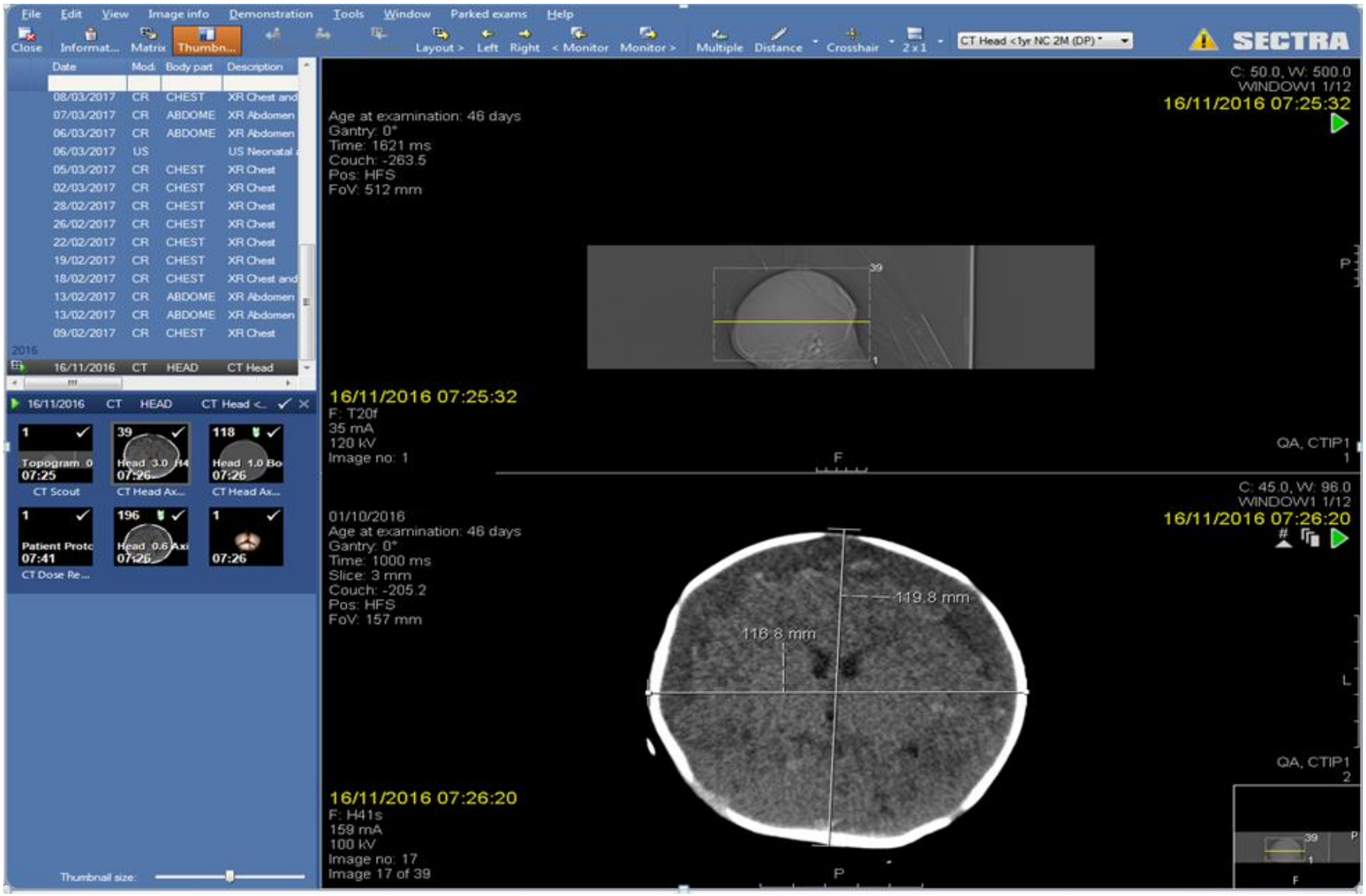

Siemens Definition AS+ & Aquillion One CT Heads - CTDIvol vs CSA
(Jan 2016 - Nov 2017)
CTDIvol mGy
CSA cm2
0
10
20
30
40
50
60
0
50
100
150
200
250
300
Aquillion ONE
Definition AS+


Siemens Definition AS+ & Aquillion One CT Heads - CTDIvol vs CSA
(Jan 2016 - Nov 2017)
CTDIvol mGy
CSA cm2
0
10
20
30
40
50
60
0
50
100
150
200
250
300
Definition AS+
Aquillion ONE

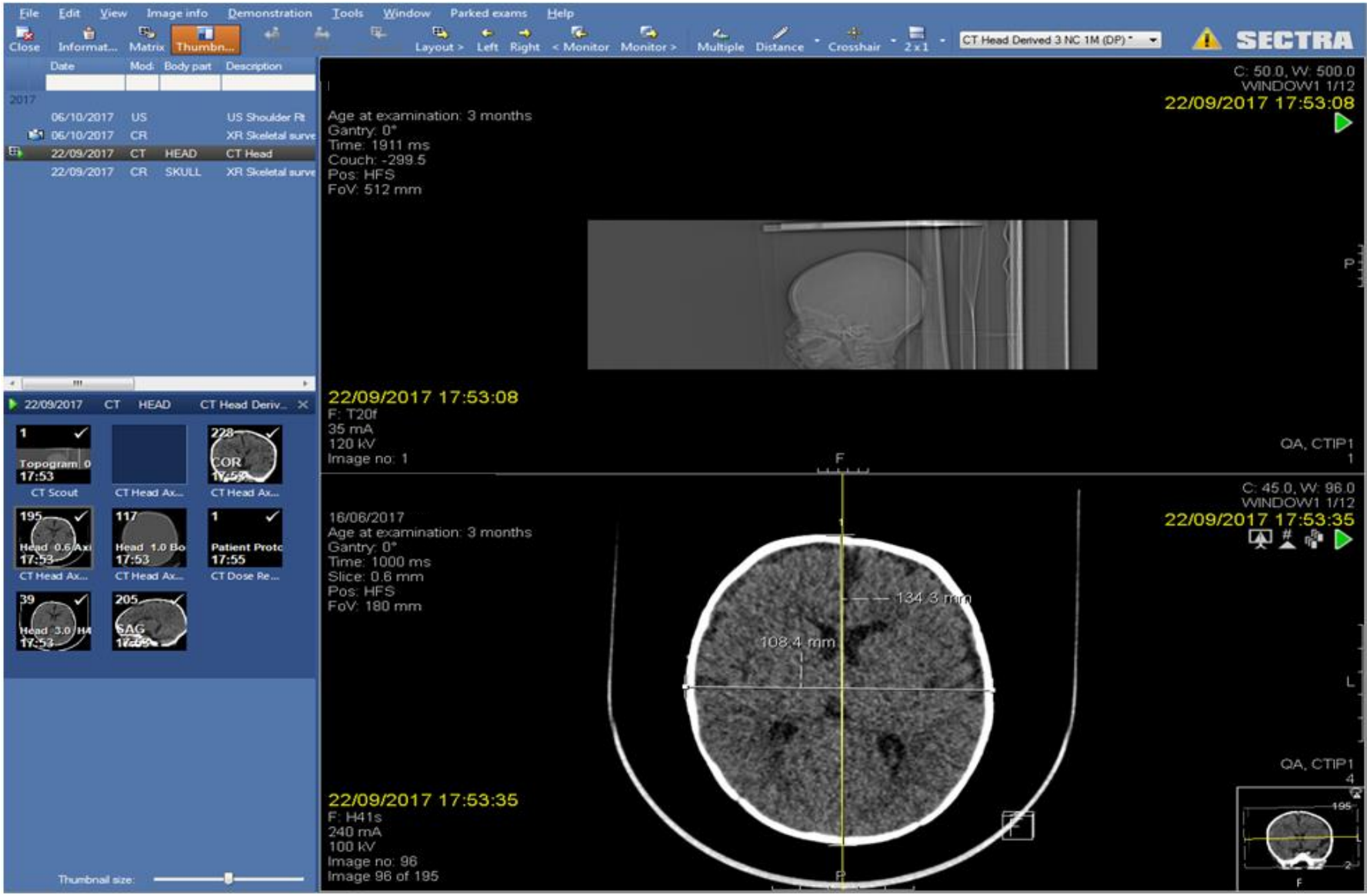
Odd spread on
the Siemens?

IMAGES

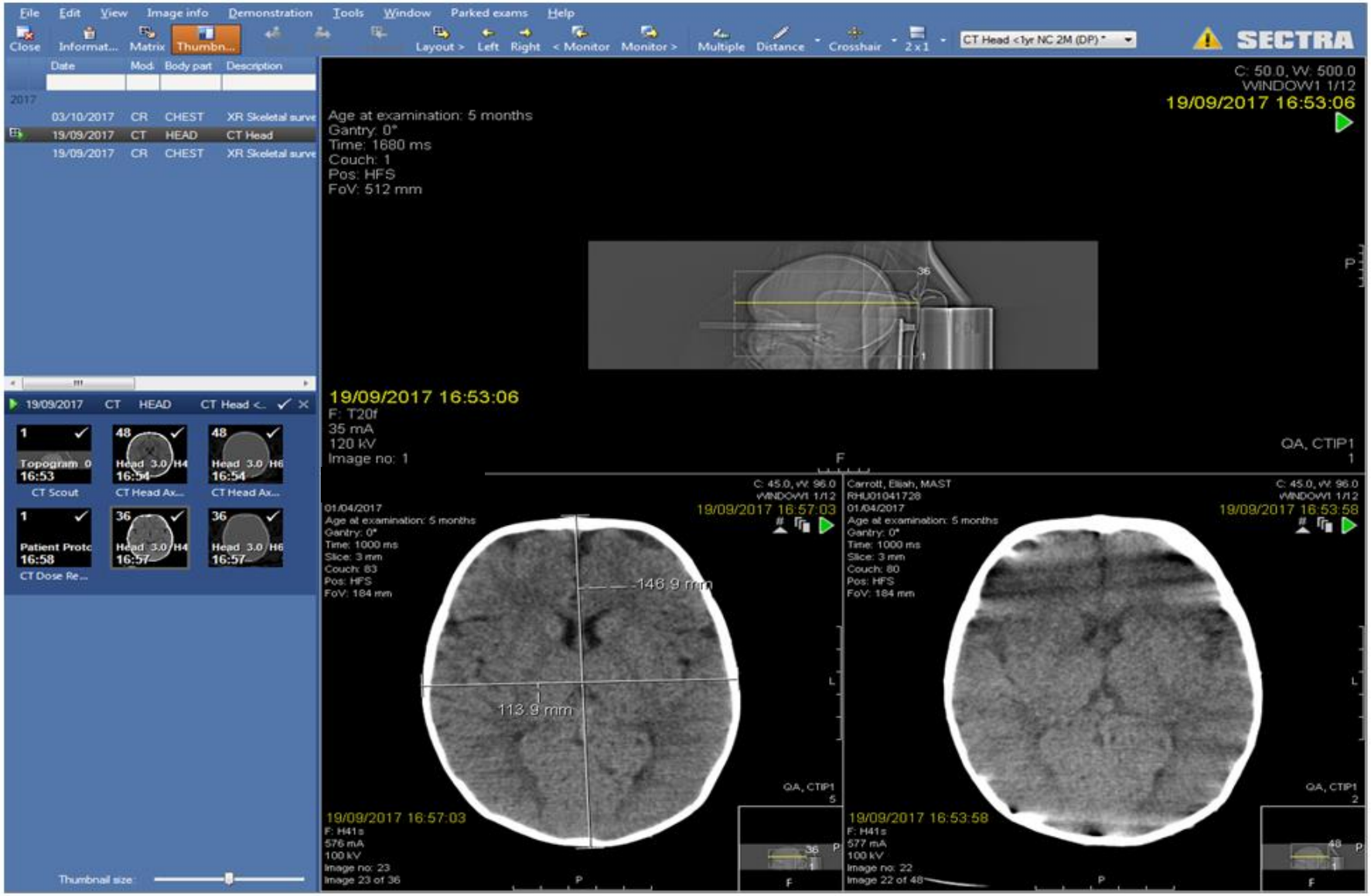
The good

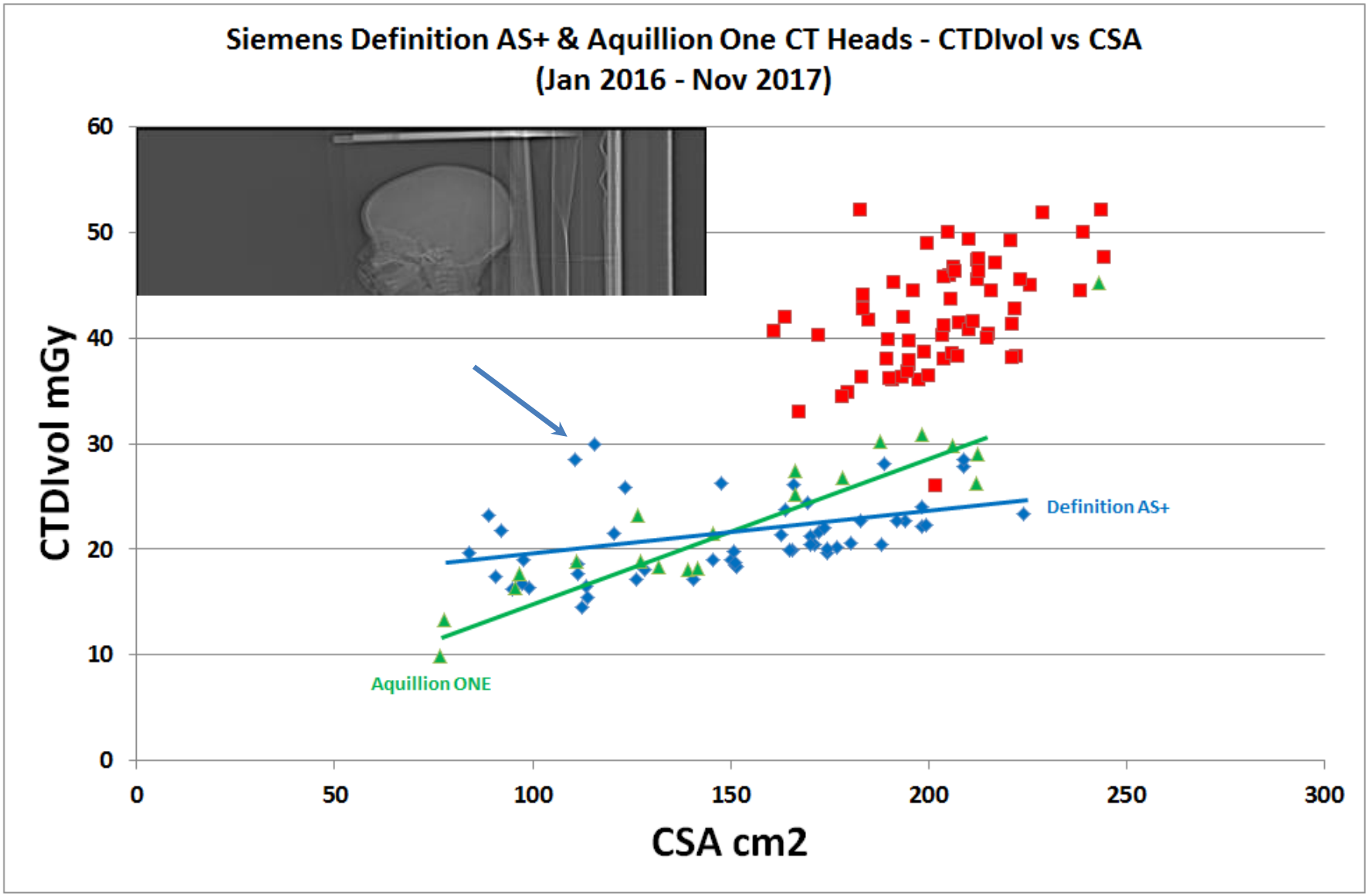

File Edit View Image info Demonstration Tools Window Parked exams Help
Close Informat... Matrix Thumbn... Layout > Left Right < Monitor Monitor > Multiple Distance Crosshair 2 x 1
CT Head <1yr NC 2M (DP) *
SECTRA
Date Mod. Body part Description
08/03/2017 CR CHEST XR Chest and
07/03/2017 CR ABDOME XR Abdomen
06/03/2017 CR ABDOME XR Abdomen
06/03/2017 US US Neonatal
05/03/2017 CR CHEST XR Chest
02/03/2017 CR CHEST XR Chest
28/02/2017 CR CHEST XR Chest
26/02/2017 CR CHEST XR Chest
22/02/2017 CR CHEST XR Chest
19/02/2017 CR CHEST XR Chest
18/02/2017 CR CHEST XR Chest and
13/02/2017 CR ABDOME XR Abdomen
13/02/2017 CR ABDOME XR Abdomen
09/02/2017 CR CHEST XR Chest
2016
16/11/2016 CT HEAD CT Head
16/11/2016 CT HEAD CT Head <..
Topogram 0 07:25
CT Scout
Head 3.0 R4 07:26
CT Head Ax...
Head 1.0 Bo 07:26
CT Head Ax...
Patient Protc 07:41
CT Dose Re...
Head 0.6 Axi 07:26
07:26
Thumbnail size:
Age at examination: 46 days
Gantry: 0°
Time: 1621 ms
Couch: -263.5
Pos: HFS
FoV: 512 mm
C: 50.0, W: 500.0
WINDOW1 1/12
16/11/2016 07:25:32
16/11/2016 07:25:32
F: T20f
35 mA
120 kV
Image no: 1
QA, CTIP1
1
01/10/2016
Age at examination: 46 days
Gantry: 0°
Time: 1000 ms
Slice: 3 mm
Couch: -205.2
Pos: HFS
FoV: 157 mm
C: 45.0, W: 96.0
WINDOW1 1/12
16/11/2016 07:26:20
119.8 mm
116.8 mm
16/11/2016 07:26:20
F: H41s
159 mA
100 kV
Image no: 17
Image 17 of 39
QA, CTIP1
2

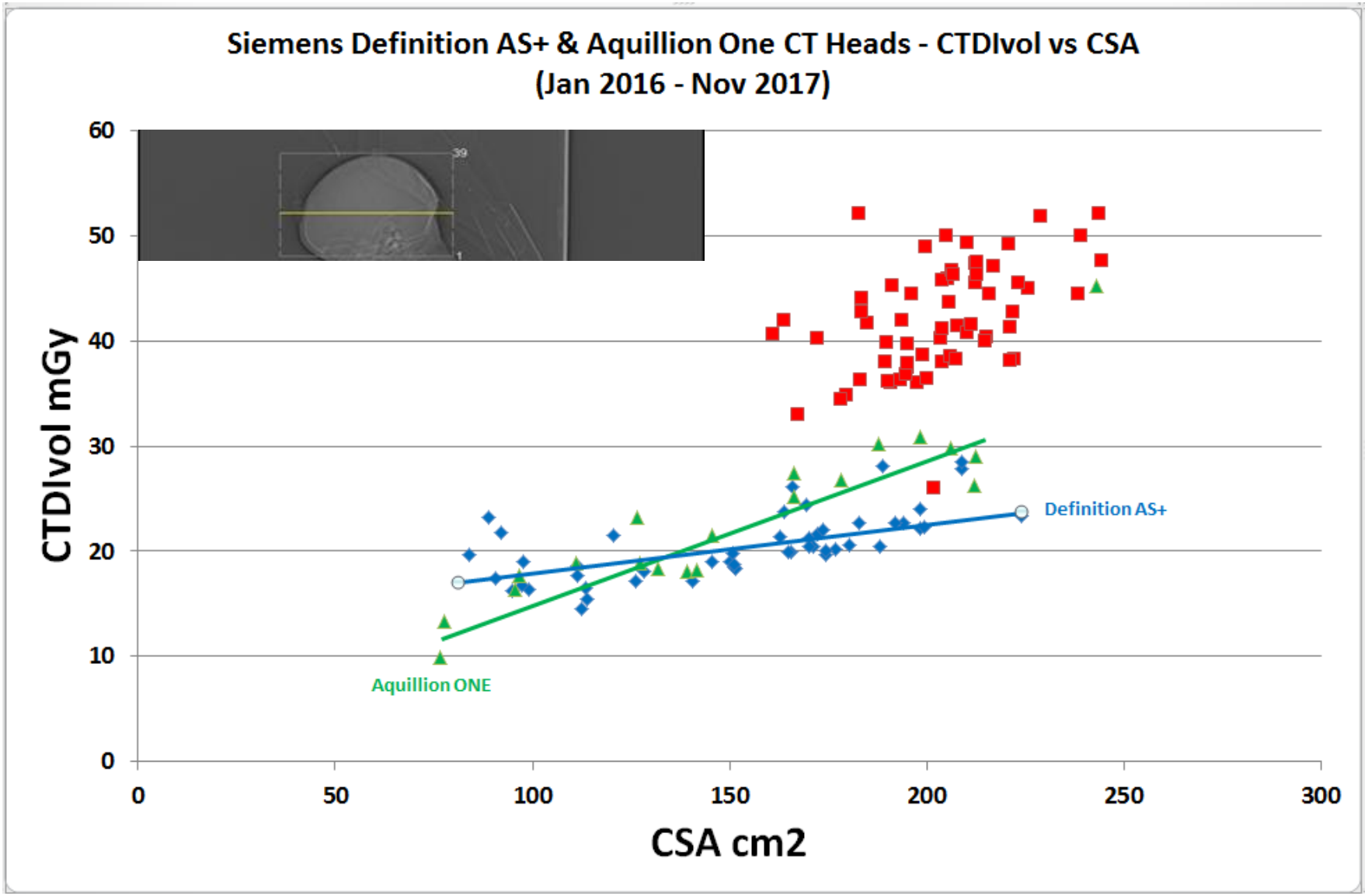
The questionable ?

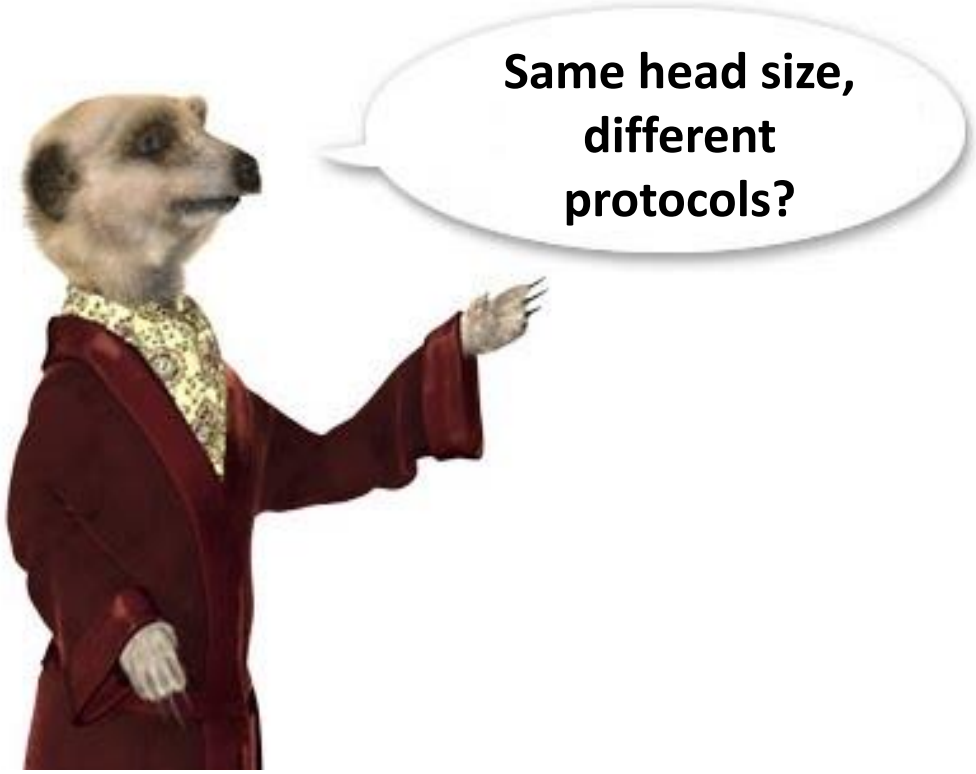


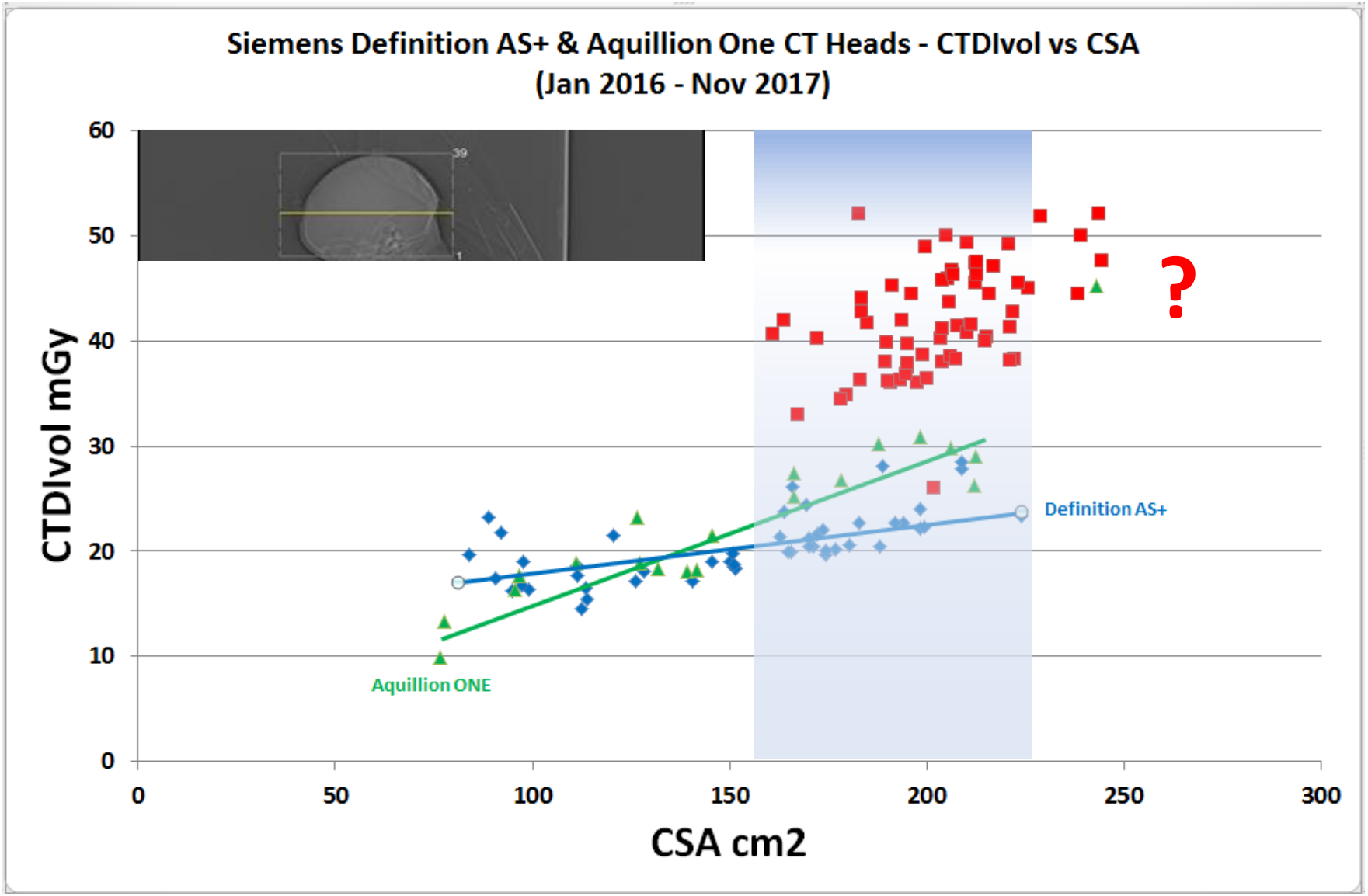
The unacceptable?




Siemens Definition AS+ & Aquillion One CT Heads - CTDIvol vs CSA
(Jan 2016 - Nov 2017)
CTDIvol mGy
CSA cm2
0
10
20
30
40
50
60
0
50
100
150
200
250
300
Definition AS+
Aquillion ONE


Siemens Definition AS+ & Aquillion One CT Heads - CTDIvol vs CSA
(Jan 2016 - Nov 2017)
CTDIvol mGy
CSA cm2
0
10
20
30
40
50
60
0
50
100
150
200
250
300
Definition AS+
Aquillion ONE


Same head size,
different
protocols?


Siemens Definition AS+ & Aquillion One CT Heads - CTDIvol vs CSA
(Jan 2016 - Nov 2017)
CTDIvol mGy
CSA cm2
0
10
20
30
40
50
60
0
50
100
150
200
250
300
?
Definition AS+
Aquillion ONE

Recommendations / options:

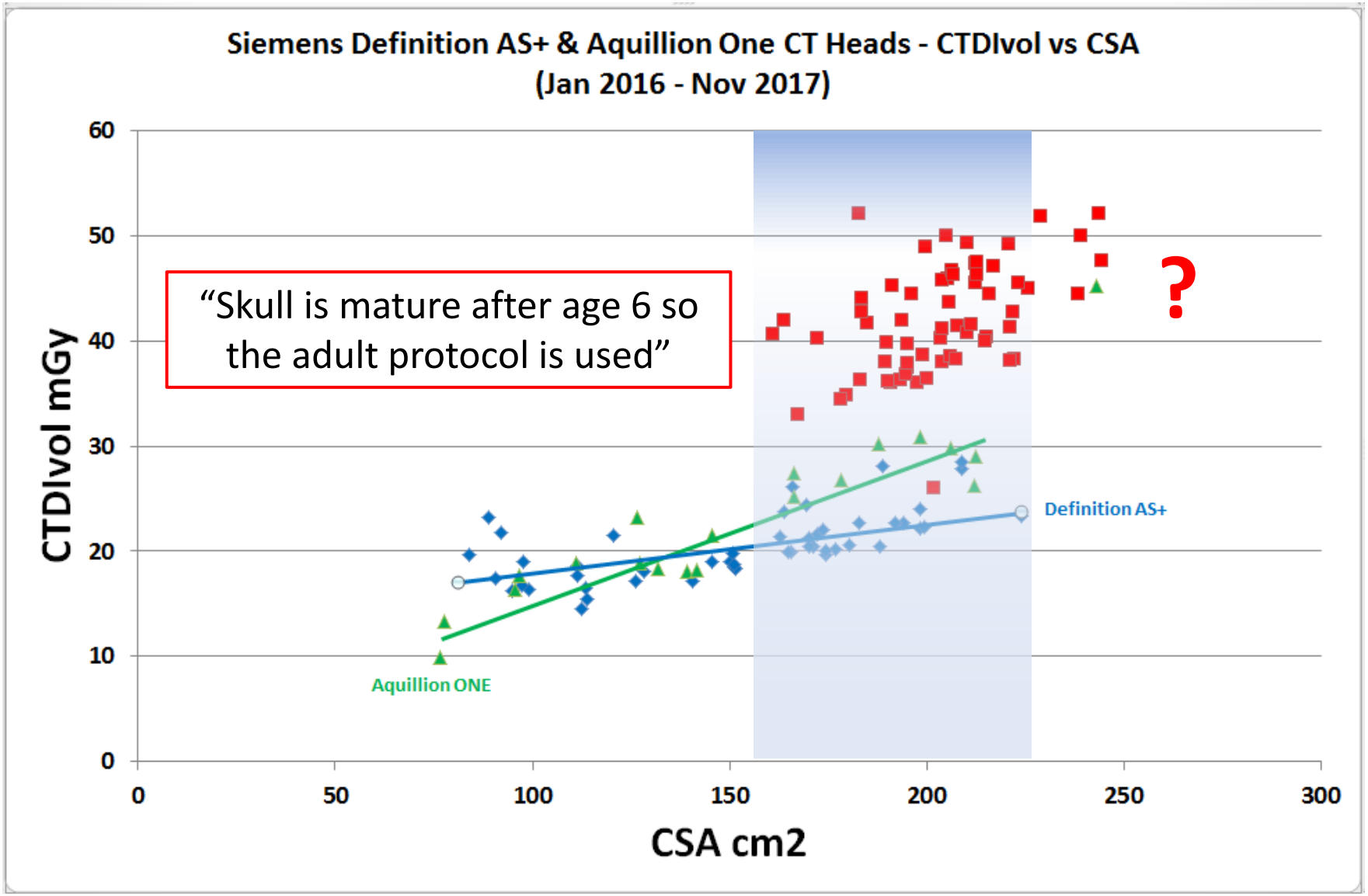
Attention is given to achieving consistent positioning to prevent table structures or attachments from affecting the topogram determined scan factors.

Continued use of the adult 1A_Spiral Brain protocol is evaluated for all patients below age 14, to use instead the existing 0-6yrs protocol. Image quality should be reviewed to ensure no adverse impact of such a change.

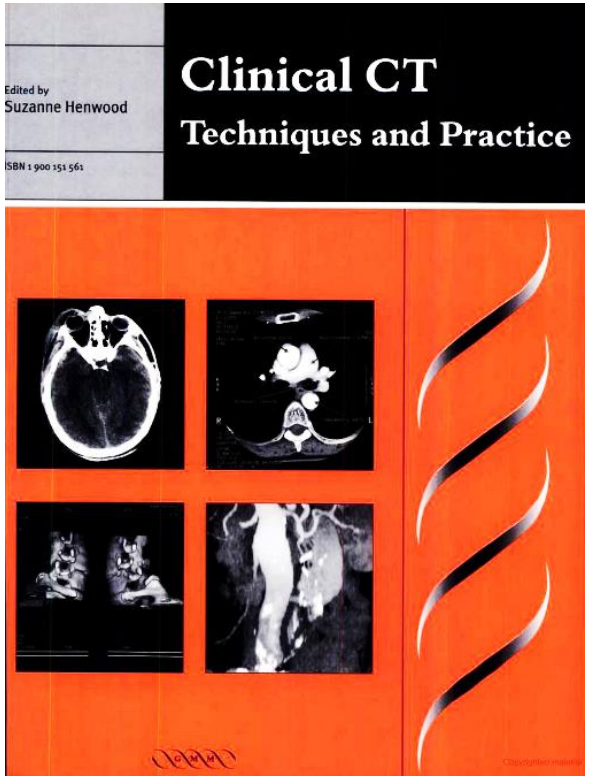
Consideration is given to adjusting the mA adaptation to increase the strength setting to achieve greater reduction in dose for smaller head sizes, alongside an appraisal of impact on image quality.

A newborn to 3 month protocol could be considered with a lower QRef mAs and or lower kV.

Consideration should be given to implement recording of patient weight for all paediatric patients, either in the scanner or on PACS.


Siemens Definition AS+ & Aquillion One CT Heads - CTDIvol vs CSA
(Jan 2016 - Nov 2017)
"Skull is mature after age 6 so the adult protocol is used"
?
Definition AS+
Aquillion ONE
CTDIvol mGy
CSA cm2
0
10
20
30
40
50
60
0
50
100
150
200
250
300

….the apps
specialist ?



First published 1999

Table 2.1 – Protocol for routine brain scan

Patient position	Supine, head in head rest, scanner gantry parallel to radiographic baseline (RBL). Head in centre of scan field. (Lateral scan projection radiograph may be used if required)
Start position	RBL
Protocol	
Slice thickness	10 mm
Table increment	10 mm
Kilovoltage	120 kV
mAs per slice	300 mAs
Algorithm	Standard
Scan field of view	25 cm
Display field of view	25 cm
Window width (WW)	150/100/80
Window level (WL)	40

Adapting technique to the pathology and the patient

The Posterior Fossa

When the clinical information clearly indicates a posterior fossa or mid-brain pathology the slice width and table incrementation are adjusted to 5 mm (or in some cases 3 mm) to better demonstrate these areas. It may be necessary to adjust the mAs per slice to 320 mAs to obtain a comparable image quality. For most adults 8–10 sections will be done on average. Begin the scan 1 cm below and parallel to the RBL.

Paediatrics

It is necessary to adapt techniques to suit the wide variety of child and infant sizes. Basic protocols for paediatric use are suggested in Tables 2.2–2.4.

After 7 years of age the adult programme can be used, with reduced mAs values until the child's head is approaching adult size. (Note that the skull vault will have achieved adult size before the facial bones have matured to adult proportions.)

Equally, it may be necessary to reduce mAs values for very petite adults.

Table 2.2 – Basic paediatric protocol: neonate

Patient position	Supine, head in head rest, scanner gantry parallel to RBL. Head in centre of scan field.
Start position	RBL
Protocol	
Slice thickness	7 mm
Table increment	7 mm
Kilovoltage	100 kv
mAs per slice	100 mAs
Algorithm	Soft/standard
Scans field of view	25 cm
Display field of view	20 cm
Window width	150/100/80
Window level	40

Table 2.3 – Basic paediatric protocol: 6 months–2 years

Patient position	Supine, head in head rest, scanner gantry parallel to RBL. Head in centre of scan field.
Start position	RBL
Protocol	
Slice thickness	7 mm
Table increment	7 mm
Kilovoltage	100 kv
mAs per slice	150 mAs
Algorithm	Standard
Scan field of view	25 cm
Display field of view	22 cm
Window width	150/100/80
Window level	40

Table 2.4 – Basic paediatric protocol: 2 years–7 years

Patient position	Supine, head in head rest, scanner gantry parallel to RBL. Head in centre of scan field.
Start position	RBL
Protocol	
Slice thickness	10 mm
Table increment	10 mm
Kilovoltage	120 kV
mAs per slice	200 mAs
Algorithm	Standard
Scan field of view	25 cm
Display field of view	22 cm
Window width	150/100/80
Window level	40

The Image Gently Alliance

2. An adult head is examined at a technique of 140 kVp, 0.5 sec scan time, 400 mA, pitch = 1, and FOV = 25 cm. What is the appropriate technique for a one year old head?

Head Baseline:	kVp= *140*	mA= *400*	Time= *0.5* sec
	Pitch= *1*		
PA Thickness (cm)	Approx Age	Head mAs Reduction Factor (RF)	Head Estimated mAs = BL x RF *(fill in)*
12	newborn	0.74	*148*
16	1 yr	0.86	*172*
17	5 yr	0.93	*186*
19	med adult	Baseline (BL)	200

Doses from Computed Tomography (CT) Examinations in the UK – 2011 Review

P C Shrimpton, M C Hillier, S Meeson[1] and S J Golding[1]

[1] NUFFIELD DEPARTMENT OF SURGICAL SCIENCES, UNIVERSITY OF OXFORD, UK

TABLE 10 *(continued)* **Comparison by examination type of values of $CTDI_{vol}$ (mGy) from the 2003 and 2011 national CT surveys: third quartile values for distributions of typical practice (mean doses per CT scanner) and recommended national reference doses**

		Third quartile values for $CTDI_{vol}$ per sequence (mGy)			National reference doses for $CTDI_{vol}$ per sequence (mGy)		
		2003		2011[a]	2003		2011
Examination (clinical indication)	Scan region/ technique	SSCT	MDCT	MDCT	SSCT	MDCT	MDCT
Chest-abdomen-pelvis[c] (cancer)	Lung	10	12	–	10	12	–
	Abdo/pelvis	12	14	–	12	14	–
	All sequences	12	13	13 (11)	–	–	–
Paediatric head: 0–1 y[b] (trauma)	Post fossa	34[d]	34[d]	–	35[d]	35[d]	–
	Cerebrum	28[d]	28[d]	–	30[d]	30[d]	–
	All sequences	28[d]	28[d]	26 (17)	–	–	**25**
Paediatric head: >1–5 y[b] (trauma)	Post fossa	49[d]	49[d]	–	50[d]	50[d]	–
	Cerebrum	42[d]	42[d]	–	45[d]	45[d]	–
	All sequences	43[d]	43[d]	43 (18)	–	–	**40**
Paediatric head: >5 y[b] (trauma)	Post fossa	65[d]	65[d]	–	65[d]	65[d]	–
	Cerebrum	46[d]	46[d]	–	50[d]	50[d]	–
	All sequences	51[d]	51[d]	61 (15)	–	–	**60**

Correlations between size and dose for individual paediatric pati illustrated in Figures 11 and 12 in relation to $CTDI_{vol}$ and total DI relationships (as indicated by the largest correlation coefficients mass (Figures 11c and 12c), although all these trends remain re figures illustrating information concerning age include data (mar in relation to the range of mean values of $CTDI_{vol}$ (Figure 11a) a for the samples of adults undergoing head CT at the different CT centres in the survey; the vertical bar indicates the minimum and maximum mean values, together with the mean for this distribution. It is evident that the dose indicators recorded for many of the children in the survey, even those of younger age, are similar to the values of $CTDI_{vol}$ or DLP typically used for examinations on adults. Indeed, subsequent review by some participating centres of their paediatric data submitted to the survey unfortunately identified the local use of protocols that were similar to those used for examinations of the adult head. Such analyses highlight the urgent need for these centres in particular to implement specific protocols that are optimised for imaging paediatric patients of different ages and size.

The optimisation of protection for all patients requires recourse to a range of protocols that have been specifically developed for each disparate patient group (with due account of size) in order to meet the particular imaging tasks for each type of examination (and associated clinical indication) for the lowest possible levels of dose.

PEDIATRIC HEAD – ROUTINE (SPIRAL) (selected SIEMENS scanners)

(Back to INDEX)

TOPOGRAM: Lateral, 120 kVp, 40 mA, from base of skull through vertex, angle to Reid's baseline to avoid orbits

GENERAL: Scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible.
Gantry tilt is available for sequence scanning, not for spiral scanning. Gantry tilt is not available for dual source scanners. Use Kernel C30s for reconstructing **Neonate** scans.

Note: Users may select a manual approach or an AEC approach, according to their site's preference.
- Manual – scaling factors according to [1] are applied to an equivalent adult protocol. Tube voltage setting is kept constant.
- AEC – manufacturer recommended setting, where the exposure (mAs-as well as kV-value, if available) is automatically adjusted to patient attenuation

SIEMENS	Perspective 128	Definition AS+/ Edge (128-slice)	Definition Flash (Dual source 128-slice)	Somatom Force (Dual source 192-slice)
Rotation time (s)	1.0*	1.0*	1.0*	1.0*
Detector Configuration (mm)	32 x 0.6	[a]128 x 0.6 (64 x 0.6 = 38.4)	[a]128 x 0.6 (64 x 0.6 = 38.4)	[a]192 x 0.6 (96 x 0.6 = 57.6)
Pitch	0.55	0.55	0.55	0.55
Manual Approach				
Manual kV approach	110	100	100	100
Manual mAs approach	0-1yr: 1-2yrs: 2-6yrs: 206 6-16yrs: 16+yr:413	0-1yr: 1-2yrs: 2-6yrs: 291 6-16yrs: 16+yr: 582	0-1yr: 1-2yrs: 2-6yrs: 291 6-16yrs: 16+yr: 582	0-1yr: 1-2yrs: 2-6yrs: 248 6-16yrs: 16+yr: 495 [d]
CTDIvol (mGy)	0-1yr: 1-2yrs: 2-6yrs: 35 6-16yrs: 16+yr: 69	0-1yr: 1-2yrs: 2-6yrs: 25 6-16yrs: 16+yr: 50	0-1yr: 1-2yrs: 2-6yrs: 25 6-16yrs: 16+yr: 56	0-1yr: 1-2yrs: 2-6yrs: 22 6-16yrs: 16+yr: 44
AEC Approach				
CARE Dose4D	On	On	On	On
Quality ref. mAs	413	582	582	495 [d]
CARE kV	N/A (use kV from manual approach)	[c]ON	[c]ON	[c]ON
CTDI vol (mGy)	35 (with 206 mAs) [e]	25 (with 291 mAs) [e]	25 (with 291 mAs) [e]	22 (with 248 mAs) [e]
RECON 1				
Kernel	H31 J30(2) [d]	H31 J30(2) [d]	H31 J30(2) [d]	Hr40(3) [d]
Slice (mm)	5.0	5.0	5.0	5.0
Position increment (mm)	5.0	5.0	5.0	5.0
RECON 2				
Kernel	H60 J70(2) [d]	H60 J70(2) [d]	H60 J70(2) [d]	Hr59(3) [d]
Slice (mm)	5.0	5.0	5.0	5.0
Position increment (mm)	5.0	5.0	5.0	5.0

* Shorter rotation times should be considered if the required tube current-time product (mAs) can be reached.
[a] indicates that a z-axis "flying focal spot" technique is used to obtain twice as many projections per rotation as detector rows
[b] with IVR (Interleaved Volume Reconstruction) to improve spatial resolution
[c] if scanner is equipped with automatic kV selection (CARE kV), this should be activated by selecting "On". For head exams, a "Dose saving optimized for" slider position of 3 is recommended
[d] with ADMIRE, SAFIRE or IRIS
[e] CTDIvol will be generated upon acquisition of the topogram. CAREDose4D will adjust the mAs/eff. mAs to the patient based on the topogram. CTDIvol values for any given patient should be comparable or lower than the values associated with the manual mAs and kV approach. The value in brackets is the value for a 20 kg/5years old child.

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PEDIATRIC HEAD – ROUTINE (HELICAL) (selected TOSHIBA scanners)

(Back to INDEX)

SCANOGRAM: Lateral, 120 kVp, 40 mA, from base of skull through vertex, angle to Reid's baseline to avoid orbits

TOSHIBA	Aq ONE/ ONE Vision	Aq ONE/ ONE Vision
Scan Type	Helical	Volume
*Rotation Time (s)	0.75*	0.75*
Detector Configuration	32 x 0.5	0.5
CT Pitch Factor	Detail (0.656)	N/A
Speed (mm/rot)	10.5	N/A
kV	100 (0-2yrs) 120 (2+yrs)	100 (0-2yrs) 120 (2+yrs)
Manual mA 0-2yrs, 100 kV	0-1yr: 230 >1-2yrs: 285	0-1yr: 115 >1-2yrs: 145
Manual mA 2+yrs, 120 kV	>2-6yrs: 125 >6-16yrs: 160 >16+yr: 200	>2-6yrs: 125 >6-16yrs: 160 >16+yr: 200
SURE Exposure approach	Not recommended	Not recommended
AIDR 3D	AIDR 3D	AIDR 3D
Scan FOV	240mm (S)	240mm (S)
CTDI-vol (mGy)	0-1yr: 22.1 1-2yrs: 27.4 2-6yrs: 36.2 6-16yrs: 46.3 16+yr: 57.9	0-1yr: 21.7 1-2yrs:27.3 2-6yrs: 36.3 6-16yrs: 46.5 16+yr: 58.1
VOLUME RECON - BRAIN		
Type	Volume	Volume
SURE IQ*	Pediatric Brain	Pediatric Brain
Image Thickness (mm)	0.5	0.5
Reconstruction Interval (mm)	0.3	0.3
VOLUME RECON - BONE		
Type	Volume	Volume
SURE IQ*	Pediatric Bone	Pediatric Bone
Image Thickness (mm)	0.5	0.5
Reconstruction Interval (mm)	0.3	0.3

REFORMATS: The following reformat table applies to all of the Toshiba volume reconstructions above.

	REFORMAT 1	REFORMAT 2	REFORMAT 3
Type	Axial	Coronal	Sagittal
Start	Base of skull	Anterior	Left
End	Vertex	Posterior	Right
SURE IQ**	Pediatric Brain	Pediatric Brain	Pediatric Brain
Thickness (mm)	5	5	5
Interval (mm)	5	5	5

* Shorter rotation times should be considered if the required tube current-time product (mAs) can be reached.

**The SURE IQ setting determines the reconstruction FC as well as other post-processing and reconstruction options, such as AIDR. The SURE IQ settings listed here refer to the manufacturer default settings.

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THE ALLIANCE FOR QUALITY COMPUTED TOMOGRAPHY
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Actions taken:

Head holder from earlier scanner withdrawn from use

Radiographer education sessions on positioning and immobilization

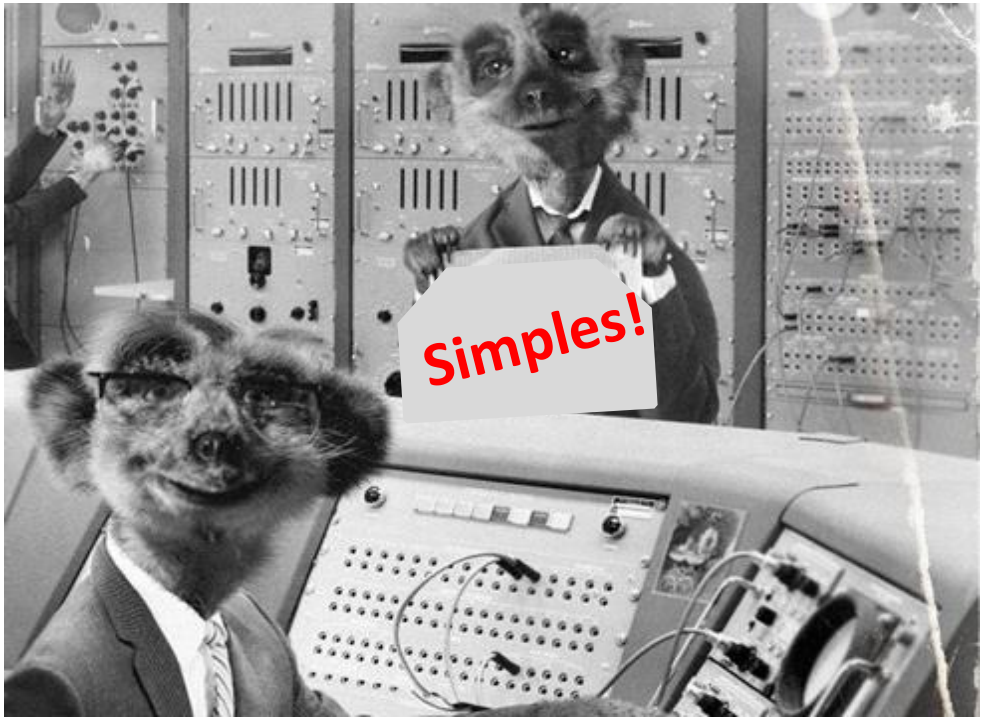
Protocol changes & additions

Weight recording commenced

Neonate 0 to 6 yrs reduced Qref mAs 320 (previously 513)

New Spiral Brain 6-10 years same as existing 0-6 spiral (513 mAs)

New age 10-16 Spiral 1A in the adult folder Qref 350 mAs and CARE kVp on. (previous 410 mAs)


Simples!