Optimisation experiences in and around Leeds

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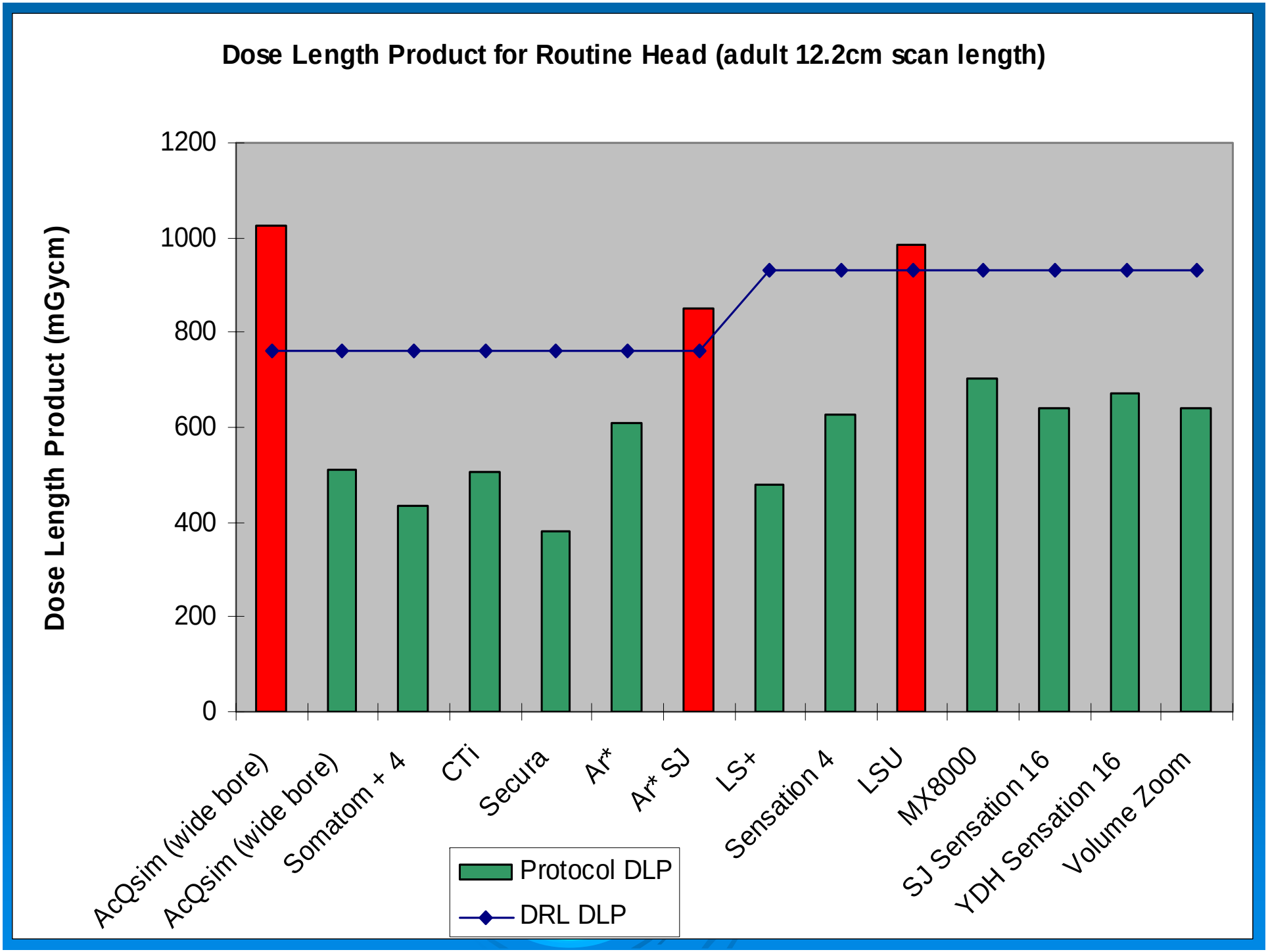
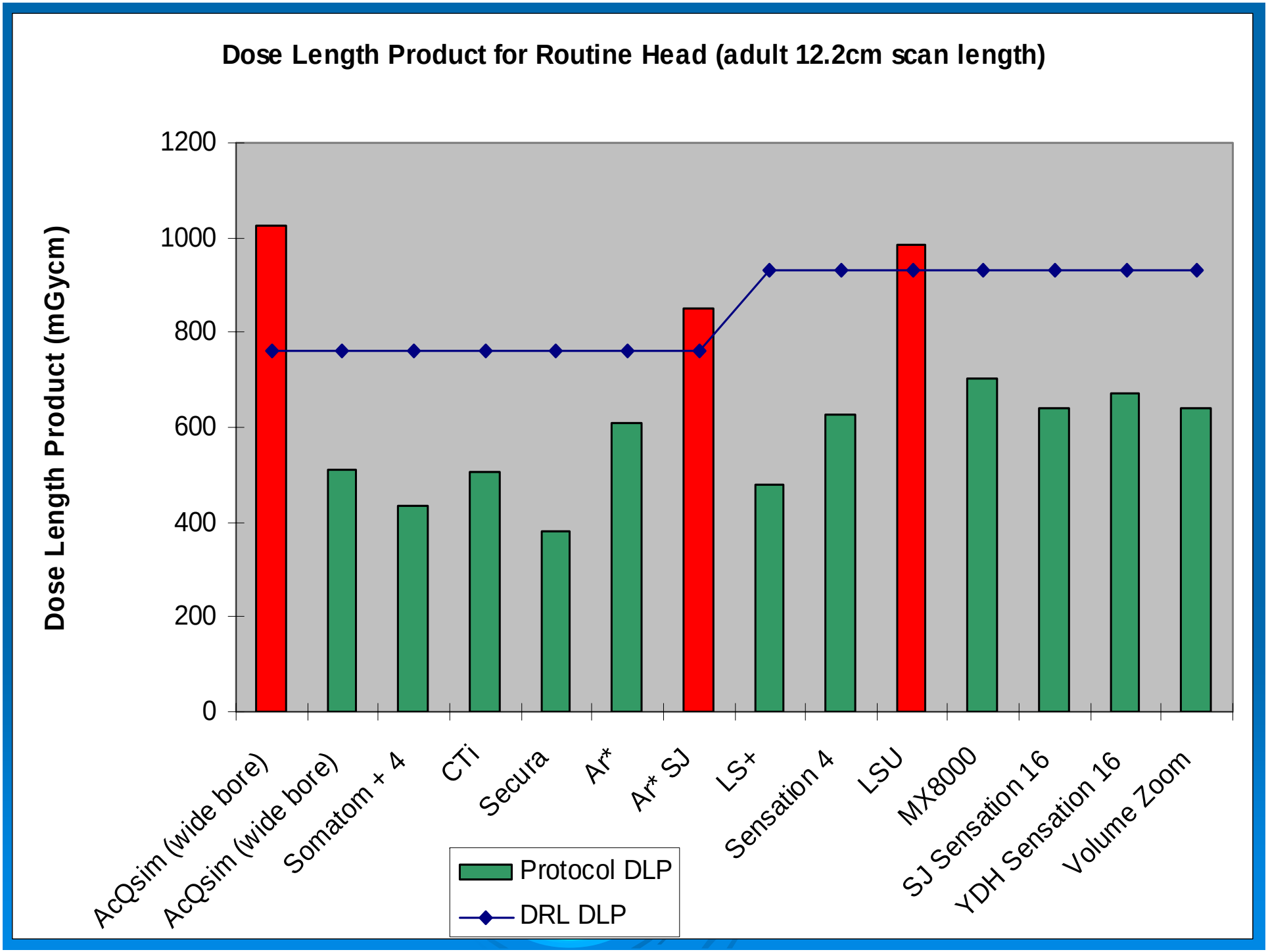

Dose Length Product for Routine Head (adult 12.2cm scan length)
Dose Length Product (mGycm)
1200
1000
800
600
400
200
0
AcQsim (wide bore)
AcQsim (wide bore)
Somatom + 4
CTi
Secura
Ar*
Ar* SJ
LS+
Sensation 4
LSU
MX8000
SJ Sensation 16
YDH Sensation 16
Volume Zoom
Protocol DLP
DRL DLP

What we did about over DRL scans

- Raised awareness
- follow up
- Suggested alternative techniques

Raising awareness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Technique comparison chart

scanner	kVp	mAs	Rad'n (mm)	pitch	Length (cm)	DLP
AcQsim (wide bore)	130	260	5	1	19.5	550
Somatom + 4	120	128	10	1.5	19.5	120
CTi	120	240	7	1.5	19.5	210

follow up

Suggesting alternative techniques

When dose exceeds DRL…

1. reduce factors slightly
2. try it on a phantom
3. important degradation ?
4. if yes stop, otherwise …

When dose exceeds DRL…

…

5 trial it on a patient

6 consistent with intended purpose (CWIP)?

7 if yes, repeat until DRL met, otherwise technique was already ALARP.

Example 1

- Wide bore radiotherapy simulator
- They stopped using it for head scans

Example 2

- Identical scanners using different protocols

Example 2

scanner	Part of head	Exposure time (s)	DLP (mGy cm)
6	Cerebrum	2 x 1.5	1000
	Post fossa	2 x 1.5	
7	Cerebrum	2 x 1.9	1200
	Post fossa	2 x 1.9	

Example 3

- Unusually high CTDIw
- Radiographers trialled adjusted technique on patients

Review

- Doses are being brought within DRLs
- Image quality remains CWIP
- So…
- …We're on our way to complying with IRMER and everything's OK - isn't it ?

“The consequences of a failure to make a correct diagnosis because of poor image quality are immediate and the risks are far greater than those from the radiation exposure.” (Martin, BJR June 2005)

“for the majority of applications we need as high quality an image as the technique can provide.” (Martin, BJR June 2005)

Maximum image quality has not been our goal

Which is correct ?

A. The highest image quality is usually best for the patient.

B. Something less than the highest image quality is best for the patient.

Why this is important

- I may be compromising patient care by promoting less than maximum image quality ?

What’s the evidence ?

Evidence to support less than maximum IQ

- Britten et al showed diagnosis of a condition called PVLD wasn't changed significantly by a (simulated) 50% reduction in dose although visibility worsened. (BJR 04)
- Practitioners say such images can be CWIP

Argument to support maximum IQ

- a dose reduction of 1 mSv might lower the risk of radiation induced fatal cancer by 1 in 25 000, but if it means that 1 cancer is missed in every 10 000 patients, there is a net increase in risk

Isn’t this the practitioner’s job ?

- Are we better off leaving well alone until we have evidence to show one dose level is better than any other ?