



Australian Government

Australian Radiation Protection and Nuclear Safety Agency

# Radiation Protection of the Australian Public via the Introduction of a National Diagnostic Reference Level Scheme

*P. Marks, A. Wallace, K. Edmonds, A. Hayton, D. Tingey*

[paul.marks@arpansa.gov.au](mailto:paul.marks@arpansa.gov.au)

Living with Radiation – Engaging with Society 13–18 May 2012 ■ SECC ■ Glasgow ■ Scotland



13th International Congress of the International Radiation Protection Association





- Population: 22,482,198
- Area: 7,617,930 km<sup>2</sup>

- Australia is a Commonwealth made up of six states and two territories
- Each jurisdiction (State & Territory) is responsible for its own radiation regulation and compliance
- ARPANSA regulates radiation protection and nuclear safety for Commonwealth entities



Australian Government

Australian Radiation Protection and Nuclear Safety Agency

# What, Why & How?

## ARPANSA and National Surveys:

- The Australian Government charged ARPANSA to construct national DRL's, in conjunction with various professional groups.



Australian Government

Department of Health and Ageing

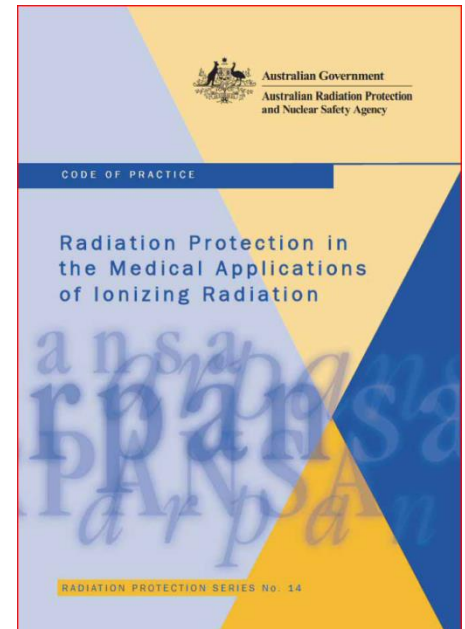


The Royal Australian  
and New Zealand  
College of Radiologists\*



ACPEM

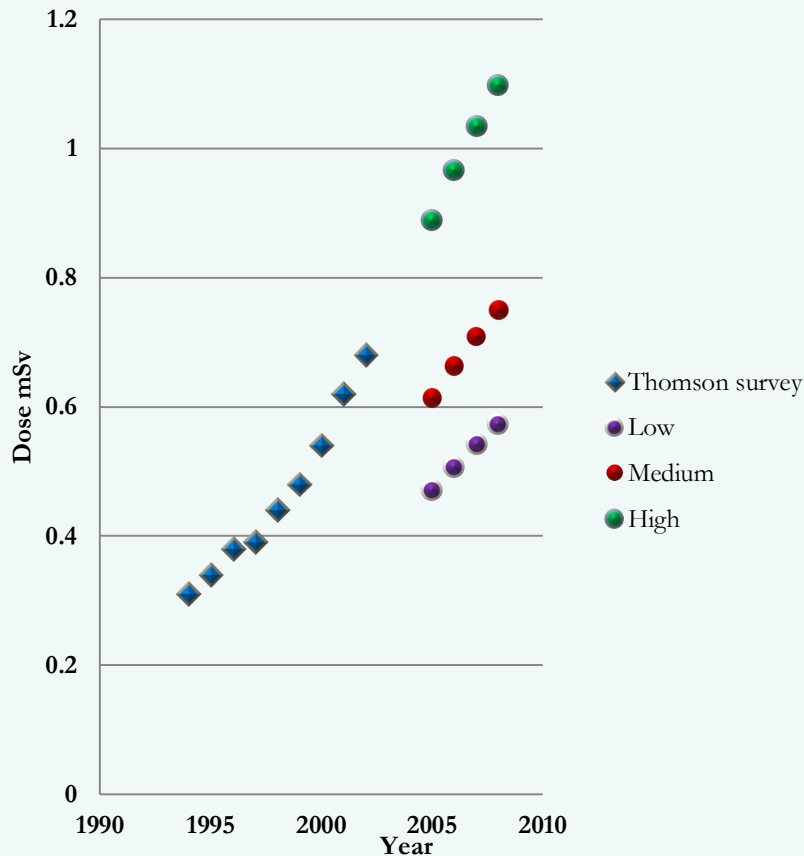
Australasian College of Physical  
Scientists & Engineers in Medicine



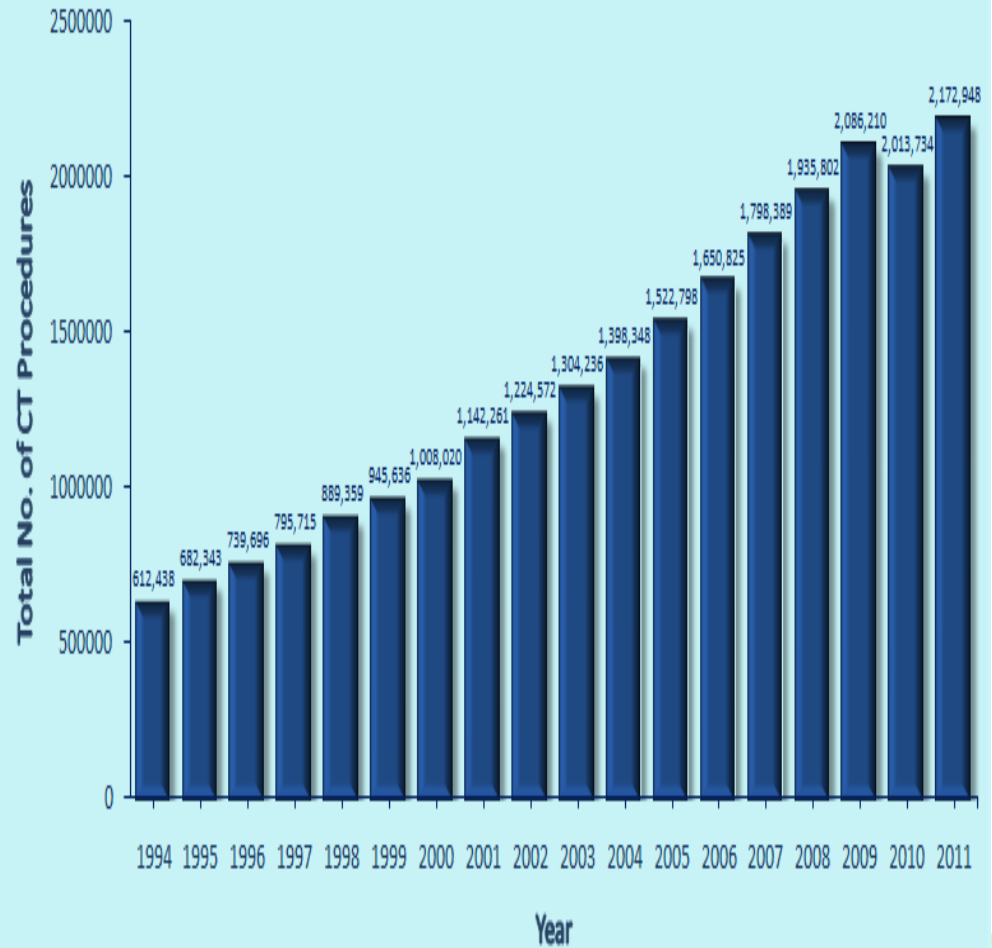


# What, Why & How?

## Dose per Capita from CT (1994 – 2008)



## Total CT Procedures recorded by Medicare Australia





# What, Why & How?

## Metrics Acquired

### On-Line DRL Survey

Head Neck **Chest** Abdo/Pelvis Lumbar Spine Chest, Abdo and Pelvis

Chest

Scan Range

- between lung apices to adrenal glands

(Scan region is within red lines as shown on the diagram)

e.g.

- mediastinal, pleural, pulmonary pathology and oncology

No HRCT

Close

kVp	Rotation Time	Reconstruction Algorithm Kernel
mAs	No. of Phases	Scan Field of View
Pitch	Helical or Axial	Beam Shape Filter
Contrast	Detector Configuration	Noise Index
Dose Modulation	Reconstruction Slice Width	



# What, Why & How?

**Australian Government**  
**Australian Radiation Protection and Nuclear Safety Agency**  
 Australian National Diagnostic Reference Level Survey  
 Diagnostic Imaging & Nuclear Medicine Section, 619 Lower Plenty Road, Yalla Yalla, 3083.

Report For: Australian Radiology  
 Protocol: Abdo/Pelvis      Age Group: Adult  
 Machine: Toshiba Aquilion 16 Slice      Start Date: Jul 19 2011  
 Room 2      End Date: Jul 19 2011

Survey Outcome		
Practice Reference Level (mGy.cm)	European Survey DRL <sup>(1)</sup> (Adult) (mGy.cm)	Comment
806	1380	European Data is provided for information only. Australian National DRLs are expected in 2012.

Australian Radiology

[1] European Guidance on Estimating Population Doses from Medical X-Ray Procedures, Radiation Protection No. 154, European Commission, 2008

PO Box 655      Email: ndrld@arpansa.gov.au      Web: www.arpansa.gov.au      619 Lower Plenty Road  
 MIRANDA NSW 1400      Free Call: 1800 033 972 (a free call from fixed phones in Australia)      YALLAMBIE VIC 3085  
 Phone: +612 9541 9333      Phone: +613 9433 2211

Australian National Diagnostic Reference Level Survey

The spread of DLPs from the published 2008 European Surveys (Adult)

European Survey Adult	Low	Average	High
Abdo/Pelvis	1260	1380	1427
DLP (mGy.cm)			

DLP	Head	Neck	Chest	Abdo/Pelvis	Lumbar Spine	Chest, Abdo Pelvis
High	1143	475	586	1427	400	2073
Average	952	424	571	1380	353	1951
Low	762	407	471	1260	240	1731

Carl-Magnus Larsson  
 CEO  
 ARPANSA

If you have any enquiries about this report please contact the Diagnostic Imaging and Nuclear Medicine Section at ARPANSA  
 Email: ndrld@arpansa.gov.au  
 Phone: 1800 033 972

Australian National Diagnostic Reference Level Survey

Practice Name Australian Radiology

Protocol: Abdo/Pelvis      Age Group: Adult  
 Machine: Toshiba - Aquilion 16 Slice      Start Date: Jul 19 2011  
 Room 2      End Date: Jul 19 2011

kVp	120	Rotation Time	0.85	Reconstruction Slice Width	5
mAs	330.00	No. of Phases	1	Reconstruction Algorithm/Kernel	Standard
Pitch	0.800	Helical/Axial	Helical	Scan Field of View	40
Contrast	Yes	Detector Configuration	64 X 0.500	Beam Shaping Filter	Large
Dose Modulation	Yes			Noise Index	15

Patient	CTDIvol	DLP	Patient Weight
1	15	671	52
2	16	639	64
3	17	1416	126
4	15	1482	95
5	15	1455	105
6	15	793	87
7	15	446	47
8	16	1086	90
9	16	1111	94
10	14	314	40
11	14	740	63
12	13	601	42
13	16	802	80
14	17	1232	98
15	19	850	100
16	19	810	82
17	15	1486	121
18	15	794	64
19	16	721	70
20	15	1270	91

- Survey Details Summary
- Survey Outcome Box
  - PRL
  - European DRL
  - Comment
- Spread of DLPs for the survey

- European Survey Summary for the specific protocol
- European Survey Summary for all protocols
- Graph and Table

- Survey Details Summary
- Settings
- Patient Data Entry Table



# What, Why & How?

**The objective of a diagnostic reference level is to help avoid excessive radiation dose to the patient that does not contribute additional clinical information value to the medical imaging task.**

***“The best diagnostic image for the least amount of radiation dose to the patient.”***





# What, Why & How?

- Proposed Australian MDCT DRL's

Habitus	DRL (mGy.cm)
Head	1000
Neck	600
Chest	450
Abdo/Pelvis	700
Chest/Abdo/Pelvis	1200
Lumbar Spine	900





Australian Government

Australian Radiation Protection and Nuclear Safety Agency

# The Future

**Interventional Radiology**

**PET-SPECT/CT**

**Nuclear Medicine**

**Mammography**

**General Radiography**



**OPTIMISATION**



Australian Government

Australian Radiation Protection and Nuclear Safety Agency

# THANK YOU

## CONTACT ARPANSA

<b>Email:</b>	<a href="mailto:info@arpansa.gov.au">info@arpansa.gov.au</a>
<b>Website:</b>	<a href="http://www.arpansa.gov.au">www.arpansa.gov.au</a>
<b>Telephone:</b>	+61 3 9433 2211 Freecall 1800 022 333
<b>General Fax:</b>	+61 3 9432 1835

