

# Pilot Survey of Skin Entrance Dose for Selected Radiology Procedures

**A pilot survey of Skin Entrance Dose (SED) for selected radiology procedures was undertaken in private and public radiology centres in Victoria. The centres had been chosen to represent a cross-section of rural and city based centres, public hospitals and dedicated radiology centres. The data obtained was to be used as a baseline for comparisons with centres assessed in the future.**

## Survey Methodology

During 1993, a survey of the Skin Entrance Dose (SED) for several radiography procedures was undertaken at 15 hospital/radiology centres in Victoria.

The doses were measured by performing free-in-air measurements using an ionisation chamber. The free-in-air dose was then corrected for ionisation chamber calibration, skin to air ratio and a backscatter factor dependent on field size and beam quality.

The radiography factors used for the selected procedures were obtained by interviewing a radiographer at the centre being assessed. The radiographer was requested to provide the factors used for a male patient weighing approximately 70 kg.

The choice of the procedures to measure the SED was based upon previous work conducted by National Radiological Protection Board (NRPB) in the United Kingdom<sup>1</sup>. In this way, the data obtained by the NRPB and their derived reference levels<sup>2</sup> could be compared directly to data obtained in the pilot survey.

## Results and Discussion

Table 1 (below) summarises the distribution of SED measured for each of the selected procedures. Also included is the reference level derived by the NRPB. It should be noted that this reference level is based upon

the third quartile of the data obtained from the NRPB survey.

A comparison of the pilot survey data presented shows that the obtained third quartile levels are approximately half of the reference levels used in the UK. This comparison implies two things. The first is that patient doses delivered in Victoria are less than those measured in the NRPB survey for identical procedures. It should be noted that the NRPB survey was conducted in the early 1980s, and, since that time, the use of faster film-screen combinations has become more common. The second implication is that it is not appropriate to use the UK reference levels for application to Victorian centres. Reference levels that are more appropriate for Victoria or Australia should be developed. These reference levels could be based upon the third quartile level obtained from data obtained from more extensive measurements of SED.

As the survey population only represents approximately 1 per cent of the general medical X-ray units registered in Victoria, it would not be appropriate to use the data from this survey in establishing reference levels.

The data from this pilot survey should only be used for comparative purposes until a

much larger population has been has been monitored. An appropriate population size could be approximately 10 per cent of hospital/radiology centres.

## Conclusion

A survey of the SED delivered for selected procedures at 15 radiology centres in Victoria was conducted. This survey showed that the doses measured are in general less than those measured in a similar survey conducted in the UK in the early 1980s. It is recommended that the data obtained from this survey be used as a comparative baseline until sufficient data is collected to establish patient dose reference levels for selected procedures.

## Further Information

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## References

- 1 Shrimpton, P.C., Wall, B.F., Jones, D.G., Fisher, E.S., Hillier, M.C. and Kendall, G.M., 1986 'A National Survey of Doses to Patients Undergoing a Selection of Routine X-Ray Examinations in English Hospitals', *NRPB-R200*, National Radiological Protection Board.
- 2 Dosimetry Working Party of the Institute of Physical Sciences in Medicine, 1992 'National Protocol for Patient Dose Measurements in Diagnostic Radiology', National Radiological Protection Board.

**Table 1: Distribution of Skin Entrance Dose (mGy) for a Pilot Survey of Public and Private Radiology Centres in Victoria.**

|                          | Abdomen AP | Pelvis AP | Skull AP | Skull LAT | Chest PA | Chest LAT | Lumbar Spine AP | Lumbar Spine LAT | Lumbar Spine LSJ |
|--------------------------|------------|-----------|----------|-----------|----------|-----------|-----------------|------------------|------------------|
| <b>Minimum</b>           | 2.42       | 1.25      | 0.62     | 0.37      | 0.03     | 0.15      | 2.32            | 3.17             | 2.42             |
| <b>First Quartile</b>    | 3.01       | 2.00      | 1.29     | 0.82      | 0.06     | 0.39      | 3.01            | 8.21             | 9.56             |
| <b>Median</b>            | 3.49       | 2.59      | 1.52     | 1.24      | 0.10     | 0.57      | 3.94            | 10.7             | 14.6             |
| <b>Third Quartile</b>    | 4.50       | 5.35      | 1.97     | 1.54      | 0.14     | 0.65      | 5.48            | 17.0             | 25.3             |
| <b>Maximum</b>           | 6.24       | 17.2      | 2.49     | 4.72      | 0.27     | 0.98      | 11.7            | 23.4             | 38.1             |
| <b>Average</b>           | 3.77       | 4.13      | 1.58     | 1.41      | 0.11     | 0.54      | 4.88            | 11.8             | 17.7             |
| <b>UK Reference Dose</b> | 10         | 10        | 5        | 3         | 0.3      | 1.5       | 10              | 30               | 40               |

**Note:** The Third Quartile of the distribution and the UK Reference Dose level have been highlighted for comparative purposes.