

**THE ANNUAL REPORT OF  
THE RADIATION ADVISORY COMMITTEE  
FOR THE YEAR ENDING SEPTEMBER 2003**

**RADIATION ADVISORY COMMITTEE**

**Melbourne, Australia**

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Hon Bronwyn Pike MP  
Minister for Health

Dear Minister

Pursuant to Section 108AK(10) of the *Health Act 1958*, the Radiation Advisory Committee submits the 2003 annual report of the Committee for presentation to Parliament.

Yours faithfully

A handwritten signature in black ink, appearing to read 'B M Tress', written in a cursive style.

B M Tress  
(Professor)  
Chairman  
**RADIATION ADVISORY COMMITTEE**

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## RADIATION ADVISORY COMMITTEE

### COMPOSITION

The Radiation Advisory Committee met on 11 occasions from October 2002 to September 2003. The members of the Radiation Advisory Committee during this period were:



**CHAIRMAN**  
**Professor Brian M. Tress**  
Department of Radiology  
University of Melbourne  
*Meetings Attended: 7*



**Dr. Geza Benke**  
Research Fellow  
Dept of Epidemiology & Preventive Medicine  
Monash Medical School  
*Meetings Attended: 7*



**Dr. David Bernshaw**  
Consultant Radiation Oncologist  
Peter MacCallum Cancer Institute  
*Meetings Attended: 10*



**Mr. Philip Brough**  
Chief Medical Imaging Technologist  
Department of Medical Imaging  
Geelong Hospital  
*Meetings Attended: 8*



**Mr. Peter Burns**  
Director  
Environmental and Radiation Health Branch  
ARPANSA  
*Meetings Attended: 7*



**Ms. Christy Fejer**  
Manager, Information and Education  
WorkSafe Victoria  
*Meetings Attended: 8*



**Dr. John Heggie**  
Director  
Department of Medical  
Engineering and Physics  
St. Vincent's Hospital  
*Meetings Attended: 11*



**Dr. Michael Kelly**  
Director of Nuclear Medicine  
Alfred Hospital  
*Meetings Attended: 8*



**Dr. Paul Van Buynder**  
Senior Medical Adviser  
Social & Environmental Health  
Department of Human Services  
*Meetings Attended: 7*



**Dr. Ken Joyner**  
Director  
Global EME Strategy & Regulatory Affairs  
Motorola Australia Pty Limited  
*Meetings Attended: 9*



**SECRETARY**  
**Ms Caroline Isakow**  
Radiation Safety Program  
Department of Human Services

## RESPONSIBILITIES

The Radiation Advisory Committee was established by the Minister for Health under the *Health Act 1958* to advise the Minister or the Secretary on any matters relating to the administration of the radiation legislation referred to it by the Minister or the Secretary including the following:

- (a) the promotion of radiation safety procedures and practices;
- (b) recommending the criteria for the licensing of persons and the qualifications, training or experience required for licensing;
- (c) recommending the criteria for the registration of radiation apparatus and sealed radioactive sources;
- (d) recommending research projects involving the irradiation of human volunteers for approval;
- (e) recommending the nature, extent and frequency of periodic safety assessments of radiation apparatus and sealed radioactive sources;
- (f) codes of practice with respect to particular radioactive substances and uses of ionising and non-ionising radiation; and
- (g) any matter which the Minister agrees the Committee should consider and report on.

## 1. INTRODUCTION

The past year has been both busy and productive for the Radiation Advisory Committee and the Radiation Safety Program.

Throughout the year a number of issues were considered by the Committee including:

- the use of CT scanners;
- the administration of strontium-89;
- radiation protection responsibilities in hospitals;
- the monitoring of NORM contaminated equipment; and
- a variety of research projects involving the irradiation of human volunteers.

The Committee reviewed numerous research projects that involved the irradiation of human volunteers. These research projects included the delivery of relatively small radiation doses using Dual Energy X-ray Absorption (DEXA) equipment to the use of CT Scanners delivering relatively high radiation doses. The volunteers in these research projects ranged from adolescents to the elderly.

The Committee is currently reviewing the definition of a volunteer that has enrolled in a research project that involves the exposure to ionising radiation. The Committee is mindful that the processes used by the Department in approving research projects only captures projects where the volunteers do not receive a direct benefit. As such, the Committee is attempting to develop definitions of the types of volunteers where the research project requires the approval under the licensing aspects of the *Health (Radiation Safety) Regulations 1994*.

The review of projects involved a considerable amount of the Committee's time and effort.

The Committee believes that the process used by the Department to approve research projects is justified, as it is important that the radiation detriment from any project can be justified when compared to the benefits and outcomes from that project.

On a national level the Committee has kept a watching brief on the progress of the National Directory for Radiation Protection developed by ARPANSA and the implementation of the National Waste Repository.

The Committee noted the reported incidents of maladministration of radiopharmaceuticals over the past year. The Committee encourages thorough reporting and investigation, which hopefully results in improved work practices and minimal reoccurrence. To this end the Committee has encouraged the proposed audit of nuclear medicine practices in Victoria by the Radiation Safety Program and awaits the results with interest.

Non-ionising radiation issues still concern the public. The possible health effects of exposure to electromagnetic fields, mobile phones radiation and such sources were considered by the Committee over the past year. There has been insufficient evidence to alter the Committee's view on possible health effects.

The past year has seen the departure of Mr Paul Marks from the Radiation Safety Program. The Committee would like to thank Mr Marks for his assistance with Committee issues particularly in the area of nuclear medicine. The Committee also thanks the staff of the Radiation Safety Program, particularly Caroline Isakow who provided the secretarial support to the Committee and Paul Einsiedel, for their continued support and assistance in the preparation of this report.

## 2. IONISING RADIATIONS

### 2.1

#### Audit of Nuclear Medicine Practices

The Committee was advised that the Radiation Safety Program was proposing to carry out an audit of nuclear medicine practices. The data obtained from this audit would be examined against current accreditation standards produced by the Australian and New Zealand Association of Physicians in Nuclear Medicine (Inc).

The main reason for the audit was to determine if there was any underlying pattern behind the increase in the reported number of incidents involving unsealed radioactive sources within nuclear medicine departments. It is envisaged that the information gathered from the audit would assist clinical practices in improving their protocols and in particular minimising the chance of mal-administration of radiopharmaceuticals.

The particulars of the audit were noted by the Committee, however, it was suggested that emphasis be placed on identifying issues within medium sized centres who need to ensure that correct radiopharmaceutical activities were being administered to patients.

### 2.2

#### Australian Society of Dermal Clinicians

The Committee received correspondence from the Australian Society of Dermal Clinicians requesting:

- (a) Acknowledgement of the Society's role in informing its members of progress related to laser safety and regulating issues.
- (b) Written information relating to practice, licensing and examination that might be required under possible legislation.
- (c) Acknowledgement of the formal education of the degree they offer relating to lasers and applications.

- (d) To be allowed to consult or contribute as a professional entity.

A response was prepared by the Radiation Safety Program for the Committee's consideration. The response acknowledged the appropriateness of items (a) and (d) which in the latter case invited the Society to engage in consultation with the Radiation Safety Program. Items (b) and (c) were considered inappropriate given that laser legislation was not imminent and that endorsement of their undergraduate degree course would imply that the Department had conducted a thorough scientific review of the course notes.

The Committee endorsed the prepared response but was of the view that it should be sent via the office of the Chief Health Officer of the Department.

### 2.3

#### Proposed CT Scanner at a Rural Hospital

In early 2002 the Committee was asked to consider a proposal to use a teleradiology system at a rural hospital as an alternative to having a radiologist on-site (a requirement of the CT code of practice) for CT examinations. The Committee expressed a number of concerns with the proposal, particularly in the quality of the transmitted images and the availability of radiologists to read and report on transmitted images. The hospital was requested to provide further information on the proposal. Subsequently, additional information was provided, however, the proposed teleradiology system did not meet the requirements of the RANZCR policy document, *Position on Teleradiology*.

A revised proposal relating to an alternative teleradiology system was provided. Additional information relating to the availability of radiologists for viewing of transmitted images was also provided. The Committee considered the new request and

commented that the intention of the Code of Practice was to ensure that the most modern CT equipment was used, that only qualified personnel operate the equipment and that a supervising radiologist be on-site to assist in the diagnosis and reporting on radiographic images. In circumstances where a radiologist cannot be in attendance on-site, however, the Committee has approved the use of teleradiology as an alternative. Any teleradiology system used for primary diagnosis, however, must comply with the RANZCR policy document, *Position on Teleradiology*.

Based on the information in the revised proposal the Committee recommended the approval of the installation and use of the CT scanner with the following conditions:

1. CT scanning equipment only be operated by personnel holding the appropriate operator licence, as required by the *Health Act 1958*, or registration with the Medical Radiation Technologists Board of Victoria;
2. The CT scanner is not of the translate / rotate type, i.e. first and second generation;
3. CT scanners, older than ten years of age since first installation, only be registered if, in the judgement of the Department of Human Services, it produces images of adequate diagnostic quality and meets appropriate radiation safety standards;
4. Demonstrated evidence be provided to indicate that any teleradiology link used for primary diagnosis meets the requirements of the RANZCR policy document, *Position on Teleradiology*; and
5. Radiation shielding be provided in the doors, walls, floor and ceiling of the room in which the apparatus is installed to ensure that no person receives a radiation dose in excess of the relevant radiation protection limit specified in schedule 1 of the *Health (Radiation Safety) Regulations 1994*.

## 2.4

### Whole Body CT Scanning

The Committee was presented with an extract from the NSW Parliamentary Hansard dealing with whole body CT scanning. The NSW Health Minister, Mr Knowles, had outlined the following action to be taken in relation to this matter by the EPA:

- ensure that clients had a referral for a whole body scan from an independent doctor;
- ensure that clients were fully informed of the risks from a whole body scan and the uncertain benefit of the scan;
- clients were advised of what a whole body scan was able to detect and not detect;
- a declaration was required to be signed by the client stating that they have received the advice but wish to proceed with the whole body scan.

In reviewing this matter, the Committee reaffirmed that whole body CT scanning could not be justified from a radiation dose perspective on the basis of risk versus benefit. The radiation dose from a whole body CT scan could vary between 4 mSv to 27 mSv.

The Radiation Safety Program informed the Committee that they were not aware of any sites in Victoria offering whole body CT scanning procedures.

The Committee considered it appropriate that, should this practice become available in Victoria, the Radiation Safety Program instigate similar action to that carried out by the NSW EPA via the placement of additional conditions of registration on CT scanners.

The Committee also considered that similar conditions of registration should be placed on CT scanning equipment used for calcium scoring. It was the Committee's view that, when using a helical / multi-slice CT scanner, calcium scoring may still not be a proven diagnostic procedure in reducing or identifying clients at risk from adverse cardiac conditions.

The Committee suggested that the Radiation Safety Program write to the RANZCR, the AIR and registered owners of CT scanning equipment outlining the Committee's concerns regarding whole body CT scanning and calcium scoring and listing the proposed new conditions of registration.

## 2.5 Strontium-89 Health Physics Support Survey

The Radiation Safety Program sought the advice of the Committee as to whether health physics support was still considered necessary for administration of strontium-89, and if so, under what specific circumstances.

A guideline document, developed five years ago by the Radiation Safety Program, recommended that "*An appropriate health physics adviser should be aware of all patients considered for treatment with strontium-89, and in appropriate circumstances, should be directly involved with the patient's treatment. Therapy with strontium-89 should not be undertaken in situations where health physics advice is not possible or radiation protection guidelines cannot be adequately addressed.*"

The Committee was presented with the findings of a survey, recently conducted by the Radiation Safety Program, of all sites performing the administration of strontium-89. The survey involved a questionnaire requesting information as to whether physics support was available, whether there was a health physicist on site or whether there was only access to verbal advice. The results indicated that 12.5% had physics support on site, 20% had access to verbal advice and 67.5% had no access to physics support at all.

The Committee noted that the statement from the guideline document indicated that support from a health physics adviser was not mandatory. Furthermore when the document was first developed the initial dosimetry data indicated significant radiation doses and risk to persons handling corpses containing strontium-89. Since that time follow-up studies conducted by the NRPB had

demonstrated significantly lower radiation doses and associated risk.

It was indicated by the Committee that the most probable time when radiation safety advice would need to be sought was following the death of a patient. The Committee also indicated that professional groups other than health physicists might have the appropriate knowledge to provide the relevant advice. The Committee recommended that reference to 'health physics adviser' in the guideline document be changed to 'appropriate radiation safety adviser'.

The Committee also advised that the guideline document should:

- direct that users of strontium-89 to seek the appropriate radiation safety advice upon the death of any patient injected with strontium-89; and
- make reference to the Radiation Safety Program's document dealing with the handling of corpses that contain radioactive material (currently in draft form).

## 2.6 Withdrawal of CT Code of Practice

Following a number of issues with compliance with the *Code of Practice for the Use of Computed Tomography Equipment in Victoria* by a number of radiology centres, the Committee considered the Radiation Safety Program's proposal to withdraw the code. The Committee agreed with the Radiation Safety Program's view that the code was somewhat outdated, dealt with very few issues specific to radiation protection and restricted radiology centres from using new technology to achieve comparable outcomes.

In considering the withdrawal of the CT Code of Practice the Committee recommended that:

- the clauses contained within the code that specifically relate to radiation safety matters, ie age and generation of the CT

scanner, quality of the images and the radiation dose delivered, be retained as either conditions of registration or policy when considering new CT applications for registration;

- further policy or conditions of registration be developed where teleradiology systems are employed to assist in diagnosis. In this regard the Committee recommended that the RANZCR policy statement "*Position on Teleradiology*" be adopted as the minimum standard.

The Committee endorsed the Radiation Safety Program's recommendation to remove the CT code of practice as a condition of registration and write to the RANZCR and AIR advising of the Program's intentions.

## 2.7

### Units of Measure in Nuclear Medicine

The Committee was advised of correspondence received by the Radiation Safety Program from the Radiation Health Committee advising of an incident that occurred in a NSW hospital where a patient was administered 6 GBq of a radiopharmaceutical rather than the intended 6 mCi. The incident appears to have occurred due to confusion between the non SI unit of radiation, the curie (Ci) and the SI unit of radiation, the becquerel (Bq).

It was advised that the curie was still an Australian 'legal derived unit of measurement' under the *National Measurement Regulations 1999*. Also some medical specialists prescribe activities in millicuries, while most 'dose' calibrators are capable of measuring in becquerels and millicuries.

The Radiation Health Committee recommended that:

- the becquerel be used in prescribing and administering radiopharmaceuticals; and
- appropriate checking and re-checking of procedures be developed to ensure correct radiation doses were administered.

The Committee requested that the Radiation Safety Program advise all nuclear medicine departments of the possible consequences if SI units of measure are not uniformly used and the need to re-check procedures to ensure that correct doses are administered.

## 2.8

### Unintentional Exposure of a Foetus

The Radiation Safety Program brought to the attention of the Committee an occurrence where a 27 year old woman had an abdominal CT examination because of pain and suspected mass in the lower pelvic region. Upon completion of the CT scan it was determined that the patient was pregnant. An ultrasound examination revealed a 15 week old foetus. The radiographer who performed the CT scan had queried the patient prior to the examination if there was any possibility that she could be pregnant; the patient indicated that she was not pregnant. A calculation by the hospital physicist estimated the radiation dose to the foetus to be between 5 and 10 mGy. The Radiation Safety Program, using the IMPACT dose spreadsheet, had estimated the dose to the foetus as being approximately 25 mGy.

The Committee was questioned whether this type of occurrence was considered a reportable incident and if so whether a written report was required to be submitted as required by the Regulations.

The Regulations require that incidents involving abnormal or unplanned exposure to radiation must be reported. Since the radiographer had asked the patient the standard line of questioning and made the determination that she was not pregnant, the procedure may not be considered an abnormal or unplanned exposure and as such constitute an incident. The Committee requested that the Radiation Safety Program investigate the issue further with the Department's legal unit.

In view of the circumstances of this occurrence the Committee considered that the Department investigate providing advice to

organisations about the need to develop protocols to ensure pregnancy tests are conducted for high radiation dose procedures.

## 2.9

### **Radiation Protection Responsibilities of Professional Staff**

The issue of the responsibilities of professional staff in the context of radiation safety was brought to the attention of the Committee following reported incidents at two hospitals. A specific case was cited where an orthopaedic registrar was wearing only a thyroid collar and lead skirt as protective clothing during a fluoroscopic procedure. When questioned the registrar indicated to the radiographer that it was common practice for a lead jacket not to be worn.

In a second example, nursing staff were not appropriately attired during fluoroscopic procedures; again wearing only a thyroid collar and lead skirt but no lead jacket. In one specific instance, when questioned, the nurse indicated that it was common practice not to wear a lead jacket. When the nurse was asked to put on a lead jacket the nurse refused. In this case the radiographer requested that the nurse either put on a lead jacket or leave the operating suite. In another instance a staff member, wearing only limited protection, was questioned and indicated that full protection was not necessary as they were not going to have any further children.

It was commented that anecdotal evidence indicated had such scenarios occurred in operating suites during fluoroscopic procedures and it was considered that education of theatre staff on radiation safety issues would ensure better compliance with safety requirements.

In reviewing this issue the Committee referred to Regulations 32 of the *Health (Radiation Safety) Regulations 1994* which refers to the provision of training and instruction of employees concerning radiation hazards and safe working practices and Regulation 43 which refers to the obligations of employees to

use all safety devices provided. Also the Committee was informed that a condition of registration for fluoroscopic equipment required that protective lead aprons of minimum lead equivalence be provided to all staff.

The Committee requested that the Radiation Safety Program advise the professional specialist personnel at the hospital of the regulatory requirements.

## 2.10

### **Application for Licence to Use DEXA Equipment from a Gynaecologist / Obstetrician**

The Committee was informed that the Radiation Safety Program had received an application for an operator licence to use DEXA equipment from a gynaecologist / obstetrician. It was indicated that the person in question had no knowledge of the types of DEXA equipment available or any formal training in the use of such equipment. As such, the applicant, had requested information on training avenues available to them in order to satisfy the licensing requirements.

The RANZCR *Accreditation Guidelines for Bone Densitometry* document was presented to the Committee and it was indicated that 'standard 1' of the document states that staff operating DEXA equipment must:

*... be tertiary educated (degree or diploma) in the field of radiography, nuclear medicine, science or nursing, and must have additional post-graduate training in bone densitometry.*

The Committee recommended that the licence application be refused, the licence applicant be made aware of the RANZCR accreditation guidelines and that the requirements of 'standard 1' of the guidelines be complied with by the licence applicant.

## 2.11 Breach of Requirements by Research Facility

It had been previously brought to the Committee's attention that a Victorian research facility had carried out research involving the irradiation of human subjects without initially seeking the Committee's approval. The Committee had requested that the Radiation Safety Program seek legal advice on this issue.

The legal advice was presented to the Committee. In summary the advice indicated that the volunteers were exposed to a small amount of radiation and that a significant period of time had elapsed since the research project took place and, as such, it was considered that no further action was necessary or could be taken. The Committee accepted the advice.

## 2.12 Death and Cremation of Patient Containing Strontium-89

The Radiation Safety Program reported to the Committee of an occurrence with a patient administered with strontium-89.

The evening following the administration of strontium-89 the urine collection bag, worn by the patient, developed a leak. He returned to the hospital the next day and was thoroughly washed down. All contaminated bed linen was collected, monitored and appropriately stored. The patient was subsequently discharged and advised of the necessary precautions that need to be followed.

The hospital learned, some time later, that the patient had died and was cremated. It was unclear if cremation staff had been notified that the deceased patient contained radioactive material.

The Committee emphasized that should a patient die with a significant activity of strontium-89 still present, then this residue must be considered. It was suggested that the

requirements and precautions outlined in the Department's *Guidelines for the Therapeutic Administration of Strontium-89* document be outlined to the pathologist at the hospital.

## 2.13 Iodine-131 Patient Waste Disposal Exemption

The Committee reviewed a request from a hospital for an exemption for the radionuclide iodine-131 from Regulation 73 of the *Health (Radiation Safety) Regulations 1994*. Regulation 73 relates to the disposal of radioactive waste into the sewerage system. Regulation 73(1) sets a concentration limit for disposal to the sewerage system, while Regulation 73(2) sets a maximum activity limit that can be disposed of in any 24 hour period. The request indicated that due to the activities of iodine-131 administered and the number of inpatients proposed that would receive treatment, compliance with Regulation 73 would be difficult.

An exemption from Regulation 73(2), the activity limit requirement, had been granted to two hospitals in 1996 by the Department following a recommendation of the Committee. In this instance, the Committee was prepared to recommend a similar exemption be granted. It was not, however, prepared to recommend an exemption from the concentration requirements, Regulation 73(1), as there was no guarantee that this would not pose a potential hazard.

The Committee recommended that the hospital be advised that it only would recommend an exemption from Regulation 73(2) as had been given in the past.

## 2.14 Clearance Levels for NORM Contaminated Equipment

Endorsement was sought from the Committee by the Radiation Safety Program for a proposed method for determination of clearance levels for naturally occurring

radioactive material (NORM) contaminated equipment for unrestricted re-use or recycling.

The Committee was informed that up to 100 tonnes of low-level radioactive sludges and scales were brought ashore annually from oil platforms in Bass Strait. This naturally occurring radioactive material is a by-product of oil and natural gas operations. The radionuclides of interest are radium-226, radium-228, radon-222 and lead-210. They appear at a low level in process formation water, sludges, and scales, which contaminate pipes, pumps and a range of other equipment.

The proposal was to identify equipment, with insignificant levels of contamination, which could then be disposed of through normal channels. This involved characterisation of contamination levels using a hand-held Health Physics Instrument Cypher 5000 meter connected to a pancake GM radiation probe, measuring alpha and beta particles. In practical terms, this would mean measuring counts-per-second (cps) on a radiation monitor and being able to determine the approximate contamination in Bq/g.

The procedure, developed by Esso in collaboration with a consulting firm, involved a complete scan of the inside of pipes and other equipment, with the probe in close proximity to the internal surfaces. Data were presented which showed that 5 cps on the radiation monitor was consistent with radium-226 concentrations in the range 2 - 2.5 Bq/g, radium-228 concentrations of 0.5 - 1 Bq/g, and lead-210 concentrations of 0.5 - 1 Bq/g. The annual radiation dose received using this 5 cps criterion as the maximum level was estimated to result in less than 10  $\mu$ Sv per annum being received by any individual.

Esso proposed unconditional release of the equipment with preference for re-use as fencing posts or recycling via smelting. The Committee endorsed the approach of measuring the counts per second to characterise contamination levels in piping and

considered this level as an acceptable criterion to identify equipment for release.

## **2.15 X-ray Fluoroscopy Course for Orthopaedic Surgeons**

The Committee was presented for comment with a course structure and course notes for a proposed "X-ray Fluoroscopy Course for Orthopaedic Surgeons" submitted by the Australian Orthopaedic Association. The Association requested comment on the appropriateness of this course to enable orthopaedic surgeons to be licensed in Victoria.

The introduction of this type of course and training was seen as a positive step by the Committee toward improvement of awareness and safe operation of image intensifiers by orthopaedic surgeons. The Committee, however, was concerned by the quality of the course notes in respect to other similar approved courses.

A number of comments were provided to the Radiation Safety Program as feedback to the Australian Orthopaedic Association. Before the Committee could recommend approval of the course it suggested that these issues should be addressed by the Association. The Committee also suggested that the Radiation Safety Program contact the other jurisdictions in regard to the requirements for licence for orthopaedic surgeons and the types of equipment permitted to be used.

## **2.16 Radiation Doses to Patients from CT Scanners**

The Committee received correspondence from two radiation safety officers (RSO) located at two metropolitan hospitals that wished to draw the Committee's attention to a scientific paper entitled 'Solid Cancer Risks from Radiation Exposure for the Australian Population' by Keith Wise of ARPANSA which had recently been published in the Australasian College of Physical Scientists and Engineers in Medicine

journal. Specifically, the RSOs wished to draw the Committee's attention to the number of theoretical fatal cancers induced in the Australian population from undergoing CT examinations outlined in this scientific article.

The Committee noted the article, however, it did query Dr Wise's paper in that the researcher had not considered a 5-year latent period in his estimations of the solid cancer rates, however the Committee did not dispute the figures quoted.

The Committee was mindful of the risks involved with CT scanning however in the case of patients with symptomatic conditions the beneficial aspects from undergoing the CT procedures outweigh these risks.

The Committee's view was that significant radiation dose savings could be achieved via an education process if both the practitioner and operator had a better understanding of the radiation dose that is being delivered from routine CT examinations.

## **2.17 Operator Licences for Dental Nurses**

### **(i) intra-oral dental X-ray examinations**

The Committee was informed that the Radiation Safety Program had received an application for an operator licence from a dental nurse to perform intra-oral dental X-ray examinations. In support of the application the applicant indicated that they had completed a course in intra oral radiography at the Torrens Valley Institute, Adelaide. The Committee was provided with an outline of the course and advised that the course was accredited by the Dental Assistants Education Council of Australia Inc.

Following receipt of this application, the Radiation Safety Program had contacted the Dental Practice Board of Victoria to determine their position in relation to dental nurses operating intra-oral X-ray equipment. It was indicated in their response that they had no objections to the issuing of operator licences to

appropriately trained dental nurses to perform intra oral dental radiography.

The Radiation Safety Program also contacted the other jurisdictions in relation to the licensing of dental nurses.

South Australia and NSW recognised the radiography course stated above. Western Australia did not grant licences to dental ancillary staff but did allow them to perform intra-oral radiography under the supervision of a dentist once they had completed an approved course, like the one conducted in South Australia. Tasmania was currently drafting new legislation to accommodate dental assistants who wish to perform intra oral radiography. The Northern Territory did not grant licences but allowed the radiographer's board to administer professions such as dental nurses. The Radiation Safety Program did not receive responses from Queensland or the Australian Capital Territory.

The Committee indicated that based on the acceptance of the issuing of operator licences to dental nurses by the other jurisdictions, mutual recognition directives and the level of training offered by the South Australian course, it recommended that licences be granted to dental nurses. The Committee recommended that the criteria for issuing a licence should be:

- that the dental nurse must have completed the intra-oral radiography course at the Torrens Valley Institute, Adelaide or a course with an equivalent content.
- the issuing of a licence should be restricted to intra-oral radiography only; and
- that intra-oral radiography only be undertaken when requested by the dentist following an examination of the patient.

### **(ii) extra-oral dental X-ray examinations**

The Committee was informed that the Radiation Safety Program had received an application for an operator licence from a dental nurse to perform extra-oral (i.e. orthopantomographic (OPG) and cephalometric)

dental X-ray examinations. In support of the application the applicant indicated that they had completed the Dental Assistants Education Council of Australia (DAECA) radiography course and was licensed in Queensland to use intra- and extra-oral radiography equipment without any restrictions.

A copy of the outline of the DAECA course was provided to the Committee.

As required by mutual recognition directives and given the level of training offered by the DAECA course, the Committee recommended that the licence be granted to the dental nurse to operate extra-oral equipment. The Committee recommended that the criteria for issuing a licences for extra-oral radiography to dental nurses in the future should be:

- that the applicant must have completed a course that incorporates training in the use of extra-oral radiography equipment; and
- that intra-oral radiography only be undertaken when requested by the dentist following an examination of the patient.

## 2.18 Radiation Incidents

Reported incidents involving radiation are infrequent and rarely pose a major health risk to the individuals involved. Regulation 36 of the *Health (Radiation Safety) Regulations 1994* requires that the Department be notified in writing within five working days of any abnormal or unplanned exposure to radiation. Following investigation, incidents of this nature are reported to the Radiation Advisory Committee for information and further advice.

The Committee was advised of ten radiation incidents during the year. Eight of these incidents involved the maladministration of a radiopharmaceutical, while the remaining two resulted from an unintended CT scan procedure.

The incidents occurred at a number of different Victorian clinical centres and in a

majority of cases the radiation incident was attributed to technologist error.

The Committee was of the view that the increase in reported incidents from the previous year was due to the introduction of an awareness campaign conducted by the Radiation Safety Program in relation to the legislative reporting requirements. The Committee encourages thorough reporting and investigation since this provides a forum for improving work practices.

When compared to the number of nuclear medicine and CT procedures conducted in Victoria each year, the number of reported incidents is very small and in line with international benchmarks. Finally, in each of the incidents the risk to the patient from the unintended radiation exposure was very low.

## 2.19 Research Projects Involving Human Volunteers

During the year the Committee reviewed 40 new or continuing research projects. Research involving exposure of human volunteers to ionising radiation requires approval from both the institution's ethics committee and the Department of Human Services.

Each project is reviewed in some detail in respect to the NHMRC document *Administration of Ionizing Radiation to Human Subjects in Medical Research (1984)* and the ICRP principle that radiation practices must be justified. Institutions proposing to carry out research involving exposure of human volunteers to ionising radiation must provide:

- copies of the research protocol;
- the participant information sheet;
- estimates of the radiation doses to participants; and
- evidence of approval by the institution's ethics committee.

The Radiation Advisory Committee reviews this information before approval of the research is given. The 40 research projects reviewed by the Committee are listed in appendix 1.

Of the 40 research projects reviewed, five were approved as presented, 26 were approved subject to modifications or further information. This normally required either:

- revised or more detailed radiation dose estimates;
- modification of the radiation risk statements in the participant information sheets; or
- approval from the institute's ethics committee.

In reviewing the projects the Committee determined that nine projects did not require the approval of the RAC. This decision was based on the clause of *Administration of Ionizing Radiation to Human Subjects in Medical Research (1984)* which states:

*Where the person irradiated is a patient who may benefit from the procedure, the justification for the irradiation can be judged in the same way as for other medical exposures. Nevertheless, because of the experimental nature of the procedure, it should still be subject to thorough review by the ethics committee.*

Of the projects submitted to the RAC for consideration, a number involved the irradiation of human volunteers under the age 18 years. For persons under the age of 18, ARPANSA states in its Radiation Protection Series No. 1 *Recommendations for limiting exposure to ionizing radiation (1995)* (republished March 2002) that:

*Volunteers should, where practicable, be over 40 years of age, and preferably over 50. Persons under the age of 18 should normally not be permitted to be exposed to radiation as volunteers in medical research. Young children, in*

*particular, are not in a position to give informed consent. However, if an ethics committee regards a special case as justified, exposure of the children should conform to a cumulative effective dose of 5 mSv by age 18 years and be permitted only if the information sought cannot be obtained using adult volunteers, and only with the approval of those legally responsible for the child.*

In examining research proposals that involved the irradiation of minors, the Committee had to ensure that the radiation exposure could be justified on the basis that:

- the research project did indicate a beneficial outcome;
- each project submission presented a satisfactory case for the need to irradiate volunteers of this age group;
- the research in question could not be carried out using volunteers over 40 years of age; and
- the cumulative radiation dose to the volunteers from all research would be less than 5 mSv.

Given the possible sensitivities of the irradiation of children, the RAC wished to be assured that the ethics committees of the institutions had assessed the proposal in respect of the ARPANSA recommendation noted above.

## **2.20 Guidelines Regarding Research Involving Radiation Exposure of Human Volunteers**

The Committee was provided with an updated version of the document "Guidelines Regarding Research Involving Radiation Exposure of Human Volunteers". The document had been modified in light of discussions regarding what constituted a volunteer in research involving radiation exposure of human volunteers.

Revision to the document included:

- a more detailed definition of a volunteer;
- a description of the licence approval process, including the role of the RAC;
- information that is required to be provided with applications; and
- preferred risk statements to be used.

The Committee approved of the document as a whole but was concerned with the definition of a volunteer. The Committee was concerned that the suggested definition would capture research projects which would not normally be coming to the RAC for approval, that is where patients could benefit from participating in the research.

In light of these concerns it was suggested that the document be redrafted and resubmitted to the Committee.

## 2.21

### Other Matters Considered

#### (i) National Directory for Radiation Protection

The public discussion document of the National Directory for Radiation Protection, developed by ARPANSA, was tabled for the information of the Committee. The Directory contains legislative provisions intended to be adopted gradually by the States and Territories as a means of progressing towards national uniformity of radiation control in Australia. The Committee requested that it be kept informed of the progress of the development of the Directory.

#### (ii) Open Letter to *Spectrum*

A proposal was presented to the Committee that an open letter be sent to the AIR journal *Spectrum*. This suggestion was prompted by the discussion on the attitude of some professional personnel with regard to their radiation protection responsibilities (see item 2.9 of this report). The letter, from the Committee, would outline the responsibilities of professional individuals and organisations in respect to radiation protection for staff and

themselves. The requirements of the Regulations would also be presented. The Committee requested that the Radiation Safety Program draft a letter for consideration.

#### (iii) Chiropractic Procedures for Asymptomatic Patients

The Committee received correspondence from the Chiropractors Registration Board of Victoria and the Chiropractors Association of Australia requesting more information regarding item 2.4 of the 2002 RAC annual report. The item detailed information about a chiropractor promoting the routine X-ray examination of asymptomatic patients in a local suburban newspaper. The Committee requested the radiation Safety Program provide the public domain information, regarding this issue, to the institutions.

#### (iv) Operation of PET/CT Imaging Systems

The Committee was presented with a position statement developed by the Medical Radiation Technologists Board (MRTB) of Victoria for information. The document entitled, *Position Statement Regarding the Operation of Hybrid PET/CT Imaging Systems by Registered Nuclear Medicine Technologists* dealt with the issue of nuclear medicine technologists operating CT scanners as part of a PET/CT co-registration system. The Committee suggested that a bridging course may be required for nuclear medicine technologists not fully trained in CT physics. The Committee agreed, in principle, with the position outlined by the MRTB.

#### (v) ISO/IEC 17025 Application Document

A draft document, entitled *ISO/IEC 17025 Application Document - Supplementary Requirements for Accreditation in the Field of Medical Imaging*, was brought to the attention of the Committee. The document had been developed by the RANZCR in consultation with NATA and was targeted at medical imaging departments. It was designed to cover all areas including qualifications, equipment

calibration, good practice, radiation safety and classes of services.

The Committee felt that the RANZCR's aim to introduce this type of guideline document was well-intended, however, there appeared to have been little consultation with the relevant professional societies or regulatory agencies. It was agreed that the document should be tabled at the next Radiation Health Committee meeting.

**(vi) Inappropriate Advertising of X-rays**

The Committee was provided with correspondence, that had been sent to the MRTB from an undisclosed author, expressing concern at an advertisement that had appeared in a local newspaper. The advertisement had stated, "Hey Kids, did you know X-rays don't hurt?".

The Committee recommended that the practice, who had paid for the advertisement, be advised of the inappropriateness of the wording in the advertisement.

### 3. NON-IONISING RADIATIONS

#### 3.1

#### **Victorian and South Australia Research Institutes Form Centre of EME Research Excellence**

The Federal Minister for Health, announced in July that a consortium of research institutions, led by the Royal Melbourne Institute of Technology, will establish a \$2.5 million national research centre to study potential health effects of emissions from mobile phones and their base stations.

The Australian Centre for Radiofrequency Bioeffects Research (ACRBR) will include researchers at RMIT, Monash University, Swinburne University, Telstra Research Laboratories and the Institute of Medical and Veterinary Science in South Australia.

This consortium, led by Professor Irena Cosic from RMIT, will receive \$500,000 a year over five years to conduct research on potential health risks and boost research expertise in this area by providing research training and career development programs in EME-related areas.

#### 3.2

#### **Electromagnetic Radiation (EMR) Health Complaints Register**

In July the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) announced the establishment of an EMR Health Complaints Register<sup>1</sup> for members of the public who believe they have suffered ill-effects as a result of exposure to EMR to lodge a written complaint. A standard reporting form will allow people to describe the nature of their exposure and any adverse health effects they claim to have experienced. ARPANSA have said information could be used by them to help identify future areas of research into the effects of EMR on people and the environment. The information may also be

<sup>1</sup> [http://www.arpansa.gov.au/media/mr1\\_040703.htm](http://www.arpansa.gov.au/media/mr1_040703.htm)

disclosed to the National Health and Medical Research Council for its consideration.

#### 3.3

#### **New Standard for Radiocommunications Equipment**

On 1 March 2003 by the Australian Communications Authority (ACA) mandated new standards for radiocommunications transmitting equipment<sup>2</sup>. These standards apply to mobile phone and base station emissions as well as all broadcast installations. The ACA standard is based on the 2002 standard for human exposure to radiofrequency fields developed by ARPANSA. The ACA will conduct random audits to ensure licensees and suppliers are complying with the new regulations. Under the Radiocommunications Act 1992, suppliers can face penalties of up to \$165,000 for supplying a non-standard device. The ACA's regulatory regime also includes an industry code of practice, Deployment of Radiocommunications Infrastructure, registered by the ACA on 10 October 2002. The code aims to address community concerns about the placement of mobile phone base station and allow the community and councils greater participation in decisions made by carriers.

#### 3.4

#### **Epidemiological Studies**

A number of epidemiological studies addressing the question of cellular telephone use and brain cancer have been published in the past 12 months.

The most controversial study was by Hardell et al (2003)<sup>3</sup> who reported an

<sup>2</sup> [http://www.aca.gov.au/aca\\_home/media\\_releases/media\\_enquiries/2003/03-07.htm](http://www.aca.gov.au/aca_home/media_releases/media_enquiries/2003/03-07.htm)

<sup>3</sup> Hardell L, Hansson Mild K and Carlberg M: Further aspects on cellular and cordless telephones and brain tumour. *Int J Oncol* 22:399-407, 2003

increased risk of brain tumour when using analogue mobile phones, as well as a significantly increased brain tumour risk among digital phones users, but only on the same side of the head (ipsilateral) as the subjects recalled using the phone.

The researchers also conducted further analyses of tumor latency and ear used (laterality) for each of three phone types including cordless phones. They summarize:

*Our present study showed an increased risk for brain tumours among users of analogue cellular telephones. For digital cellular phones no significantly increased risk was found overall, but ipsilateral exposure increased the risk significantly. Cordless phones yielded significantly increased risk overall with a greater than 5-yr latency period.*

The study included a re-analysis of data from previous studies by Hardell and colleagues. The new analyses suffered from many of the same methodological weaknesses marking Hardell and colleagues' earlier work, according to Boice and McLaughlin (2002)<sup>4</sup> in their report "Epidemiologic Studies of Cellular Telephones and Cancer Risk - A Review" to the Swedish Radiation Protection Authority in 2002. In addition to the problem of multiple comparisons, the limitations included:

1. The fact that increased risk of brain tumour location with side of head used to talk on the phone were counter-balanced by deficits of tumours on the opposite (contralateral) side of the head. This suggests reporting bias or bias in data collection, because "it is not reasonable to conclude that the use of a cellular telephone would simply change the location in the brain where diagnoses occur, or that cellular telephones would protect against the development of tumours on the opposite side of the head," Boice and McLaughlin noted. "Thus, in this

study it seems plausible that a person with a brain tumour was prone to incorrectly report telephone use on the side of the head in which the tumour occurred, leading to a positive bias in the laterality analyses. Such a reporting bias will affect all tumours for all types of telephones, as was seen even for cordless telephones."

2. Use of non-standard follow-up telephone contact by a nurse and selective telephoning of cellular phone users, raising the possibility of interviewer bias.

Dr Hardell was also the only medical doctor who offered support for specific causation of cancer and phone use in a highly publicised US court case which ruled on the admissibility and credibility of submissions from scientific witnesses. One of the reasons the Judge dismissed Dr Hardell's claim was because he reported a statistical association between the use of all phones – analogue, digital and cordless phones and cancer, even though there is otherwise no scientific claim that cordless phones cause brain cancer. The judge also added:

*Arrayed against Dr. Hardell's findings are the numerous studies published in peer reviewed journals and by international scientific and governmental bodies.*<sup>5</sup>

The objective of the Cook et al (2003)<sup>6</sup> study was to determine whether incidence rates of brain, head and neck malignancies in New Zealand had varied since the introduction of cellular telephones in 1987. The study collected data on men and women aged 20 to 69 from the cancer registry between 1987 and 1998, as well as data on mobile phone use. The researchers found incidence rates for malignancies arising in the brain,

<sup>5</sup> <http://www.mdd.uscourts.gov/Opinions152/DisplayMDLCom.asp>

<sup>6</sup> Cook A, Woodward A, Pearce N and Marshall C: Cellular telephone use and time trends for brain, head and neck tumours. *New Zealand Medical Journal*, Vol 116 No 1175 (1-8), 2003 <http://www.nzma.org.nz/journal/116-1175/457>

<sup>4</sup> [http://www.ssi.se/ssi\\_rapporter/pdf/ssi\\_rapp\\_2002\\_16.pdf](http://www.ssi.se/ssi_rapporter/pdf/ssi_rapp_2002_16.pdf)

head and neck, including those sites that hypothetically receive the highest levels of radio frequency radiation during cellular telephone use, had not changed materially since the introduction of cellular telephones to New Zealand.

The researchers concluded:

*Incidence rates for malignancies arising in the head and neck, including those sites that hypothetically receive the highest levels of radio frequency radiation during cellular telephone use, have not changed materially since the introduction of cellular telephones to New Zealand. However, ecological studies of this nature are limited in many ways and a stronger study design is clearly needed to establish more exactly any elevation in risk.*

In a study by Warren et al (2003)<sup>7</sup> on cellular telephone use and the risk of intratemporal facial nerve (IFN) tumours the authors concluded:

*Regular cellular telephone use does not appear to be associated with a higher risk of IFN tumor development. The short duration of widespread cellular telephone use precludes definite exclusion as a risk for IFN tumor development.*

The Committee is of the view that there is now considerable epidemiological evidence that shows no consistent association between cellular phone use and brain cancer.

### 3.5 Human Studies

Haarala et al (2003)<sup>8</sup> reported on a replication/validation study of their previous

<sup>7</sup> Warren H, Prevatt A, Daly K, and Antonelli P: Cellular Telephone Use and Risk of Intratemporal Facial Nerve Tumor. *Laryngoscope*, 113:663-667, 2003

<sup>8</sup> Haarala C, Björnberg L, Ek M, Laine M, Revonsuo A, Koivisto M, Hämäläinen H. Effect of a 902 MHz electromagnetic field emitted by mobile phones on

work published in 2000 on the effect of mobile phones on cognitive function. Results suggest that EMF exposure from a GSM phone either has no effect on human cognitive functioning, or has such a small effect on behaviour when observed at all, that it is best explained as individual performance variation.

Improvements over the original study include adopting a double-blind design, using a larger sample size, conducting independent tests at two different centres, and adding more cognitive function tasks.

Japanese researchers<sup>9</sup> reported constantly ringing mobile phones can trigger attacks of eczema and dermatitis and claimed "High technology in the modern world may be stressful to patients with eczema and dermatitis and it may play a role in aggravating allergic symptoms."

The Committee had concerns with regards to this study, since the methodology used did not exclude the obvious possibility that the heat generated by the electronics in the operating phones triggered the allergic responses that were reported.

Hocking et al (2003)<sup>10</sup> reviewed case studies of people accidentally exposed to high RF EMF levels or people who self-reported symptoms such as headache and fatigue after using a mobile phone. They assert that "in some cases, symptoms are transitory but lasting in others. After very high exposures, nerves may be grossly injured. After lower exposures, which may result in dysaesthesia, ordinary nerve conduction studies find no abnormality but current perception threshold studies have found abnormalities. Only a small proportion of similarly exposed people develop

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human cognitive function: A replication study. *Bioelectromagnetics*, 24(4):283-88, 2003

<sup>9</sup>[http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list\\_uids=12483040&dopt=Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=12483040&dopt=Abstract)

<sup>10</sup> Hocking B and Weterman R, Neurological effects of radiofrequency radiation. *Occupational Medicine*, 53:123-127, 2003

symptoms.” The authors recommend further research. The Committee recommended that such research should focus on double blind provocation studies rather than self-reported symptoms.

### 3.6 Mobile Phone Use in Hospitals

The Committee considered a letter to the editor of the *Lancet*<sup>11</sup> and an editorial in the *British Medical Journal*<sup>12</sup>, which queried the current level of bans on mobile phones in hospitals. The articles indicated that a more sensible approach to the bans on mobile phones should be explored since some studies found that the initial bans were based not on real evidence, but on an intellectual and precautionary impression without knowledge of the susceptibility of the devices.

The Committee to some extent supported this approach, more so for medical staff of the hospital rather than for members of the public visiting the premises.

### 3.7 The Committee’s View on the Health Effects of Electromagnetic Fields

The additional evidence concerning health effects of electromagnetic fields reviewed by the Committee during the past year has not been sufficiently compelling to alter the Committee’s position concerning the issue. This is that, overall, there is insufficient evidence to come to a firm conclusion regarding possible health effects from exposure to power frequency electric and magnetic fields.

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<sup>11</sup> Letter to the Editor, *The Lancet*: Use of mobile phones in hospital: time to lift the ban? 361: 788, 1 March, 2003.

<sup>12</sup> Myerson SG and Mitchell ARJ: Mobile phones in hospitals *BMJ* 326: 460-461, 2003.

### 3.8 The Committee’s View on the Health Effects of Radiofrequency Radiation

The Committee considers that there is no substantive evidence to suggest that exposure to radiofrequency radiation can increase the risk of chronic health effects such as cancer. It has, however, noted the extent of public concern over the issue, particularly in view of the current controversy over mobile phones and base transmitters, and will continue to review the relevant research literature.

### 3.9 Operation of Solaria in Victoria.

The Committee was advised of the Department’s actions in relation to solaria.

In early 2002, the Department conducted a survey of Victorian solarium operators to determine the level of compliance with the Australian Standard. The survey, covering 41 establishments providing solarium services, showed a much higher level of compliance with the Australian Standard than was the case determined by a survey carried out ten years ago. There was concern, however, over the emergence of un-staffed coin-operated solarium salons, and the relatively poorer performance of operators such as beauty salons and health clubs. As a response, the Department conducted an education campaign to increase levels of compliance with the Australian Standard. An information pack was distributed amongst solarium operators in August 2002, outlining the key requirements of the Standard and provided information templates for use. The Cancer Council of Victoria is presently conducting a follow-up survey of solarium operators, 12 months after the education campaign. If this new survey shows that compliance with the Australian Standard has not increased since the last survey, further action will be considered by the Department.

The Committee endorsed the actions taken by the Department in relation to last year’s solarium survey and the follow-up education campaign.

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## APPENDICES

## APPENDIX 1

## TABLES OF RESEARCH PROJECTS

<b>(i) Research Projects Approved by the Committee</b>		
LICENSEE	RESEARCH WORK LOCATION	PRINCIPAL RESEARCHER
<b><i>RESEARCH PROJECT TITLE</i></b>		
Austin & Repatriation Medical Centre	Department of Nuclear Medicine and Centre for PET	Dr Christopher Rowe
<b><i>Positron emission tomography of very mild cognitive impairment.</i></b>		
Austin & Repatriation Medical Centre	Positron Emission Tomography Centre	Ms Kunthi Pathmaraj
<b><i>Serotonin release in spatial learning and memory by positron emission tomography (PET).</i></b>		
Austin & Repatriation Medical Centre	Endocrine Unit	Professor George Jerums
<b><i>Dextran sulfate stability in blood and urine.</i></b>		
St Vincent's Hospital	Department of Rheumatology	Dr Clemens
<b><i>An open-label multicentre study of Anakinra (Kineret™) in combination with DMARDs in subjects with active rheumatoid arthritis.</i></b>		
University of Melbourne	Office for Gender and Health	Professor Lorraine Dennerstein
<b><i>Osteoarthritis, menopause and aging.</i></b>		

**(ii) Research Projects Recommended for Approval by the Committee Subject to Modifications or Further Information**

LICENSEE	RESEARCH WORK LOCATION	PRINCIPAL RESEARCHER
<b><i>RESEARCH PROJECT TITLE</i></b>		
Barwon Health –The Geelong Hospital	Cardiology Department	Dr John Amarena
<b><i>A randomized, double-blind, placebo-controlled trial comparing clopidogrel plus acetylsalicylic acid (ASA) versus ASA alone in subjects with acute ST elevation myocardial infarction (STEMI) treated with fibrinolytic therapy (CLARITY TIMI 28).</i></b>		
Barwon Health –The Geelong Hospital	Radiotherapy Department	Dr Stephen Hughes
<b><i>The effect of organ motion on radiotherapy plans.</i></b>		
Box Hill Hospital		Dr Helmut Butzkueven, Director of Neuroscience
<b><i>A randomized, double-blind, placebo-controlled, fixed-flexible-dose, parallel-group, multicentre study to determine the dose and the safety, tolerability, and preliminary efficacy of CCI-779 in subjects with relapsing multiple sclerosis.</i></b>		
Box Hill Hospital		Dr Richard Simpson
<b><i>A phase III, randomised, double-blind, placebo controlled, multicentre trial to evaluate the safety and efficacy of BMS-298585 as monotherapy in subjects with type 2 diabetes who have inadequate glycemc control.</i></b>		
Box Hill Hospital & Southern Health – Monash Medical Centre	Department of Medicine  Diabetes Unit	Dr Richard Simpson  Associate Professor Richard O’Brien
<b><i>A 24 month multicentre, open-label, randomised, parallel group, long term safety trial comparing intensive treatment of pulmonary inhaled human insulin with insulin aspart administered s.c., both in combination with NPH, in subjects with type 1 diabetes (NN1998-1496).</i></b>		

<b>(ii) Research Projects Recommended for Approval by the Committee Subject to Modifications or Further Information</b>		
<b>LICENSEE</b>	<b>RESEARCH WORK LOCATION</b>	<b>PRINCIPAL RESEARCHER</b>
<b><i>RESEARCH PROJECT TITLE</i></b>		
Box Hill Hospital	Department of Neurology	Associate Professor Chris Bladin
<b><i>ICSS - International carotid stenting study version 2.</i></b>		
Box Hill Hospital	Department of Gastroenterology	Professor Peter Gibson & Sue Shepherd (PhD student)
<b><i>Role of the gluten free diet in health of people with Coeliac disease.</i></b>		
Box Hill Hospital	Director of Neurosciences	Associate Professor Chris Bladin
<b><i>Aventis Enoxaparin study XRP4563H/4001. An open-label, randomised, parallel-group, multi-centre study to evaluate the efficacy and safety of Enoxaparin versus unfractionated Heparin in the prevention of venous thrombolism in patients following acute ischaemic stroke.</i></b>		
Bristol-Myers Squibb (sponsoring company on behalf of the licensee.)		
<b><i>A phase III, randomized, double-blind, active controlled, multicentre trial to evaluate the safety and efficacy of BMS-298585 in combination with metformin compared to pioglitazone in combination with metformin subjects with type 2 diabetes who have inadequate glycaemic control on metformin therapy alone.</i></b>		
Deakin University, Burwood		Ms Kate Singleton and Dr Shona Bass
<b><i>Does the golf swing facilitate an osteogenic response at the spine in postmenopausal women?</i></b>		

**(ii) Research Projects Recommended for Approval by the Committee Subject to Modifications or Further Information**

LICENSEE	RESEARCH WORK LOCATION	PRINCIPAL RESEARCHER
<b>RESEARCH PROJECT TITLE</b>		
Royal Melbourne Hospital		Associate Professor Rowan Walker Dr Kathy Nicholls, Dr Ian Fraser and Dr Shlomo Cohney
<i>Protocol number: CFTY7200124. A one-year, multicentre, partially blinded, double-dummy, randomised study to evaluate the efficacy and safety of FTY720 combined with reduced-dose or full-dose Neoral<sup>®</sup> and corticosteroids versus mycophenolate mofetil (MMF, CellCept<sup>®</sup>) combined with full-dose Neoral<sup>®</sup> and corticosteroids, in de novo adult renal transplant recipients.</i>		
Royal Melbourne Hospital	Department of Nephrology	Dr Lawrence McMahon
<i>Effects of uraemia on skeletal muscle ion regulation, metabolism and exercise performance.</i>		
Royal Melbourne Hospital	Department of Neurosurgery	Mr John Laidlaw
<i>Familial Intracranial Aneurysm (FIA) study.</i>		
Royal Melbourne Hospital	Department of Orthopaedics	Professor Stephen Graves
<i>Orthopaedic work station. The testing of a computerised system for pre-operative planning of primary total joint replacement of the hip.</i>		
Royal Melbourne Hospital	Department of Colorectal Medicine & Genetics	Professor Finlay Macrae and Dr Damien Stella
<i>A comparison of screening tests for colorectal neoplasia in average risk asymptomatic subjects.</i>		
Royal Melbourne Hospital	Department of Medicine	Associate Professor Joseph Proietto
<i>A phase IIb, randomised, double-blind, placebo-controlled study to assess the efficiency, safety and tolerability of 12 weeks treatment with AOD9604 on weight and fat loss in obese adults.</i>		

<b>(ii) Research Projects Recommended for Approval by the Committee Subject to Modifications or Further Information</b>		
<b>LICENSEE</b>	<b>RESEARCH WORK LOCATION</b>	<b>PRINCIPAL RESEARCHER</b>
<b>RESEARCH PROJECT TITLE</b>		
Southern Health – Monash Medical Centre		Associate Professor Geoff Littlejohn
<i>13 week, multicentre, randomised, double-blind, double-dummy, placebo-controlled, parallel trial of 2 different doses of lumiracoxib (100 mg od and 200 mg od initial dose for two weeks followed by 100 mg od) in patients with knee osteoarthritis, using celecoxib (200 mg od) as a comparator.</i>		
Southern Health – Monash Medical Centre		Associate Professor Geoff Littlejohn,
<i>A phase II, randomized, double-blind study to evaluate the effects of MEDI-522, a humanized monoclonal antibody to integrin alpha V beta 3, disease activity and progression of joint damage in patients with active rheumatoid arthritis suboptimally responding to methotrexate.</i>		
Southern Health – Monash Medical Centre	Department of Surgery	Mr Simon Bell
<i>CT follow-up of anterior stabilization using bio absorbable suture anchors.</i>		
St. Vincent’s Hospital		Dr Craig Mills & Dr John O’Donnell
<i>A prospective, randomized, single centre clinical study to evaluate the Stryker Knee Navigation system during total knee arthroplasty.</i>		
St. Vincent’s Hospital	Department of Gastroenterology	Dr William Connell
<i>A randomised, placebo-controlled, double-blind trial to evaluate the safety and efficacy of infliximab in patients with active ulcerative colitis.</i>		
St. Vincent’s Hospital	Department of Gastroenterology	Dr William Connell
<i>A multi-centre, randomised, double-blind, placebo-controlled study of the human anti-TNF monoclonal antibody adalimumab for the induction and maintenance of clinical remission in subjects with Crohn’s disease.</i>		

**(ii) Research Projects Recommended for Approval by the Committee Subject to Modifications or Further Information**

LICENSEE	RESEARCH WORK LOCATION	PRINCIPAL RESEARCHER
<b>RESEARCH PROJECT TITLE</b>		
St. Vincent's Hospital	Department of Rheumatology	Dr Laurie Clemens
<b><i>ZEST Study (S-NON-00017): Phase II study on analgesic efficacy, safety and tolerability of AZD3582: a 6 week double-blind, randomised, placebo controlled, dose-finding, multi-centre study comparing AZD3582 with Rofecoxib (VIOXX) in subjects with osteoarthritis of the hip and knee.</i></b>		
University of Melbourne	Centre for Sports Medicine, Research and Education	Associate Professor Kim Bennell
<b><i>Neuromuscular and biomechanical characteristics in individuals with and without osteoporotic vertebral fracture.</i></b>		
University of Melbourne	Centre for Sports Medicine, Research and Education	Associate Professor Kim Bennell
<b><i>The neurobiology of essential hypertension: pathophysiological mechanisms of increased sympathetic activity in hypertensive subjects.</i></b>		
University of Melbourne at Barwon Health - The Geelong Hospital	Department School of Physiotherapy	Associate Professor Kim Bennell
<b><i>Improving exercise prescription for postmenopausal women at risk of osteoporosis.</i></b>		

**(iii) Research Projects Rejected by the Committee**

LICENSEE

RESEARCH WORK  
LOCATIONPRINCIPAL  
RESEARCHER***RESEARCH PROJECT TITLE***

There were no research projects rejected by the Committee during the period covered by this annual report.

**(iv) Research Projects Submitted that did not Require Committee Approval**

LICENSEE	RESEARCH WORK LOCATION	PRINCIPAL RESEARCHER
<b>RESEARCH PROJECT TITLE</b>		
Barwon Health – The Geelong Hospital	Geelong Cardiology Research Unit	Dr John Amerena & Dr Martin Sebastian
<i>A double-blind, randomised, placebo controlled, parallel-group, multicentre, phase III study to assess the impact of rosuvastatin treatment for 26 weeks (titrated to a maximum dose of 40 mg once daily) on left ventricular function, cytokines and lipid parameters in patients with established systolic chronic heart failure.</i>		
Kendle International	Box Hill Hospital, Maroondah Hospital, The Avenue Hospital, The Masada Hospital and Barwon Health - Geelong Hospital	Ms Melissa Sullivan
<i>ThromboEMbolism Prevention Efficacy and Safety Trial (TEMPEST): A double-blind four week study to assess the efficacy, safety and tolerability of SB-424323 in the extended prophylaxis of patients following total hip arthroplasty.</i>		
Peter MacCallum Cancer Institute		Ms Angie Dobbrick
<i>A pilot study to examine swallowing function in people with head and neck cancer.</i>		
Royal Children's Hospital	Cystic Fibrosis Clinic	Associate Professor Philip Robinson and Dr Heather Elphick
<i>Comparison of techniques for imaging in children with portacaths for cystic fibrosis.</i>		
Royal Children's Hospital	Department of Neonatology	Dr Peter Dargaville and Dr John Mills
<i>A multicentre randomised controlled trial of therapeutic lung lavage in ventilated infants with meconium aspiration syndrome.</i>		

**(iv) Research Projects Submitted that did not Require Committee Approval**

LICENSEE	RESEARCH WORK LOCATION	PRINCIPAL RESEARCHER
<b><i>RESEARCH PROJECT TITLE</i></b>		
Royal Women's Hospital	Department of Urogynaecology	Dr Marcus Carey
<b><i>A randomised controlled trial comparing the implanted sacral nerve stimulator device with conservative treatment for severe and refractory lower urinary tract symptoms and faecal incontinence.</i></b>		
Royal Melbourne Hospital	Department of Respiratory Medicine	Dr Abe Rubinfeld
<b><i>Effect of Roflumilast on exacerbation rate in patients with chronic obstructive pulmonary disease. A 52 weeks double-blind study with 500 mcg Roflumilast once a daily versus placebo.</i></b>		
Southern Health – Monash Medical Centre		Dr Andrew Strickland
<b><i>A phase III randomised study of Cetuximab (Erbix, C225) and best supportive care in patients with pre-treated, metastatic epidermal growth factor receptor (EGFR) - Positive Colorectal Carcinoma.</i></b>		
St. Vincent's Hospital	Department of Endocrinology	Associate Professor Dr K W Ng
<b><i>SOTI and TROPOS Phase III Studies open-Labelled EXTENSION. The long term efficacy and long term safety assessment of a three-year oral administration of S12911 in osteoporotic postmenopausal women having participated either to Spinal Osteoporosis Therapeutic Intervention 'SOTI' study or to treatment of Peripheral Osteoporosis 'TROPOS' study. A three-year multicentre multinational open study with S12911.</i></b>		

## APPENDIX 2a

## NUMBER OF OPERATOR LICENCES AS OF 30 SEPTEMBER 2003

<b>LEGEND</b>	
LICENSED :	Approved and current licence.
UNLICENSED :	Licences approved but pending payment and licence applications awaiting approval.

<b>BOREHOLE LOGGERS</b>		
	LICENSED	UNLICENSED
SEALED RADIOACTIVE SOURCES	22	16
IRRADIATING (X-RAY) & SEALED RADIOACTIVE SOURCES	3	0
	25	16

<b>CARDIOLOGISTS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	54	10
UNSEALED RADIOACTIVE SOURCES	1	0
	55	10

<b>CARDIOLOGIST and RESEARCH</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY) & UNSEALED RADIOACTIVE SOURCES	1	0

<b>CHIROPRACTORS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	235	38

<b>DENTISTS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	2079	117

<b>DENTAL HYGIENISTS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	80	8

<b>DENTAL THERAPISTS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	187	17

<b>DENTAL THERAPIST and DENTAL HYGIENIST</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	15	0

<b>DERMATOLOGISTS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	3	2

<b>GENERAL PRACTITIONERS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	228	55

<b>INDUSTRIAL RADIOGRAPHERS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	66	23
SEALED RADIOACTIVE SOURCES	13	0
IRRADIATING (X-RAY) & SEALED RADIOACTIVE SOURCES	189	19
	268	42

<b>PORTABLE MOISTURE and/or DENSITY GAUGE OPERATORS</b>		
	LICENSED	UNLICENSED
SEALED RADIOACTIVE SOURCES	258	47

<b>NUCLEAR MEDICINE SPECIALISTS</b>		
	LICENSED	UNLICENSED
UNSEALED RADIOACTIVE SOURCES	33	0
IRRADIATING (X-RAY) & SEALED RADIOACTIVE SOURCES	1	0
SEALED & UNSEALED RADIOACTIVE SOURCES	1	0
IRRADIATING (X-RAY) & UNSEALED RADIOACTIVE SOURCES	2	0
	37	0

<b>OPHTHALMOLOGISTS</b>		
	LICENSED	UNLICENSED
SEALED RADIOACTIVE SOURCES	19	1
SEALED & UNSEALED RADIOACTIVE SOURCES	2	0
	21	1

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<b>OTHER MEDICAL SPECIALISTS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	30	7
UNSEALED RADIOACTIVE SOURCES	2	1
	32	8

<b>OTHER PARAMEDICAL</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	22	13
UNSEALED RADIOACTIVE SOURCES	6	1
	28	14

<b>RADIATION CONSULTANTS</b>		
	LICENSED	UNLICENSED
SEALED RADIOACTIVE SOURCES	0	3
SEALED & UNSEALED RADIOACTIVE SOURCES	5	1
IRRADIATING (X-RAY), SEALED & UNSEALED RADIOACTIVE SOURCES	1	0
	6	4

<b>RADIATION ONCOLOGISTS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	5	0
SEALED RADIOACTIVE SOURCES	1	0
IRRADIATING (X-RAY) & SEALED RADIOACTIVE SOURCES	23	1
IRRADIATING (X-RAY), SEALED & UNSEALED RADIOACTIVE SOURCES	23	0
	52	1

<b>RADIOLOGISTS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	242	18
IRRADIATING & UNSEALED RADIOACTIVE SOURCES	41	1
	283	19

<b>RADIOLOGIST and NUCLEAR MEDICINE SPECIALIST</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY) & UNSEALED RADIOACTIVE SOURCES	25	0

<b>RESEARCH WITH HUMAN VOLUNTEERS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	34	12
SEALED RADIOACTIVE SOURCES	1	0
UNSEALED RADIOACTIVE SOURCES	9	4
SEALED & UNSEALED RADIOACTIVE SOURCES	1	0
	45	16

<b>SERVICE TECHNICIANS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	135	39
SEALED RADIOACTIVE SOURCES	37	12
IRRADIATING (X-RAY) & SEALED RADIOACTIVE SOURCES	40	2
IRRADIATING (X-RAY), SEALED & UNSEALED RADIOACTIVE SOURCES	5	0
	217	53

<b>SERVICE TECHNICIAN and INDUSTRIAL RADIOGRAPHER</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY) & SEALED RADIOACTIVE SOURCES	1	0

<b>SERVICE TECHNICIAN and TESTER</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	1	1
SEALED RADIOACTIVE SOURCES	1	0
SEALED & UNSEALED RADIOACTIVE SOURCES	1	0
	3	1

<b>TESTERS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	25	2
SEALED RADIOACTIVE SOURCES	3	0
IRRADIATING (X-RAY) & SEALED RADIOACTIVE SOURCES	39	1
IRRADIATING (X-RAY), SEALED & UNSEALED RADIOACTIVE SOURCES	4	1
	71	4

<b>VASCULAR SURGEON</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	21	7

<b>VETERINARY SURGEONS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	623	33
SEALED RADIOACTIVE SOURCES	0	2
IRRADIATING (X-RAY) & SEALED RADIOACTIVE SOURCES	13	0
IRRADIATING (X-RAY) & UNSEALED RADIOACTIVE SOURCES	10	0
IRRADIATING (X-RAY), SEALED & UNSEALED RADIOACTIVE SOURCES	1	0
	<b>647</b>	<b>35</b>

<b>VETERINARIAN and DENTIST</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	1	0

<b>OVERALL TOTALS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	4086	402
SEALED RADIOACTIVE SOURCES	355	81
UNSEALED RADIOACTIVE SOURCES	51	6
IRRADIATING (X-RAY) & SEALED RADIOACTIVE SOURCES	309	23
SEALED & UNSEALED RADIOACTIVE SOURCES	10	1
IRRADIATING (X-RAY) & UNSEALED RADIOACTIVE SOURCES	79	1
IRRADIATING (X-RAY), SEALED & UNSEALED RADIOACTIVE SOURCES	34	1
<b>TOTALS</b>	<b>4924</b>	<b>515</b>

Note: Medical Imaging Technologists, Radiation Therapists and Nuclear Medicine Technologists are now registered with the Medical Radiation Technologists Board.

## APPENDIX 2b

## NUMBER OF REGISTRATIONS AS OF 30 SEPTEMBER 2003

**LEGEND**

REGISTERED : Approved and current registration.

UNREGISTERED : Registrations approved but pending payment and registration applications awaiting approval.

<b>BONE MINERAL DENSITOMETRY</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	59	4

<b>BOREHOLE LOGGING</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	1	0
SEALED RADIOACTIVE SOURCE	24	0
	25	0

<b>CABINET X-RAY EQUIPMENT</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	64	7

<b>CALIBRATION</b>		
	REGISTERED	UNREGISTERED
SEALED RADIOACTIVE SOURCE	111	21

<b>CHIROPRACTOR</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	59	10

<b>CONDENSOR DISCHARGE X-RAY UNITS</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	118	5

<b>INDUSTRIAL RADIOGRAPHY CRAWLER GUIDE SOURCES</b>		
	REGISTERED	UNREGISTERED
SEALED RADIOACTIVE SOURCE	17	3

<b>CT SCANNER</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	140	8

<b>CYCLOTRON</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	3	0

<b>DERMATOLOGY</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	1	0
SEALED RADIOACTIVE SOURCE	1	0
	2	0

<b>DENTAL</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	2073	106

<b>FIXED RADIOGRAPHY</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	405	34

<b>FIXED RADIOSCOPY</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	188	12

<b>GAS CHROMATOGRAPH - ELECTRON CAPTURE DETECTOR</b>		
	REGISTERED	UNREGISTERED
SEALED RADIOACTIVE SOURCE	48	20

<b>INDUSTRIAL RADIOGRAPHY</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	77	14
SEALED RADIOACTIVE SOURCE	49	6
	126	20

<b>IRRADIATION CELL</b>		
	REGISTERED	UNREGISTERED
SEALED RADIOACTIVE SOURCE	3	0

<b>LABORATORY IRRADIATOR</b>		
	REGISTERED	UNREGISTERED
SEALED RADIOACTIVE SOURCE	8	0

<b>LINEAR ACCELERATOR</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	34	0

<b>LITHOTRIPTER</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	3	2

<b>MAMMOGRAPHY</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	160	3

<b>MOBILE IMAGE INTENSIFIER</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	148	9

<b>MOBILE PLAIN RADIOGRAPHY</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	57	2

<b>MEDICAL (GENERAL PRACTITIONER)</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	39	8

<b>NUCLEAR MOISTURE and/or DENSITY GAUGE</b>		
	REGISTERED	UNREGISTERED
SEALED RADIOACTIVE SOURCE	152	14

<b>ORTHOPANTOMOGRAPHIC and/or CEPHALOMETRIC X-RAY</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	232	18

<b>OPHTHALMOLOGY</b>		
	REGISTERED	UNREGISTERED
SEALED RADIOACTIVE SOURCE	15	5

<b>OTHER INDUSTRIAL</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	18	1
SEALED RADIOACTIVE SOURCE	81	14
	99	15

<b>OTHER MEDICAL</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	7	0
SEALED RADIOACTIVE SOURCE	13	2
	20	2

<b>RADIATION GAUGE</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	11	1
SEALED RADIOACTIVE SOURCE	398	12
	409	13

<b>RADIOTHERAPY</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	9	1
SEALED RADIOACTIVE SOURCE	16	2
	25	3

<b>RESEARCH</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	7	1
SEALED RADIOACTIVE SOURCE	27	1
	34	2

<b>TEACHING</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	14	5
SEALED RADIOACTIVE SOURCE	52	31
	66	36

<b>THERAPY SIMULATOR</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	7	0

<b>VETERINARY</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	379	23
SEALED RADIOACTIVE SOURCE	5	1
	384	24

<b>VETERINARY DENTAL</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	10	1

<b>X-RAY ANALYSIS</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	60	4

<b>OVERALL TOTALS</b>		
	REGISTERED	UNREGISTERED
IRRADIATING (X-RAY)	4383	279
SEALED RADIOACTIVE SOURCE	1020	132
<b>TOTALS</b>	<b>5403</b>	<b>411</b>

## APPENDIX 2c

## NUMBER OF COMPANY / INSTITUTION LICENCES AS OF 30 SEPTEMBER 2003

<b>LEGEND</b>		
LICENSED : Approved and current licence.		
UNLICENSED : Licences approved but pending payment and licence applications awaiting approval.		

<b>EDUCATION AND RESEARCH</b>		
	LICENSED	UNLICENSED
UNSEALED RADIOACTIVE SOURCES	37	3

<b>GOVERNMENT DEPARTMENTS</b>		
	LICENSED	UNLICENSED
UNSEALED RADIOACTIVE SOURCES	3	3

<b>HOSPITAL</b>		
	LICENSED	UNLICENSED
UNSEALED RADIOACTIVE SOURCES	15	0

<b>INDUSTRIAL</b>		
	LICENSED	UNLICENSED
UNSEALED RADIOACTIVE SOURCES	9	1

<b>MANUFACTURE AND POSSESSION OF SEALED RADIOACTIVE SOURCE DEVICE</b>		
	LICENSED	UNLICENSED
SEALED RADIOACTIVE SOURCES	1	0

<b>MANUFACTURER OF APPROVED IRRADIATING APPARATUS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	0	0

<b>NUCLEAR MEDICINE</b>		
	LICENSED	UNLICENSED
UNSEALED RADIOACTIVE SOURCES	51	2

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<b>OTHER LABORATORY</b>		
	LICENSED	UNLICENSED
UNSEALED RADIOACTIVE SOURCES	1	0

<b>OTHER MEDICAL</b>		
	LICENSED	UNLICENSED
UNSEALED RADIOACTIVE SOURCES	0	0

<b>PATHOLOGY</b>		
	LICENSED	UNLICENSED
UNSEALED RADIOACTIVE SOURCES	9	0

<b>RADIOTHERAPY</b>		
	LICENSED	UNLICENSED
UNSEALED RADIOACTIVE SOURCES	2	0

<b>RESEARCH WITH HUMAN VOLUNTEERS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY), SEALED & UNSEALED RADIOACTIVE SOURCES	17	1

<b>SALES</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	45	4
SEALED RADIOACTIVE SOURCES	54	9
UNSEALED RADIOACTIVE SOURCES	17	1
IRRADIATING (X-RAY) & SEALED RADIOACTIVE SOURCES	10	1
SEALED & UNSEALED RADIOACTIVE SOURCES	2	0
	128	15

<b>TRANSPORT (GENERAL)</b>		
	LICENSED	UNLICENSED
TRANSPORT	15	5

<b>TRANSPORT (LOW LEVEL WASTE)</b>		
	LICENSED	UNLICENSED
TRANSPORT	6	0

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<b>VETERINARY</b>		
	LICENSED	UNLICENSED
UNSEALED RADIOACTIVE SOURCES	9	0

<b>OVERALL TOTALS</b>		
	LICENSED	UNLICENSED
IRRADIATING (X-RAY)	45	4
SEALED RADIOACTIVE SOURCES	55	9
UNSEALED RADIOACTIVE SOURCES	153	10
IRRADIATING (X-RAY) & SEALED RADIOACTIVE SOURCES	10	1
IRRADIATING (X-RAY) & UNSEALED RADIOACTIVE SOURCES	2	0
IRRADIATING (X-RAY), SEALED & UNSEALED RADIOACTIVE SOURCES	17	1
TRANSPORT	21	5
<b>TOTALS</b>	<b>303</b>	<b>30</b>

## ABBREVIATIONS AND DEFINITIONS

<b>ACA</b> Australian Communications Authority	<b>ELF</b> extremely low frequency
<b>ACPSEM</b> Australasian College of Physical Scientists and Engineers in Medicine	<b>EME</b> electromagnetic energy
<b>AIR</b> Australian Institute of Radiography	<b>EMF</b> electromagnetic frequency
<b>ALARA</b> as low as reasonably achievable	<b>EMR</b> electromagnetic radiation
<b>ANSTO</b> Australian Nuclear Science and Technology Organisation	<b>EPA</b> Environment Protection Authority
<b>ARPANSA</b> Australian Radiation Protection and Nuclear Safety Agency	<b>GBq</b> gigabecquerel, a unit of radioactivity (1 GBq = 1,000 000 000 Bq).
<b>ARPS</b> Australasian Radiation Protection Society	<b>GeV</b> gigaelectron volts (1 GeV = 1,000 000 000 eV). The electron volt is a unit of energy. The energy required to move an electron through a potential difference of 1 volt.
<b>Bq</b> becquerel, a unit of radioactivity (1 Bq = 1 disintegration per second)	<b>GHz</b> gigahertz, a unit of frequency (1 GHz = 1,000,000,000 Hz)
<b>CDMA</b> code division multiple access	<b>GP</b> general practitioner
<b>cps</b> counts per second	<b>GM</b> gieger-müller
<b>CT</b> computed tomography	<b>GSM</b> Global system for mobile communication. A digital mobile telephone system.
<b>DAECA</b> Dental Assistants Education Council of Australia	<b>Hz</b> hertz, a unit of frequency (1 Hz = 1 cycle/second)
<b>DEXA</b> dual energy X-ray absorptiometry	

**IAEA**

International Atomic Energy Agency

**ICNIRP**

International Commission on Non-Ionizing Radiation Protection

**ICRP**

International Commission on Radiological Protection

**IEC**

International Electrotechnical Commission

**IFN**

intratemporal facial nerve

**ImPACT**

Imaging Performance Assessment of CT scanners. A radiation dose spreadsheet developed by ImPACT group, the UK's CT scanner evaluation centre, funded by the Medicines and Healthcare products Regulatory Agency (MHRA). <[www.impactscan.org](http://www.impactscan.org)>.

**ISO**

International Organisation for Standardisation

**kBq**

kilobecquerel (1 kBq = 1,000 Bq)

**keV**

kiloelectron volts (1 keV = 1,000 eV). The electron volt is a unit of energy. The energy required to move an electron through a potential difference of 1 volt.

**kV**

kilovolt (1 kV = 1,000 V)

**MBq**

megabecquerel (1 MBq = 1,000,000 Bq)

**μGy**

microgray, a unit of absorbed dose (1 μGy = 0.000,001 Gy)

**μSv**

microsievert, a unit of equivalent and effective dose (1 μSv = 0.000,001 Sv)

**μT**

microtesla, a unit of magnetic flux density (1 μT = 10 mG)

**MHz**

megahertz, a unit of frequency (1 MHz = 1,000,000 Hz)

**mG**

milligauss, a unit of magnetic flux density (1 mG = 0.001 G)

**mGy**

milligray, a unit of absorbed dose (1 mGy = 0.001 Gy)

**MIT**

medical imaging technologist

**mSv**

millisievert, a unit of equivalent and effective dose (1 mSv = 0.001 Sv)

**mT**

millitesla, a unit of magnetic flux density (1 mT = 10 G)

**MRTB**

Medical Radiation Technologists Board

**NATA**

National Association of Testing Authorities

**NCRP**

National Council on Radiation Protection and Measurements

**NHMRC**

National Health & Medical Research Council

**NIR**

non-ionizing radiation

**NMT**

nuclear medicine technologist

**NORM**

naturally occurring radioactive materials

**NRPB**

National Radiation Protection Board (UK)

**OPG**

orthopantograph

**PET**

positron emission tomography

**RAC**

Radiation Advisory Committee

**RANZCR**

Royal Australian and New Zealand College of Radiologists

**RF**

radiofrequency

**RMIT**

Royal Melbourne Institute of Technology

**RSO**

radiation safety officer

**RSP**

Radiation Safety Program (Department of Human Services)

**SI**

Système International d'Unités is a coherent system of units of measurements developed from the MKSA (metre-kilogram-second-ampere) system.

**Sv**

sievert, the special name given to the equivalent and effective dose unit,  $J\ kg^{-1}$

**TLD**

thermoluminescent dosimeter

**V/m**

volts/metre, a unit of electric field

**W/kg**

Watts per kilogram - a unit the amount of absorption of radiofrequency radiation energy.

**WHO**

World Health Organisation