Foreword

In May 2005 I had the great honour to be appointed as Surgeon General Australian Defence Force (SGADF). I would like to extend my appreciation to the outgoing Chair, Air Vice-Marshal Bruce Short, for the dedication and skill which he displayed in the management of the diverse ethical issues which confront us in Defence research.

As a Human Research Ethics Committee registered with the National Health and Medical Research Council (NHMRC), the Australian Defence Human Research Ethics Committee (ADHREC) is responsible for providing ethical oversight and approval for human research conducted within the Australian Defence Force (ADF).

Such research is increasingly diverse in scope, being conducted under the auspices of health organisations both within Australia and overseas, foreign Defence Forces, Universities, individuals and the ADF’s own specialist areas. One such area, the Army Malaria Institute (AMI), is a centre of excellence for research into arboviruses. It contributes specialist knowledge and personnel to analysis of disease types, new vaccine development, epidemiology and treatment regimes. AMI’s contribution plays a vital part in reducing the morbidity and mortality of diseases such as malaria, dengue fever and Japanese Encephalitis. Its outreach to the Vietnam Peoples Army (VPA) and the Papua New Guinea Defence Force involves ongoing specialist contributions with the aim of reducing the impact of these deadly diseases on world populations, as well as ADF personnel deployed to areas where the diseases are endemic.

Ethics is central to good research practice and to protecting the rights and freedoms of ADF personnel. ADHREC is fortunate to have a distinguished committee with a diverse range of backgrounds. This diversity enables all aspects of research projects to be carefully considered before granting approval for research to begin. I would like to thank all the members of ADHREC for their professionalism and dedication in considering the many research projects in 2005-6. I would also like to thank the Executive Secretariat for the hard work and dedication in the correlation of the materials relating to the research projects and the organisation of the documents. This is critical to the efficient conduct of each committee meeting.

With each passing year the number of research projects considered increases as well as the complexity and scope of the research. I look forward to another challenging year in 2006-7. I commend this report to its readers.

G.S. SHIRTLEY  RFD
Rear Admiral, RANR
Chair,
Australian Defence Human Research Ethics Committee
Rear Admiral (RADM) Graeme Shirtley, is the Surgeon General of the Australian Defence Force (SGADF). His role is to support the Head Defence Health Services in the leadership and management of the Defence Health Service Division (DHSD), chair the Australian Defence Human Research Ethics Committee (ADHREC) and advise the Head DHS and the Deputy Secretary Defence Support on all matters affecting Health Reserves. In conjunction with the Assistant Surgeons General, he facilitates outreach into the civilian health community.


RADM Shirtley was admitted as a Fellow of the Royal Australian and New Zealand College of Radiologists in 1980. He practises in Sydney as a specialist radiologist with interest in CT and musculoskeletal radiology. He was a senior Visiting Medical Officer for the Sydney Central and Eastern Breast screening program from 1990-2001.

RADM Graeme Shirtley has completed 36 years of continuous service in the Australian Defence Force.

Since 1994 he has been a Visiting Lecturer to the Department of Radiology, National Naval Medical Center Bethesda Maryland USA. In 1998 he was also guest lecturer at the Uniformed Services University of Health Sciences Washington DC. RADM Shirtley was awarded the United States Navy and Marine Commendation Medal, and the US Navy Achievement Medal, in recognition of teaching provided during these postings. He was appointed as Adjunct Assistant Professor of Radiology and Nuclear Medicine at the Uniformed Services University of the Health Sciences Bethesda Maryland USA in 2002.

RADM Shirtley is a member of the Radiological Society of North America and is a member of the Australian Medical Association. He was awarded the Reserve Force Decoration (RFD) in 1986 and a Flag Officers Commendation in 1992. RADM Shirtley presently serves as an Adjunct Associate Professor at the University of Queensland Centre for Military and Veterans Health. He is a Patron of Australian Military Medicine Association and was appointed as a member of the International Committee of the Association of Military Surgeons of the United States, 2006.

RADM Shirtley was appointed Assistant Surgeon General (Navy) in September of 2002 and was subsequently appointed SGADF and promoted to RADM in 2005.

He resides in Sydney with his wife, and their three children. His special leisure interests are golf, sailing, tennis, and windsurfing.
Professor Pearn has been a member of the Australian Defence Human Research Ethics Committee since 1990, and its Chair during 1998 until December 2000. During his Service career of 35 years, Professor Pearn has served in a number of Medical Officer, Command and non-regimental positions in Australia, the United Kingdom and Papua New Guinea.

He served on operational duty during the Indonesian Confrontation (1966), as the physician to the Australian and New Zealand Forces during the Vietnam Campaign (1970) and with the United Nations Assistance Mission in Rwanda (1994-1995) Forward Surgical Team. He served as the Defence Platoon Commander with the Royal Green Jackets (UK); and as Regimental Medical Officer with Parachute Regiment (UK) in 1972-1974.

He has published extensively in the area of military medicine and military history. In his civilian life, Professor Pearn is the Professor of Paediatrics and Child Health (University of Queensland) and a former Surgeon General of the Australian Defence Force. He is a Senior Paediatric Consultant at the Royal Children’s and Mater Children’s Hospitals in Brisbane and Honorary Consultant in Paediatrics and Genetics to the Royal Women’s Hospital, also in Brisbane. He is an Honorary Life Member of the Human Genetics Society of Australasia of which he is a past president. Professor Pearn is Preceptor, School of Medicine at the University of Queensland and also an Honorary Colonel in the Queensland University Regiment. He is the author of some 500 papers on clinical medicine and medical research in international refereed literature, the author of 24 books and of some 68 chapters in medical textbooks in international medical literature. He has a special interest in medical ethics and for his work in this field was created a Fellow of Green College, the University of Oxford.

Professor John H. Pearn, AM, RFD
Member
Colonel Warfe is a specialist public health and tropical medicine physician with significant experience in occupational and preventive medicine at national and international levels. He is an authority on military and preventive medicine, emergency health intervention strategies in responding to national disasters, and implementation of humanitarian support services, and has been responsible for the operational and humanitarian health support plans for numerous successful missions. He is a Graduate of the Army's Command and Staff College. Colonel Warfe is an Assistant Professor of Military and Emergency Medicine in the USA. He was awarded the Conspicuous Service Cross as the Senior Medical Officer, United Nations Assistance Mission to Rwanda. Colonel Warfe was the senior consultant preventive medicine physician to the United Nations Transitional Authority East Timor. Colonel Warfe has been Director of Environmental Medicine, Occupational Health and Safety, Operational Health Policy and Development, and Clinical Policy Directorates in Australian Defence Headquarters. He is the Chair of the Defence Public Health Medicine Consultative Group. Colonel Warfe is a recognised author of numerous occupational and preventive medicine publications. He is a Fellow of the Faculty of Public Health Medicine, Fellow of the Australian College of Tropical Medicine, Member of the Royal Australian College of Medical Administrators, Fellow of the Australian College of Psychological Medicine, Vocationally registered General Practitioner. He is the Vice President of the ACT Division of General Practice, a member of the United Nations Advisory Committee on Traumatic Stress Syndromes, the Director of Training and Chairman of the Medical Research Ethics Committee, St John Ambulance Australia. Colonel Warfe has been a member of the Australian Defence Human Research Ethics Committee since 1998. Colonel Warfe is currently the Managing Director of the Preventive Medicine and Rehabilitation Centre, Deakin ACT and a Consultant in Public Health Medicine to the Australian Medical Association.
Chief Justice Terence Higgins is a resident Judge of the Supreme Court of the Australian Capital Territory and a Judge of the Federal Court of Australia, being appointed on 2 July 1990. He was born in Hobart, Tasmania but was educated at St Augustine’s Christian Brothers College in Yarraville, Victoria and later, at St Edmund’s College, Canberra and the Australian National University, Canberra. He was admitted as a barrister and solicitor in the ACT in 1967 and served at the Bar as Queen’s Counsel (ACT, NSW and Victoria) from 1987 to 1990. He was Vice President of the ACT Bar Association from 1988 until his judicial appointment in 1990. Chief Justice Higgins first began practising law with J.J. O’Neill, Solicitor, in 1967 and remained there until 1971 when he became a partner in the law firm Higgins, Faulks & Martin (formerly Higgins & Faulks). In 1981 that firm became Higgins Solicitors and he remained a partner until 1984 when he went to the ACT Bar.

Chief Justice Higgins was until 2003 the National President of the Royal Life Saving Society of Australia (appointed 1997), Chairman of the Open Family Foundation ACT (as well as a National Board member), and Member of the Australian Academy of Forensic Sciences ACT Chapter. In the past, Chief Justice Higgins has been involved in many varied committees and associations including Chair of the ACT Community Law Reform Committee (1994-96), Senior Member of the ACT Gaming and Liquor Authority (1987-90) and President, Senior Common Room of the John XXIII College ANU (1993-95). Widowed, with five children and residing in the Australian Capital Territory, Justice Higgins enjoys squash, chess, reading, tennis and bridge. Chief Justice Higgins was appointed to ADHREC in 1993 and has served on the Committee continuously since. He was appointed Chief Justice of the ACT on 31 January 2003.
Mr Dillon was born in Sydney, and spent most of his childhood in Sydney and the Blue Mountains. Mr Dillon graduated from Wagga Wagga Teachers College and, after completing compulsory National Service in the Army, taught in the Snowy Mountains, Cooma, Mittagong, North West NSW and Tenterfield. After completing a Bachelor’s Degree at the University of New England, Mr Dillon spent over 20 years in the ACT Schools Authority, both in Schools and Schools Office positions. During that period Mr Dillon held a number of professional and community positions including President of the ACT Primary Principals’ Association and President of the Australian Primary Principals’ Association, representing over 7,000 Government and non-Government schools throughout Australia. He also was the foundation President of Belconnen Soccer Club and Canberra City Soccer Club, when the latter club first entered the National Soccer League of Australia. In addition, Mr Dillon held administrative positions with the ACT Soccer Federation, the National Soccer League Executive and the Executive of Australian Soccer Federation. Mr Dillon maintains a long-term affiliation with the Anglican Church, having served in various capacities in parishes for some 40 years. He retired as Principal of Melba Primary School in the ACT in 1990. Mr Dillon is a foundation member of ADHREC and has served continuously since.
Mrs Grant is a pharmacist and a company Director. She graduated from the Victorian College of Pharmacy and has had long experience in retail and hospital pharmacy. She is a life member of the Pharmaceutical Society of Australia. She was a member of the ACT House of Assembly 1979-81, a member of the ACT Parole Board 1982-1988, and a member of ADHREC since its formation in 1988. Mrs Grant was an inaugural member of the NHMRC Medical Research Ethics Committee from 1982 - 91, and a member of various Committees of NHMRC from 1982.

At present she is the Chairman of the NHMRC Animal Welfare Committee and a member of the NHMRC Research Committee from 2001 to present. She has been a member of the ACT Department of Health and Community Care Human Research Ethics Committee since 1994 and Chairman since 1997. Mrs Grant has also been the Chair of ACT Festivals Incorporated, 1989 - 1998. Her interests include community affairs, sport and the arts.

Mrs Elizabeth Grant, AM
Member
Born in Melbourne, Chaplain (Air Commodore) O’Keefe lived the majority of his youth in Sydney attending St Joseph’s College, Hunters Hill NSW for his secondary schooling. In 1964 he felt God’s call to follow a vocation to the priesthood in the Catholic Church and commenced studies at St Columba’s College, Springwood, NSW. After four years of Humanities and Philosophical studies, he proceeded to St Patrick’s College Manly for theological studies. During this period he interrupted his seminary formation to further discern his call to ministry. In 1970 he recommenced his priestly formation at St Paul’s Seminary Kensington, NSW and was ordained Deacon in December 1971 and Priest in March 1972. He commenced ministry in the rural Diocese of Wagga Wagga in January 1972. Between 1972-1982 Chaplain O’Keefe served in a number of parish appointments and in 1978 he was appointed the Director of Youth Ministry within the Diocese. In 1983 he was commissioned as a Chaplain in the Royal Australian Air Force and posted to RAAF Base Wagga Wagga where he was employed as a Chaplain at The RAAF School of Technical Training with Character Development and Training. In 1984 he was posted to an operational position at RAAF Darwin followed by a posting in 1986 to the Royal Malaysian Air Force (RMAF) Base, Butterworth as part of the RAAF Contingent. During this time he saw the major withdrawal of RAAF personnel from the RMAF Base. In 1986, whilst in Butterworth, he transferred out of the Diocese of Wagga Wagga and incardinated into the newly formed Military Ordinariate of Australia within the Catholic Church.

In March 1989 Chaplain O’Keefe returned to Australia with a posting to a Training Command position at RAAF Williams, Laverton, Victoria. During this posting he was involved with the Officers Training School, Point Cook and the character training of the Radio Mustering Apprentices at Laverton, Victoria. In 1993 he returned to Air Command with a posting to RAAF Williamtown, the home of the FA-18 Fighter Aircraft. With his posting to RAAF Richmond, outside Sydney, in 1995 he assumed the position of Coordinating Chaplain at this Strategic Air Lift Group Base and was promoted to Chaplain (Wing Commander). In 1998 Chaplain O’Keefe was posted to Headquarters Air Command, RAAF Glenbrook as Command Chaplain and promoted to Chaplain (Group Captain). In this role, he worked both within Air Force and at a tri-Service level with Headquarters Australian Theatre in the oversight of the provision of chaplaincy services to ADF operations and deployments, in particular East Timor, from September 1999 until October 2001. In October 2001, he was appointed Principal Air Chaplain Roman Catholic and posted back to RAAF Base Richmond. With this advancement and promotion to Chaplain (Air Commodore) he was appointed Vicar-General of the Catholic Military Ordinariate of Australia. In August 2002, he was appointed a Prelate of Honour by His Holiness Pope John Paul II and given the title of Monsignor. In October 2002 he was appointed the Director-General Chaplaincy Services - Air Force and moved to Canberra. In this position he is responsible to the Chief of Air Force for the RAAF Chaplaincy program and the day to day management of the RAAF Chaplain Branch.
Dr Twomey holds a Bachelor of Science degree in Applied Psychology from the University of New South Wales and a Doctorate of Philosophy from the University of Wollongong. Dr Twomey helped fund his undergraduate studies through employment in a broad range of occupations that provided him with an in-depth and broad appreciation of Australian social diversity. Prior to, and during, his postgraduate studies, Dr Twomey was employed as a research assistant, tutor and lecturer. Subsequently, Dr Twomey joined the Australian Defence Organisation where he gained administrative experience before joining the psychology stream as a research psychologist. In 1997 he became Director of Psychology (Navy) and is currently responsible for all research undertaken by the Psychology Research and Technology Group within the newly formed Defence Force Psychology Organisation.

Dr Twomey’s doctoral research involved completion of a major research thesis that included both empirical and theoretical components and incorporated elements of psycholinguistics, and cross cultural, cognitive, and educational Psychology. It required the application of diverse research methods and the integration of theoretical perspective of different academic disciplines. Dr Twomey now has more than 25 years experience in undertaking research in a wide range of areas, including more than 15 years in Defence. During this time he has published in a number of journals and books and has initiated many improvements to the way in which psychological research is undertaken in Defence. Dr Twomey was formally appointed to ADHREC in January 2000.
Lieutenant Colonel Victoria Ross
Member

Lieutenant Colonel Ross joined the Army undergraduate scheme while completing her medical training at the University of Melbourne and the Royal Melbourne Hospital. After two years working as a medical resident at the Geelong Hospital, LTCOL Ross came into the full time Army.

Lieutenant Colonel Ross has been posted to the 1st Field Hospital, Duntroon Medical Centre (now Canberra Area Medical Unit), Headquarters Logistic Command and the Defence Health Service Branch. LTCOL Ross was awarded Fellowship of the Royal Australian College of General Practitioners in 1997, and completed a Masters of Public Health (MPH) in 2003 and has commenced advanced training in Public Health Medicine.

She was Executive Secretary of ADHREC in July 1998 to June 2000 and was appointed a member of ADHREC in 2002.

Group Captain James Ross
Member

Group Captain Ross is a medical practitioner, with specialist qualifications in Occupational Medicine and Public Health Medicine, with additional post graduate qualifications in Sports Medicine, and is undertaking a course in ‘e-healthcare’.

He joined the RAAF in 1980 as a medical undergraduate, and has remained in the Services ever since. He has had roles in clinical, Command and policy positions, including an exchange with the United States Air Force from 1995-1997 and Commanding Officer of 3 Combat Support Hospital, RAAF Richmond. Most recently he was Director of Health Projects, which included a new Career package for Medical Officers, and establishing the Centre for Military and Veterans’ Health, as well as Chief of Staff of the Defence Health Service Branch. He was the founder and first president of the Australian Military Medicine Association, and is currently the Chair of the Board of Continuing Professional Development of the Australasian Faculty of Public Health Medicine. He has been involved in research, both in policy and conduct, doctrine development and clinical policy. He thus has a very broad range of experience and expertise.
Captain Brendan Byrne  
Member

Captain (CAPT) Byrne joined the RAAF in 1985 and served as a Dental Officer and Instructor on various training bases, operational bases and in military hospitals, including RAAF Base Butterworth. In 1992 he transferred to the Navy, resulting in postings in HMA Ships CERBERUS, CRESWELL, PLATYPUS, WATERHEN, LONSDALE, KUTTABUL, SUCCESS, CANBERRA, PERTH, BRISBANE, SYDNEY, and HARMAN.

In 1996 CAPT Byrne proposed and created the ADF Dental School. He attended the inaugural Australian Command and Staff Course in 2001, simultaneously completing a Graduate Certificate in Maritime Studies and a Masters of Management. He also completed a Masters of Business Administration in 2005.

In 2001, CAPT Byrne was awarded a Chief of Navy commendation for his contributions to the development of young sailors through participation in sport. He served as Senior Health Officer for Victoria from 2002 to 2005, as Director of Clinical Policy in 2006, and will be Director of Health Capability Development in 2007.

Lieutenant Colonel Rosemary A. Landy  
Executive Secretary

Lieutenant Colonel Landy graduated with honors from the Faculty of Dentistry, University of Melbourne in 1978. She joined the Royal Australian Army Dental Corps in 1980 after having spent a year at St Vincents Hospital training in oral surgery. She has served in fourteen locations throughout Australia in both clinical and Command and Staff roles. She has also served in New Zealand, where she was awarded a Graduate Diploma in Oral Surgery with distinction in 1992. Lieutenant Colonel Landy left the Regular Army in 2002, and is currently a member of the Active Army Reserve. She obtained a post graduate Diploma in Drug Evaluation and Pharmaceutical Sciences from the Faculty of Medicine, Dentistry and Health Sciences, University of Melbourne, in 2003. In 2006 she was awarded a Department of Defence Australia Day medallion for her role as Executive Secretary of ADHREC. Lieutenant Colonel Landy is married and has two young sons.
Georgina joined the Department of Defence in 2001 as an Administration Officer for the Directorate of Clinical Policy. In 2003 Georgina was promoted to Research Officer in the Directorate of Clinical Policy. Some of her duties included record management, quality representation, preparing routine correspondence and maintaining the directorate's financial budget. In May 2006 Georgina joined ADHREC on a contract and was made permanent in October 2006.

Tess Winslade obtained her Bachelor of Psychology from the Australian National University in 2003. From there she was appointed as a Resource Coordinator for a large recruitment company. In early 2004, Tess joined the Department of Defence as a Research Assistant for Health Psychology in the Psychology Research and Technology Group. Here she focused on the designing of ADF psychological forms, developing statistics from the data of these forms and assisting the psychologists of the Health Psychology section with their research projects.

Tess joined ADRHEC as the Assistant Executive Secretary in January 2005. Tess also acts as the Minute Secretary.
Awareness of the importance of respect for ethical codes in research involving human participants was accelerated in response to revelations of unethical practices, particularly during World War II. In June 1964 many countries of the world met in Helsinki, Finland, and created the Declaration of Helsinki to prevent future unethical practices in human research. Over the past 38 years the Declaration has been amended six times.

In Australia, the National Health and Medical Research Council (NHMRC) first published the Statement of Human Experimentation in 1966. The Statement is currently undergoing its third review and proposed to be available in 2006.

The Australian Defence Medical Ethics Committee (ADMEC) was formed to ensure that the Defence Force complied with these guidelines. The Chief of the Defence Force (CDF) and the Secretary of Defence formed ADMEC as a non-statutory body in 1988.

The first meeting of ADMEC was held in November 1989. Meetings were originally held biannually or as needed, but as the amount of research conducted in Defence has grown over the years, the Committee now meets more frequently with some out of session determinations being made as required. A total of 69 meetings have been convened since its inception.

In June 2001 the committee changed its name to the Australian Defence Human Research Ethics Committee (ADHREC). The Committee met seven times in the period from July 2005 to end June 2006. The 14th annual report covers the period from July 2005 to June 2006.

A new Australian Defence Force Publication, ADFP 1.2.5.3 Health and Human Performance Research in Defence - Manual for Researchers was published in early 2003. It aligns the function of ADHREC with the Defence Health and Human Performance Research Committee (DHHPRC). Following publication of the ADFP 1.2.5.3 the Defence Instruction DI(G) Admin 24-3 Conduct of Human Research in Defence was revised in April 2005 to reflect the current requirement and procedures applicable to human research in Defence.

Committee Members

The structure of the Committee, which meets NHMRC guidelines, is detailed on page 48.

With the impending completion of appointment terms for a number of committee members, the committee has undertaken to stagger appointment terms to ensure that continuity is maintained and large losses of committee corporate knowledge in a short space of time is minimised.

The committee had one change in the July 2005-June 2006 period with the departure of Group Captain James Ross and the appointment of his successor Captain Brendan Byrne, Director Clinical Policy in January 2006.

The Secretariat had one change during the July 2005 - June 2006 period, with the departure of Miss Tess Winslade and the appointment of her successor Ms Georgina Kourtis in May 2006 as Assistant Executive Secretary.

Attendance at meetings and expenditure details are listed on pages 49-53 respectively.
New Research Projects
Considered During the Period July 2005 - June 2006

The Committee received 52 new protocols during the reporting period. These protocols are detailed on pages 16-19. There are 32 of these protocols In progress and 11 pending further action before ethical approval to undertake the research is granted, thus 43 of the New protocols considered are currently Active. The status of these protocols as at 30 June 2006 is as follows:

<table>
<thead>
<tr>
<th>Protocol Status</th>
<th>Number</th>
<th>Active</th>
<th>Inactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Progress (approved)</td>
<td>32</td>
<td>32</td>
<td>-</td>
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<tr>
<td>Pending Approval</td>
<td>11</td>
<td>11</td>
<td>-</td>
</tr>
<tr>
<td>Approval Withdrawn</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Finalised/closed</td>
<td>3</td>
<td>-</td>
<td>3</td>
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<tr>
<td>Completed</td>
<td>4</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Withdrawn by researcher</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Not Approved</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Resubmitted</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Number of New Protocols Considered by ADHREC by Calendar Year

n.b. 2006 value only up until end of June 2006
# New Protocols Received & Considered by ADHREC
## During the Period July 2005 - June 2006

<table>
<thead>
<tr>
<th>Protocol No.</th>
<th>Research title</th>
<th>Protocol status</th>
</tr>
</thead>
<tbody>
<tr>
<td>399/05</td>
<td>The Australian Defence Force (ADF) Mental Health Prevalence Study</td>
<td>In Progress</td>
</tr>
<tr>
<td>400/05</td>
<td>A Pilot review of personnel deployed during Operation Warden or Operation Spitfire</td>
<td>In Progress</td>
</tr>
<tr>
<td>401/05</td>
<td>PhD Study- Predicting Organisational Citizenship Behaviour: More than satisfaction and personality.</td>
<td>In Progress</td>
</tr>
<tr>
<td>402/05</td>
<td>Optimising the utility of injury surveillance systems of active populations</td>
<td>Finalised</td>
</tr>
<tr>
<td>403/05</td>
<td>Extending Pelled’s model of workgroup diversity: The critical role of group representation</td>
<td>In Progress</td>
</tr>
<tr>
<td>404/05</td>
<td>A personal construct theory exploration of the impact of psychological trauma among Navy personnel.</td>
<td>In Progress</td>
</tr>
<tr>
<td>405/05</td>
<td>Papua New Guinea Defence Force Health Survey</td>
<td>In Progress</td>
</tr>
<tr>
<td>406/05</td>
<td>Epidemiology of dental caries in the population of the Northern Peninsual Area of Cape York, Queensland</td>
<td>Completed</td>
</tr>
<tr>
<td>407/05</td>
<td>Randomised, Double Blind, Multicentre, Placebo Controlled Phase III study of the safety and tolerability following administration of live attenuated JE Vaccine (ChimerivaxTM_JE), including information brochure H-040-10</td>
<td>In Progress</td>
</tr>
<tr>
<td>408/05</td>
<td>AMI Cooperation with Qpharm-Acambis Protocol H-040-007 Bridging Study (Randomised, double-blind, placebo controlled phase 2 dose-ranging study of the safety, tolerability and immunogenicity of live attenuated chimerivaxTM JE vaccine (Lyophilizes))</td>
<td>Completed</td>
</tr>
<tr>
<td>409/05</td>
<td>BOAT MAGIC: The Psychological Study into Team Dynamics on Patrol Boats</td>
<td>In Progress</td>
</tr>
<tr>
<td>410/05</td>
<td>Mortality and Cancer Incidence Monitoring in F-111 Deseal/Reseal Personnel</td>
<td>In Progress</td>
</tr>
<tr>
<td>411/05</td>
<td>Oberon Class Submarine Project - Focus group protocol</td>
<td>Completed</td>
</tr>
<tr>
<td>Project Code</td>
<td>Title</td>
<td>Status</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------------------------------------------------</td>
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</tr>
<tr>
<td>412/05</td>
<td>Fatigue, Nutrition and Fitness on Hydrographic Vessels</td>
<td>In Progress</td>
</tr>
<tr>
<td>413/05</td>
<td>Barriers to Mental Health Care in the Australian Defence Force.</td>
<td>Completed</td>
</tr>
<tr>
<td>414/05</td>
<td>Fatigue-induced changes to gait, posture and trunk stability during prolonged load carriage: kinematic and electromyographice factors.</td>
<td>In Progress</td>
</tr>
<tr>
<td>416/05</td>
<td>Assessing the physical requirements of the Commando Training Course</td>
<td>In Progress</td>
</tr>
<tr>
<td>417/05</td>
<td>Evaluation of the personal cooling systems and heat production at slow walking speeds</td>
<td>In Progress</td>
</tr>
<tr>
<td>418/05</td>
<td>Special Forces deployed health &amp; nutrition study</td>
<td>In Progress</td>
</tr>
<tr>
<td>419/05</td>
<td>Assessment of thermal strain during work activities in hot climates</td>
<td>In Progress</td>
</tr>
<tr>
<td>420/05</td>
<td>The effect of air-conditioning exposure on heat acclimatisation status</td>
<td>In Progress</td>
</tr>
<tr>
<td>421/05</td>
<td>Determination of Human Effects of the use of the 40-mm sponge round</td>
<td>Closed</td>
</tr>
<tr>
<td>422/05</td>
<td>Herbal and over-the-counter medication use in aircrew</td>
<td>In Progress</td>
</tr>
<tr>
<td>423/05</td>
<td>A Case Controlled Study on Dental Risk and Unscheduled Dental Visits</td>
<td>In Progress</td>
</tr>
<tr>
<td>424/05</td>
<td>Evaluation of Commercial Repellent formulation against Mosquitoes in Australia</td>
<td>In Progress</td>
</tr>
<tr>
<td>425/05</td>
<td>Resilience and Lifeskills workshop intervention</td>
<td>In Progress</td>
</tr>
<tr>
<td>426/06</td>
<td>Assessment of post-cooling techniques to treat hyperthermia</td>
<td>In Progress</td>
</tr>
<tr>
<td>427/06</td>
<td>Barriers to Mental Health Care in the Australian Defence Force (Phase Three - large scale administration)</td>
<td>In Progress</td>
</tr>
<tr>
<td>428/06</td>
<td>Barriers to Mental Health Care - Pilot of the Barriers to Mental Health Care Questionnaire</td>
<td>In Progress</td>
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<tr>
<td>429/06</td>
<td>Enablers and inhibitors of learning in the Army: A social perspective</td>
<td>Closed</td>
</tr>
<tr>
<td>430/06</td>
<td>An investigation into factors influencing risk perception and risk behaviour amongst Australian Army personnel</td>
<td>In Progress</td>
</tr>
<tr>
<td>Code</td>
<td>Title</td>
<td>Status</td>
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<tr>
<td>-------</td>
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</tr>
<tr>
<td>431/06</td>
<td>Investigating the experience of female war, peacemaking and peacekeeping veterans: Implications for reintegration and rehabilitation into the community</td>
<td>In Progress</td>
</tr>
<tr>
<td>432/06</td>
<td>An oral health substudy of the Pilot Review of personnel deployed during Operation Warden or Operation Spitfire</td>
<td>Withdrawn</td>
</tr>
<tr>
<td>433/06</td>
<td>Case-control study to analyse risk factors for exertional medial skin pain and a randomised trial of an intervention for exertional medial skin pain</td>
<td>Withdrawn</td>
</tr>
<tr>
<td>434/06</td>
<td>ADF Physical Employment Standards: Trade Task Field Observation (TTFO) of Air Defence Regiment</td>
<td>In Progress</td>
</tr>
<tr>
<td>435/06</td>
<td>General Service Respiratory “Hot/Dry” Climatic trial</td>
<td>In Progress</td>
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<td>Quality Assurance evaluation of a narrative approach to organisational change</td>
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<td>437/06</td>
<td>Bioequivalence evaluation of two tablet formulations of Artekin™ (dihydroartemisinin and piperaquine) in Vietnamese volunteers</td>
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<td>438/06</td>
<td>Six month observational study of the measures of salivary, plaque and lifestyle factors and their associations in a Defence population.</td>
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<td>Hypobaric hypoxia and combined altitude depleted oxygen (CADO): A comparison of two paradigms of aircrew physiological training.</td>
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<td>Enablers and Inhibitors of learning in the Army: Organisational and Social analysis</td>
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<td>Case control study to analyse risk factors for exertional medical shin pain and a randomised trial of an intervention for exertional medial shin pain</td>
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<td>442/06</td>
<td>Fatigue Management for Military Aircraft Maintainers</td>
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<td>Seroprevalence of anti-dengue virus antibodies in residents of Vietnam</td>
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<td>Why does the Australian Defence Force invest in the provision of higher education for its members?</td>
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<td>Ethical considerations for the collection of routine injury surveillance data collection</td>
<td>New Protocol</td>
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ADHREC Endorsed Projects
Completed during the period July 2005 - June 2006

Protocol 351/04
Land 125 load carriage equipment evaluation trial 2004

Executive Summary
As part of its Development Test Bed Program, the LAND 125 Project Office (PO) is responsible for procuring enhanced Individual Combatant Load Carriage Equipment (ICLCE) and an Enhanced Combat Helmet (ECH) for the five ARA infantry battalions. CBRNDC was tasked by the LAND 125 PO to assess the ECH and the ICLCE in its current but evolving state in 2004. Sizing, integration, comfort and functionality issues have been assessed, allowing final design modifications to be considered by the LAND 125 PO, in order to make the final ICLCE design fit for purpose. A functional and ergonomic assessment of the trial ICLCE and ECH was conducted with users from B Company, 1 RAR. Anthropometric measurements of over 200 1 RAR personnel were also collected to assist with the determination of size and procurement percentage requirements for the equipment. The trial ICLCE, is believed to be the best immediately available solution that will actually be embraced by soldiers. It should therefore be procured and issued according to the recommendations in Chapter 4, as should the ECH. Two new pack frame sizes and three new (modified) chest webbing size dimensions have been recommended. The current hip belt and sternum strap should be retained to give soldiers the option of wearing the pack more ergonomically if they want to. Future research and development of new ICLCE, based on a hip-loading principle, is warranted. For future hip-loaded military ICLCE to be accepted by users, it will have to be designed ‘from the ground up’, ensuring it addresses and evaluates all ergonomic, integration and functional requirements, especially the need to integrate the pack with the webbing and to quick-release the pack.

Protocol 356/04
Biomechanical analysis of the parachute landing fall and ground training aids: common technique faults and implications for injury risk.

Abstract: The aims of the research were to monitor 2004 Basic Parachute Course (BPC) landing injuries, to identify the main Parachute Landing Fall (PLF) technique faults that contribute to landing injury risk and to recommend training interventions that may reduce technique faults and subsequently injury risk. Injury risk for the May to September BPC period was estimated to be 1.6% per descent. The most prevalent landing technique faults observed included ‘Feet Too Far Forward’, ‘Feet Not Turned Off Correctly’, ‘Feet Apart at Impact’, and ‘Sat Back’ landings. Having the feet too far forward appears to be the main cause of ‘Sat Back’ landings, which can lead to spinal fractures. The use of real-time video feedback in the flight training bays would allow trainees the opportunity to self-correct this error. Ground training landing speeds higher than currently experienced should also be introduced, so that trainees are exposed progressively to descent velocities that more closely simulate those experienced on the Drop Zone.

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Protocol 369/04
Fatigue and human performance in the Army instructional environment.

Executive Summary
The report contained a detailed literature review into the antecedents of fatigue and their ramifications for a military instructional environment. This review also considered extant Fatigue Management Systems throughout allied industries in order to recommend a suitable Fatigue Management Strategy for employment within Training Command - Army (TC-A).

The study identified that across the board TC-A instructors and support staff had elevated fatigue levels, they had reduced levels of concentration, reduced levels of motivation and reduced levels of physical activity. This was attributed to the high work tempo throughout the Command and the excessive workload in a number of schools and the limited amount and quality of sleep obtained by the majority of staff. Even with most staff having taken their recommended 20 days leave last year, the fatigue levels at Nov 04 were still elevated - most staff still had in excess of 20 days leave in their leave records, indicating that this is a situation that has been developing for a number of years, due to the high operational tempo of the Army. Clearly the leave taken and the daily sleep obtained was insufficient to counter the effects of the increased workload/tempo suggesting the need for a strong remediation and management strategy.

The study makes four recommendations to remediate and manage the fatigue evident across the Command: and two recommendations for future studies.

1. Manage fatigue as a workplace hazard within TC-A’s overall safety management system.
2. Develop policy guidelines that articulate how TC-A will manage the risks associated with fatigue
3. Provide instructors with competency-based training and education regarding the identification, assessment, and management of fatigue risk.
4. Develop a risk management system for fatigue that is auditable.

The study also made two recommendations for future studies:

5. Conduct a further study to determine instructors’ work/rest patterns.
6. Modify the data collection protocol such that actual work/rest times are recorded by participants in future studies.

The report is currently being analysed by the Support Branch of HQ TC-A in order to develop a number of Courses of Action for consideration by the COMD. It is expected that a Fatigue Risk management System will be implemented as part of the OH&S framework of TC-A by the end of Nov 05.

Protocol 343/03
A survey of ADF health professionals regarding issues relating to the use of illicit drugs.

Executive Summary
1. The Australian Defence Force (ADF) has a duty of care towards its members. This duty of care is directly applicable to the prevention and management of problematic substance use in the ADF. Consistent with this, the ADF provides assistance to members who develop problematic drinking habits or alcohol dependence. To a lesser extent, support is also available for reformed illegal drug users.
2. In the event that a member is retained in the ADF after proven involvement with illegal drugs, or the detection of
an alcohol problem, it is mandatory that they sign an agreement to undertake an education and counseling program aimed at reform. Alternatively, a member may voluntarily refer himself or herself to such a program and, in turn, may be eligible for immunity from disciplinary action (under strict conditions).

3. Results from the Defence Attitude Survey suggest that there is both problematic alcohol and illegal drug use within the ADF. However, more detailed information related to this topic has proven difficult to source. Self-report methodology for illegal drug use has never been used in the ADF, as it is obviously difficult to apply in an ADF context, due to strict ADF regulations on mandatory reporting of illegal drug use (DI(G) Admin 45–2). Some information regarding illegal drug use might be found by looking at statistics regarding disciplinary action in the ADF. However, such data do not provide us with sufficient information on this issue, as they focus only on those ADF members who are caught.

4. One recently introduced research method is the use of “key informants” (Drake, Topp, Kaye, & Hall, 2002; Hando, Flaherty, & Rutter, 1997; Weatherburn, Jones, Freeman, & Makkai, 2003). This involves sampling not potential substance users themselves, but rather a sub-population of individuals known to have regular exposure to these people. One population within the ADF that may have regular access to drug users would be ADF health professionals, specifically doctors, nurses, psychologists and social workers. Information gathered using this method is not conclusive, but rather is useful when used in conjunction with other data sources, to form an overall conception of usage patterns in the ADF.

5. This survey was undertaken to gather information on the attitudes of ADF health professionals towards both alcohol and other drug (AOD) use and training and support requirements.

Aims

6. There are three aims of this survey:

a. To collect information on the opinions of ADF health professionals in respect to AOD use within their region of Australia (including opinions on the nature and extent of AOD use, attitudes towards current treatment and reporting policies and basic demographics),

b. To identify any potential gaps in support services for illegal drug and problematic alcohol users, and

c. To identify any potential gaps in relevant training options for ADF health professionals in respect to the use of illegal drugs, problematic alcohol use and general professional skills.

Method

7. Surveys were sent out to all Defence Force Psychology Organisation (DFPO) psychologists and Defence Community Organisation (DCO) social workers, and a sample of doctors and nurses working for the Joint Health Support Agency (JHSA). In total, 409 questionnaires were sent out to these four professional groups. There were 181 survey forms returned, yielding an overall response rate of 44.3%.

Results

8. Notably only 4.6% of health professionals responded that there was
no illegal drug use in the ADF, with the majority indicating that between 1 and 5 percent of ADF members used illicit substances. Participants were reasonably confident of their responses to the first prevalence question (“what drugs are being used”), with higher estimates being related to greater confidence. Of all the drugs rated by respondents, cannabis, MDMA, methamphetamine and steroids were reported to be the most prevalent. Regarding alcohol use, results indicate that whilst respondents believe the majority of ADF members to be low risk drinkers, there are reasonably high rates of hazardous drinking in particular. In general, there was agreement that the ADF should be required to provide treatment options for problems resulting from alcohol use, and disagreement that current ADF policy is incompatible with the day-to-day duties of a health professional.

9. Preferences for the listed training and treatment options were examined. A needs analysis was undertaken and suggested that all necessary training and treatment options were being provided at a reasonable level across all regions and professions. However, the three options flagged for improvement the most by respondents were education in current issues and trends in the management of illegal drug use, education in current issues and trends in the management of problematic alcohol use and relapse prevention for alcohol use.

Discussion

10. Data presented in this report are to be interpreted carefully. Notably, the information provided in sections one and two in no way constitutes prevalence rates for AOD use in the ADF. Because of the large amount of variance in the confidence measure used in section one (SD = 1.63 on a 7 point scale), it would be expected that these figures would have a large margin of error.

11. Given this limitation however, the information gained from the first two sections of this survey may be useful in two respects. Firstly, it provides some idea of those substances that health professionals are seeing evidence for, and by implication, those substances that may be contributing to physical and mental health problems. Secondly, when used in conjunction with other data already collected, these results may contribute to a greater understanding of illegal drug and alcohol use in the ADF.

12. In regard to training and treatment options, the information presented above presents a favourable picture of the ADF response to AOD problems. This implies that the majority of respondents believe that most or all of the treatment and training options presented in this research are either readily accessible or unnecessary in respect to their function in the ADF as health professionals.

13. As outlined earlier, no data collected throughout this study are particularly conclusive. Firstly, the sample size of 181 is not totally representative of the hundreds of health professions working within or for the ADF. Secondly, the methods used for information gathering are quite inaccurate, as it is unknown where the population of health professionals have acquired their information. It would be impossible to discern between those who have used their experience as a health professional and those who may be responding in terms of local rumour, or other informal data sources.
14. The aforementioned limitations mean that these data serve only to provide general qualitative information on AOD issues with the ADF population. The planned ADF Mental Health Prevalence Study will be collecting AOD information from ADF personnel directly using an anonymous survey, and hence will provide more accurate and quantifiable information than the present study. It would be of interest to compare the results of the prevalence study to the rates derived from this survey, which may help to validate the “key informant” method of investigation used in the present research.

Recommendations

15. The following recommendations were made:

a. **Recommendation 1.** That future reports be produced triangulating the present results with other comparable data sets, such as that collected through disciplinary procedures, wider Australian prevalence rates and the planned ADF Mental Health Prevalence Study.

b. **Recommendation 2.** That ADF ATODS continue to provide educational material and regular updates to ADF health professionals regarding the treatment of health problems arising from AOD use.

**Protocol 366/04**

Fatigue, nutrition and fitness on hydrographic vessels.

**Abstract:** Under Activity 1 of Task 03/201, DSTO has investigated fatigue, nutrition and fitness on a hydrographic ship. DSTO were requested to provide fatigue management strategies to maximise capability on hydrographic vessels and to provide baseline information concerning the nutritional status of crews. Reductions in manning levels throughout Navy, combined with 24-hour capability, have exacerbated human factors issues. The human and financial costs of work-related injury and disease in Defence, including compensation costs, are substantial and increasing [1]. Navy has a duty-of-care to manage human factors, including fatigue, nutrition and fitness, to protect the health and safety of its employees. Well-considered and informed management of these issues will achieve more than compliance with duty-of-care obligations; there is the potential to reduce injury and disease rates, reduce compensation and retraining costs, improve retention and improve operational performance. The Defence White Paper ‘Defence 2000: Our Future Defence Force’ identified a need to address retention issues before tackling other capability issues. A key element in efforts to address retention must be an increased focus on the health, safety and well-being of ADF personnel [1]. Fatigue affects cognitive performance and can significantly increase the risk of errors, with important implications for system and human safety. The International Maritime Organization (IMO) has reported that 75 percent of accidents involving ships are due to human error [2]. The United States Coast Guard investigated 279 marine casualties and concluded that fatigue was a contributing factor in 16% of critical vessel casualties and 33% of personnel injuries [3]. Fatigue and shift work can have negative impacts on eating behaviour, including appetite suppression and risk of disordered eating patterns. Circadian disruption—a potential consequence of night work—can affect hormonal control of appetite and digestion. These effects can in turn result in feelings of lethargy and apathy, exacerbating fatigue arising from poor work/rest and sleep/wake.
patterns. Shiftwork and poor nutrition are recognised as risk factors for cardiovascular disease (CVD) [4, 5]. Physical capability is an important determinant of human performance and operational capability and safety. It is fundamental to combat effectiveness and plays an important role in injury prevention. Inadequate fitness or strength may negatively impact on the ability to perform critical operational tasks. Reductions in fitness and strength during time spent at sea will exacerbate any pre-existing deficiencies. The Hydro FEG conducts surveying operations and produces maps for civilian and military use. Surveying operations are conducted around the clock, leading to crew members working long hours and experiencing disrupted sleep patterns. This report summarises the findings of a DSTO investigation into fatigue, nutrition and fitness among crew-members during two voyages on a hydrographic ship involved in its normal operational environment and activities. 1 DSTO-CR-2005-0174

2. Results and Discussion

2.1 Work/Sleep patterns of Hydrographic Personnel

2.1.1 Work Patterns The working patterns of personnel were evaluated using the FAID mathematical model (InterDynamics Pty Ltd, Sydney, Australia) that outputs fatigue scores based on work/rest patterns and circadian rhythms. The model has been used throughout Australia in the road, rail and air transport industries. The hydrographic ship participants were grouped, according to function, as administrators, hydrographers and trades personnel. The charted FAID outputs are presented in appendix A. The working patterns for the administration personnel, resulted in high fatigue scores being associated with 38.4% (voyage 1) and 39.4% (voyage 2) of their duty periods, and 15.7% (voyage 1) and 16.1% (voyage 2) of their hours on duty. For the hydrography personnel, 56.3% (voyage 1) and 51.1% (voyage 2) of their duty periods resulted in high fatigue scores, and 22.3% (voyage 1) and 26.9% (voyage 2) of their hours on duty occurred at a fatigue level in the high range or above. For the trades personnel, 37.8% (voyage 1) and 35.5% (voyage 2) of their duty periods resulted in high levels of fatigue, and 20.2% (voyage 1) and 20.8% (voyage 2) of their hours on duty occurred at a fatigue level in the high range or above. The results indicate that the levels of fatigue associated with the duty schedules of all three types of personnel (i.e. administration, hydrography, trades) exceeded those associated with schedules that involve permanent day shifts, rotating 8-hour shifts, 12-hour day/night shifts, and were similar to those associated with schedules involving permanent 12-hour night shifts (six days on, one day off).

2.1.2 Sleep Patterns The study participants spent six hours or more in bed during each 24-hour period. Overall, the data suggests that personnel obtained 5-8 hours sleep per 24-hour period. Notably, over half of the personnel (59%) obtained an average of less than 6 hours sleep per 24-hour period. Importantly, as sleep restriction was occurring over an extended period (i.e. 18 days), it is highly probable that many personnel accumulated a sleep debt. Further, sleep periods were often split into two periods (within a 24-hour period), thus the sleep obtained was unlikely to be as restorative as sleep obtained in a single period, and in fact 41% of sleep periods were considered to be of poor or very/extremely poor quality. Taken together, this suggests that many personnel were experiencing elevated levels of fatigue. Personnel did not experience any difficulty initiating sleep. The time taken to initiate sleep is an indication of sleepiness (i.e. higher levels of sleepiness/fatigue are associated with shorter sleep onset latency
Thus, the fact that personnel in the current study did not experience difficulty initiating sleep is not surprising, given that prior to most sleep periods, they reported feeling moderately (26%) or highly/extremely (50%) fatigued. Self-reported high levels of fatigue and short SOL also support the suggestion that many of the personnel had an accumulated sleep debt, due to multiple nights of sleep restriction.

2.1.3 Effect of Fatigue on Operational Capability

The potential consequences of fatigue associated with night duty and/or poor sleep quality include forgetfulness, drowsiness, lethargy and apathy; slow reaction time; impaired alertness, vigilance and performance; and poor decision-making, communication and mood. Fatigue due to sleep loss does not affect all tasks equally: physical performance is less affected than mental performance; short, simple, well learnt tasks are less affected than those that are of long duration, monotonous or complex; and analytical decision-making is more affected than are intuitive and rule-based decision-making processes [6, 7]. Despite potentially elevated levels of fatigue, hydrographic ship personnel were generally able to maintain vigilance performance while at work. As expected, there was an increase in reaction time performance as subjective fatigue levels increased, but vigilance performance was not in a range that would typically be considered impaired. However, higher-level decision-making cognitive processes may have been adversely affected at the observed levels of fatigue.

2.1.4 Supplement Usage

Caffeine was the most commonly used fatigue-alleviating supplement, with 90% of participants consuming one or more sources of caffeine; 59% consumed coffee, 45% tea, 24% cola drinks, 14% guarana drinks and 7% used guarana tablets. Daily caffeine intake of hydrographic personnel (mean ± 95% CI) was 251 ± 99 mg. This is comparable to reported values for Australians of 240 mg/day [8] and 232 mg/day [9]. Amongst caffeine consumers intake (mean ± 95% CI) was 280 ± 105 mg/day with 69% reporting feeling more awake and alert. They considered this to be a positive effect with some using it to help maintain alertness when on watch. A proportion of consumers (35%) also reported negative effects such as difficulty in sleeping if caffeine was consumed too close to bed time.

2.2 Nutritional Status of Hydrographic Personnel

Recommended Dietary Intakes (RDIs) apply to group requirements and include a safety margin, hence individual requirements are generally less than the RDIs [10]. In general, it may be assumed that an individual is meeting their nutrient requirements if they meet 70% of the RDI. Food Frequency Questionnaires completed by the study participants indicated that they met at least 70% of the RDIs for most micronutrients both ashore and at sea. The exceptions were that 7% of participants did not meet 70% of the RDI for vitamin A ashore and 48% and 74% of participants did not meet 70% of the RDI for vitamin E when ashore and at sea, respectively. The low intake of vitamin E is significant as there is evidence that sufficient vitamin E intake may decrease the risk of CVD [11]. Energy intake (EI) as a proportion of energy requirements (ER) ashore and at sea averaged 87% and 71%, respectively. Only 41% of participants met their ERs ashore, decreasing to 11% while at sea. Under-estimation of dietary intake is a limitation of dietary questionnaires and actual intakes may be greater than reported. Certainly, it can be expected that energy balance would be maintained over the longer term (ashore), however EI at sea may be less than ER, with replenishment.
occurring during port visits and on return to home port. There was an imbalance in the contribution of the macronutrients—carbohydrate, protein and fat—to daily energy intake both ashore and at sea. The mean percent contributions of protein (pre- 20 ± 1.9%; post- 23 ± 2.2%) and fat (pre- 36 ± 3.4%; post- 40 ± 2.6%) to daily energy intake were in excess of the Australian recommended values [8] (12% protein; 30% fat), while carbohydrate (pre- 37 ± 4.1%; post- 35 ± 4.2%) was substantially lower than recommended (50-60%). The average diet of the hydrographic personnel was similar to the typical diet of the Australian population [12]. However, there is concern about the high contribution of fat to energy intake and the link between high fat—particularly saturated fat—intake and CVD. Studies have shown that meal composition affects performance. High-protein/low carbohydrate and moderate-fat/moderate-carbohydrate meals improved cognitive performance relative to low-protein/high-carbohydrate, low-fat/high-carbohydrate and high-fat/low-carbohydrate meals [13, 14, 15]. But high-fat/low-carbohydrate meals have been associated with slower reaction times, lower alertness, greater sleepiness and higher fatigue ratings than high-carbohydrate/low-fat meals [16, 17]. Nutrition is an important tool in the management of the consequences of shiftwork and is relevant over both the shorter and longer time frames. Over shorter time frames nutrition plays a role in cognitive performance, sleep quality and sleep duration. Over longer time frames it is important in the management of general health, and particularly gastrointestinal health and risk factors for CVD.

2.3 Overall Fitness of Hydrographic Personnel The average aerobic fitness of the study participants did not change significantly after spending time at sea. Mean maximal oxygen uptake (VO2 max, mean ± 95% CI) based on ‘beep’ test scores was 42.2 ± 3.1 ml min-1 kg-1 (pre-voyage) and 42.9 ± 3.2 ml min-1 kg-1 (post-voyage). The range was from a low of 31.1 to a high of 54.6 ml min-1 kg-1. The VO2 max (mean ± 95% CI) of the study participants aged 18-29 years (44.0 ± 5.6 and 42.2 ± 2.2 ml min-1 kg-1 pre- and post-voyage, respectively) were slightly lower than the mean values for the Australian population of the same age group (45.5 ml min-1 kg-1). However, the VO2 max for male participants (no female participants fell within these age groups) aged 30-49 years for pre- (30-39 years = 46.7 ± 4.9; 40-49 years = 41.7 ± 7.8 ml min-1 kg-1) and post-voyage (30-39 years = 49.9 ± 2.9; 40-49 years = 39.6 ± 9.0 ml min-1 kg-1) were greater than the mean for the Australian population for the same age group (30-39 years = 41.5, 40-49 years = 37.9 ml min-1 kg-1) [18]. DSTO-CR-2005-0174 The fitness demands of RAN critical shipboard tasks have not been determined, however on the basis of research conducted on RN fire-fighting procedures it has been recommended that seagoing RN personnel attain a VO2 max of 41.0 ml min-1 kg-1 [19]. The proportion of study participants with a VO2 max less than 41.0 ml min-1 kg-1 was 44% (pre) and 33% (post). Standing vertical jump measurements were used as a measure of leg strength. There was no significant difference between mean pre-voyage and post-voyage values.

2.4 General Health 2.4.1 Body Composition Based on BMI, approximately 20% of Australian adults were estimated to be obese in 1999–2000, and approximately 40% were overweight but not obese [20]. Amongst study participants (n=31) 13% were classified as obese and 45% were overweight but not obese according to their BMI. The mean BMI of the male study participants aged between 18-39 years for pre- (18-29 years = 25.2, 30-39 years
28. Australian Defence Human Research Ethics Committee

= 25.9) and post-voyage (18-29 years = 24.7, 30-39 years = 25.4) were found to be slightly higher than the mean BMI of the Australian male population within the same age group (18-29 years = 23.9; 30-39 years = 24.9). All female participants fell within the age category, 18-29 years, and mean BMI for pre- (21.0) and post-voyage (20.5) was substantially lower than the mean for the Australian female population of the same age (23.6). Male participants aged between 40-49 years had a lower mean BMI for pre- (25.0) and post-voyage (24.8) compared to the mean for the Australian male population of the same age [18]. At the population level BMI is significantly correlated with body fat [21, 22], however muscular individuals, such as males who weight-train, may have a high BMI but a relatively low level of body fat and may be inappropriately classified as overweight. As an alternative to BMI, overweight/obesity status may be assigned according to body fat levels. Men with over 24% body fat and women with over 35% body fat may be considered obese [23] and men with 20-24% body fat and women with 30-35% body fat may be considered as overweight but not obese [24]. By these criteria 26% of study participants were found to be overweight but not obese and 23% were found to be obese. There are many health consequences of being overweight or obese. In addition to being a risk factor for CVD, obesity is associated with sleep apnoea, daytime sleepiness and fatigue [25]. 2.4.2 Risk Factors for Cardiovascular Disease Shiftworkers have been found to have an increased mortality due to CVD compared to dayworkers [5]. As shiftwork may trigger the effect of other lifestyle related risk factors [26] it is especially important that both employers and employees manage the risks. From a nutrition perspective it is important to facilitate and encourage low-risk food choices amongst hydrographic personnel exposed to occupational risk factors. DSTO-CR-2005-0174.

The proportion of tobacco smokers amongst study participants was 24%, which is the same as the proportion of Australian adults who were smokers in 2001 [4]. In addition 9% of study participants had high blood pressure, which is also similar to the proportion of Australians of all ages (10%) suffering from this condition as established in the 2001 National Health Survey [27]. The number of the modifiable risk factors—poor nutrition (high saturated fat consumption), being overweight (BMI>24.9), obesity (BMI>30.0), tobacco smoking, high alcohol consumption and high blood pressure—for CVD was established for the study participants. The proportion of study participants with at least one modifiable risk factor for CVD was 97%; 53% were found to have three or more risk factors. Both figures are higher than those found for the Australian adult population; 90% and 25% respectively [27]. Taken in combination with shiftwork these figures are of concern, however these risk factors are behavioural and therefore can be modified.

3. Conclusions and Recommendations

3.1 Conclusions

3.1.1. Participants’ sleep quality data indicates that many personnel were experiencing elevated levels of fatigue.

3.1.2. Work related fatigue levels on the hydrographic ship are relatively high based on FAID analysis.

3.1.3. Participants’ dietary intake was broadly comparable to the general Australian population, however protein and fat intake should be reduced and carbohydrate intake increased.

3.1.4. The prevalence of risk factors for CVD amongst study participants was higher than, but comparable to, the Australian adult...
population and should be reduced.

3.1.5. Participants’ aerobic fitness and strength were maintained over the five-week period of this study.

3.2 Recommendations

3.2.1. Manage personnel fatigue on hydrographic ships as a workplace hazard within the Navy Safety Management System.

- Baseline data will assist in the identification and management of fatigue related risks.
- Risk control may involve determination of the criticality of tasks, classification of tasks according to physical and cognitive demand, assignment of acceptable levels of fatigue to tasks, modification of work/rest schedules, training and education of personnel.

3.2.2. Provide personnel serving on hydrographic vessels with competency-based training and education regarding the identification, assessment and management of fatigue risk.

- Competency based training and education is a fundamental component of a fatigue management system.
- Individual knowledge and understanding of fatigue issues should be commensurate with responsibility for workplace and system safety.
- Provide personnel with RAN specific and endorsed reference material for ongoing guidance and support.

3.2.3. Review hydrographic vessel work/rest schedules to reduce fatigue scores to levels comparable to those resulting from less demanding industry shift rosters.

- Use fatigue models to develop alternative schedules.
- Evaluate alternative schedules.
- Minimise 24-hour operations.
- Minimise duty between 0000 and 0600 hours.
- Consider naps during the day (between 1400 and 1600) for personnel scheduled for sleep deprivation.

3.2.4. Implement a nutrition education program.

- Provide personnel with RAN specific and endorsed nutrition education.
- Target CVD risk factors.
- Target education programs to increase consumption of fruits and cereals, decrease intake of fats (especially saturated fats) and moderate protein intake.

393/05
Does vertical descent velocity affect the parachute landing fall technique and how is this moderated by experience?

Abstract: The purpose of this study was to investigate the effects of rate of descent on static line parachute landing technique and whether the effects were different for paratroopers of different experience levels. To achieve this goal, biomechanical data were collected from experienced (> 50 descents) and less experienced (12 - 27 descents) paratroopers during landings that simulated realistic rates of descent experienced during ground training (2.1 and 3.3 m/s) and on the DZ (4.6 m/s).

“Analysis of the data revealed that rate of descent had a significant effect on
landing technique. That is, nearly every biomechanical parameter measured during the landing action changed significantly as descent velocity increased. In contrast, few significant differences were found between the experienced and relatively inexperienced paratroopers. The most conspicuous result was that ‘toes first’ landings became significantly more prevalent as rate of descent increased. Conversely, ‘flat feet’ landings are taught during Australian Defence Force Basic Parachute Courses and ‘toes first’ landings are considered to be incorrect technique. For the slow, medium and fast rates of descent, ‘toes first’ landings were observed in 38, 66 and 78% of such trials, respectively.

“It is recommended that limited and progressive exposures to rates of descent between 3.5 m/s and 4.6 m/s are introduced to Basic Parachute Course ground training. A new training apparatus to compliment or replace the wheel trainers is also recommended. A monorail similar to the one used in this study or a variant of the ‘lateral drift apparatus’ used at the US Army Airborne training facility should be considered.

“More comprehensive research into the effects of variations in descent velocity (between 3.5 and 5.5 m/s) is also recommended. Additionally, assessment of the AS versus the US landing technique, with and without the use of ankle braces, is recommended to evaluate ‘flat feet’ and ‘toe pointing’ landings and the potential benefits of using ankle braces when employing each of these landing strategies.”

336/03
MORTALITY AND CANCER INCIDENCE OF AUSTRALIAN NUCLEAR TEST PATIENTS.

Between 1952 and 1963 the United Kingdom (UK) conducted a program of nuclear weapons development trials in the Monte Bello group of islands off the coast of Western Australia and at Emu Field and Maralinga in the South Australian desert. Servicemen and civilians from the United Kingdom and Australia participated in the tests. The health effects of the tests on the British participants have been investigated, and three successive Reports have been issued. In 1999 the Commonwealth Government resolved that a nominal roll would be compiled of Australian participants in the tests. This nominal roll would form the basis for a mortality and cancer study.

There are three reports from the study:
(i) a report on radiation exposures, from a panel of health physicists with expertise in radiation physics
(ii) a report on mortality
(iii) a report on cancer incidence, and a case-control study on the occurrence of leukaemia in relation to radiation exposure.

This summary covers the latter two reports.

Study population

The study population was based on the nominal roll of test participants compiled by the Department of Veterans’ Affairs (DVA). The study population comprised 10983 male subjects, of whom 7116 were military participants and 3867 civilians.

At the end of the study period 5494 subjects (50%) were confirmed living, and 4427 subjects (40%) were confirmed deceased. A further 23 participants were known by DVA to be deceased, but
corroborating evidence for the death could not be found. One hundred and five participants (<1%) were known to be living overseas or to have died overseas. The vital status of 934 subjects (8.5%) on the cutoff date was unknown.

Cancer incidence was studied from 1982 to 2001. Because cancer rates in the study population were compared with national rates, and because national rates are only available from 1982 onwards, this study excluded test participants who died before 1982. This does not greatly affect the study findings, as cancers caused by environmental factors do not usually develop until several years after initial exposure. Participants who died before 1982 were excluded, leaving 9558 subjects in the cancer incidence study.

Study methods

Mortality rates and cancer incidence rates in participants were compared with national rates, which are compiled by the Australian Institute of Health and Welfare.

Because of the substantial number of subjects lost to follow-up, two methods of analysis were conducted. In Method 1, subjects lost to contact on the starting date of 1 January 1982 were excluded from the study. In Method 2, subjects lost to contact were treated as if they were still alive and living in Australia. Method 2 represents the lower extreme of the range of mortality and cancer incidence rates, and it is likely that Method 1 provides a closer estimate of true rates. Therefore for clarity of presentation only results from Method 1 are presented in this summary.

Mortality is expressed as a Standardised Mortality Ratio (SMR), with a confidence interval. The SMR is the ratio death rates in the participants compared with the number expected if the rate was the same as the general Australian population. A SMR greater than 1.0 indicates that the mortality is greater than in the general population, and a SMR less than one indicates that it is less. However the SMR is only an estimate of true mortality. The confidence interval (CI) is a statistical estimate of the likely range within which the true mortality lies. If the lower boundary of the confidence interval exceeds 1.0, we can be reasonably certain that the true SMR exceeds 1.0, in which case the SMR is statistically significantly increased, i.e., the mortality rate is higher than in the general population. Conversely, if the upper boundary of the confidence interval is less than 1.0, the SMR is statistically significantly lowered.

Only statistically significant findings are shown in this summary. A “significant” increase in SMR refers to a statistically significant increase, i.e., that the true mortality rate is likely to exceed that of the general population. It does not necessarily mean that it is a large increase.

Cancer incidence refers to the rate of occurrence of new cancers, regardless of whether the outcome is fatal. The Standardised Incidence Ratio (SIR) is similar to the SMR, and like the SMR, if the SIR is greater than 1.0, then the test participants have a greater than expected number of cancers.

Results

Death rates

The commonest causes of death were cancer – 1497 deaths – and ischaemic heart disease (coronary artery disease) - 1148 deaths. Other leading causes of death were stroke (254), respiratory disease (338) and external causes, i.e., accidents, poisoning and suicide (316, including deaths in the first two years after entry to the cohort).
The overall death rate was not significantly different from the Australian male population.

In RAN personnel mortality was significantly higher than in the general population using either method. In RAAF personnel mortality was significantly lower than in the general population using either method.

Cancer mortality was 18% higher than in the general male population. Mortality rates for diseases other than cancer were not elevated. Mortality from ischaemic heart disease was significantly lowered compared with the general population. Mortality from respiratory diseases was close to population rates. The death rate from external causes (suicide, poisonings, injury), was lower than in the general male population. The suicide rate was 65% less than the rate in the population.

SMRs by major cause are shown in Table 1.

Table 1: Standardised Mortality Ratios (SMRs) for main causes of death

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>SMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>All causes</td>
<td>1.02</td>
</tr>
<tr>
<td>All cancers</td>
<td>1.18*</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>0.90*</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.86*</td>
</tr>
<tr>
<td>Respiratory disease</td>
<td>1.05</td>
</tr>
<tr>
<td>External causes (eg accidents, poisoning)</td>
<td>0.88*</td>
</tr>
<tr>
<td>Suicide</td>
<td>0.35*</td>
</tr>
</tbody>
</table>

SMR >1 means mortality rate greater than in the general male population
SMR <1 means mortality rate less than in the general male population
* means that mortality rate is significantly different from the general population
Cancer mortality and incidence

A total of 2499 cancers occurred from 1982 to 2001.

The death rate from cancer was 18% above the population rate, and there was an excess of 25% in cancer incidence. Mortality and incidence rates were significantly greater than in the general population for a number of cancers, as shown in Table 2.

Table 2: Standardised Mortality Ratios (SMRs) and Standardised Incidence Ratios (SIRs) for selected cancers

<table>
<thead>
<tr>
<th>Cancer type</th>
<th>SMR</th>
<th>SIR</th>
</tr>
</thead>
<tbody>
<tr>
<td>All cancers</td>
<td>1.18*</td>
<td>1.25*</td>
</tr>
<tr>
<td>Lip, oral cavity and pharynx</td>
<td>1.50*</td>
<td>1.41*</td>
</tr>
<tr>
<td>Oesophagus</td>
<td>1.15</td>
<td>1.51*</td>
</tr>
<tr>
<td>Lung</td>
<td>1.20*</td>
<td>1.30*</td>
</tr>
<tr>
<td>Mesothelioma</td>
<td>na</td>
<td>1.46</td>
</tr>
<tr>
<td>Colorectal</td>
<td>1.24*</td>
<td>1.19*</td>
</tr>
<tr>
<td>Melanoma</td>
<td>1.22</td>
<td>1.40*</td>
</tr>
<tr>
<td>Prostate</td>
<td>1.26*</td>
<td>1.24*</td>
</tr>
<tr>
<td>All leukaemias</td>
<td>1.18</td>
<td>1.45*</td>
</tr>
<tr>
<td>All leukaemias except chronic</td>
<td>1.25</td>
<td>1.61*</td>
</tr>
<tr>
<td>lymphatic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SMR/SIR >1 means mortality/incidence rate greater than in the general male population
SMR/SIR <1 means mortality/incidence rate less than in the general male population
* means mortality/incidence rate is significantly higher than in the general population

Cancer mortality and incidence by service category

Of the 26 mesothelioma cases in the cohort, 16 occurred in RAN personnel, and there was a significant 180% mesothelioma excess compared with the general population. Naval personnel showed a significant excess of both deaths and cancer incidence for all cancers (16% and 31% respectively), and lung cancer (48% and 51%). Cancer incidence was also significantly raised for cancers of the lip, oral cavity and pharynx (48%), melanoma (32%), prostate cancer (27%), and leukaemias other than chronic lymphatic leukaemia (non-CLL leukaemia, 87%). There was excess mortality from colorectal cancer.

In army personnel, the only incident cancer in significant excess was pancreatic cancer.

In RAAF personnel both mortality and incidence of melanoma were significantly elevated, with a doubling of the incidence rate. There was a significant excess incidence of prostate cancer (32%), all leukaemias (71%) and all leukaemias other than chronic lymphatic leukaemia (78%).

In civilian participants the all-cause mortality and cancer incidence were elevated (21% and 22%). There was an excess of both mortality and incidence of lung cancer (30% and 42%). There were also excesses of cancers of the lip, oral cavity and pharynx (41%), colorectal cancer (29%) and prostate cancer (17%).
Radiation exposure

To enable measurement of any association between mortality and exposure to ionising radiation, an assessment of past radiation exposure of all subjects was made by a panel of health physicists. Assessments were based on subject information from the nominal roll (time on site in relation to timing of tests, service division, occupation) combined with records including results of radiation monitoring and descriptions of tasks. Both internal and external sources of radiation were assessed. Each subject was assigned to one of six categories of radiation exposure, ranging from less than 1 milliSievert (Category A) to more than 50 milliSieverts (Category E). Category F was used where the exposure could not be assessed.

Only 5% of the study population had an estimated radiation exposure greater than 20 milli-Sieverts (mSv) from test participation, and 79% had an estimated exposure of less than 1mSv. The estimated mean radiation exposure of the study population was 2.8mSv. For purposes of comparison, the annual Occupational Exposure Limit to ionising radiation is 20mSv, and the mean annual estimated exposure from natural background radiation is approximately 2.5mSv world-wide, and 1.5mSv in Australia. (The estimated average exposure of 2.8mSv refers to the exposure from the testing program, and is additional to the background exposure.)

For cancers with potential association with radiation, the cancer death rates were compared between the different exposure categories. Category A, the lowest exposure category, was used as the baseline group for comparison. If an association with radiation exposure existed in this cohort, there would be a trend to increasing death rates with categories of increasing exposure.

No cancer known to have an association with radiation showed any increase in mortality or incidence with increasing radiation exposure in this cohort. Although chronic lymphatic leukaemia did not occur in significant excess, it showed a trend to increasing incidence with increased radiation exposure, however there is little evidence for this type of cancer being caused by radiation. This is possibly a chance finding.

The lack of association between these cancers and radiation is not unexpected, given the generally low levels of exposure. For example, the average exposure in the test participants was about 100 times less than the dose received by the people who survived the Japanese atomic bombs, in whom excess cancers were found. The average radiation exposure in this cohort was only slightly above the background exposure experienced by all people in a single year.

Leukaemia

Leukaemia is a cancer of particular interest because of its well-established association with ionising radiation exposure, but no association was found between the level of radiation exposure and death from non-CLL leukaemia. This lack of association was confirmed in a case-control study, where the radiation exposure of participants with non-CLL leukaemia was compared with that of a sample of participants who have not been diagnosed with non-CLL leukaemia (called the control group). Altogether 54 leukaemia cases and 216 controls were included in this study. To assess exposure the panel made a detailed examination of each subject’s activities at the test sites, using documents such as service records. No association between the incidence of leukaemia and radiation exposure was found.
The lack of association between non-CLL leukaemia and radiation in this cohort is to be expected given the low exposures. The findings are similar to those of the study conducted in the UK of British participants in the nuclear tests, where non-CLL leukaemia incidence was raised relative to controls. The UK study findings were also similar to those of the current study in finding no association with radiation exposure, although in that study the numbers presumed exposed were small, and there were no retrospective exposure assessments such as were made in this study.

The overall excess of non-CLL leukaemias is unexplained. Other known causes of leukaemia include benzene exposure, viral infection, and possibly population mixing, but investigating these causes was beyond the scope of this study. There is limited evidence that leukaemia mortality increases with increased socioeconomic status, that is, it shows an upward trend in higher socioeconomic groups such as professional and executive occupations. However there is no evidence that this is a factor in the increased incidence of non-CLL leukaemia in the test participants.

**Mesothelioma**

Of 26 incident cases of mesothelioma, 16 occurred in RAN personnel, a more than 2½-fold excess compared with the general population. This cancer is nearly always associated with past exposure to asbestos, and asbestos in naval vessels is the likely source of exposure in most of these cases. It is likely that repeated asbestos exposure occurred, which need not necessarily have occurred at the time of the nuclear tests.

Of the other 8 cases, 6 occurred in civilians. Because the cases could not be individually matched (due to privacy laws) the occupation of these civilians is unknown. However, many of the civilian subjects in the cohort were in the construction industry, where asbestos was commonly used, at a time when less caution was exercised than in recent years. Whether any of these subjects were exposed to asbestos during the nuclear tests is not known.

**Lung cancer**

An excess of lung cancer always suggests a higher smoking prevalence than in the general population.

However some contribution from asbestos is also likely. The occurrence of mesothelioma in RAN and civilian subjects is a definite indication of asbestos exposure, and occurrence of other asbestos-related diseases would therefore not be surprising. RAN and civilian participants also had the highest rates of lung cancer, which has a known association with asbestos.

There was no association between lung cancer incidence and radiation exposure in this cohort. Although previous studies have shown an association between lung cancer and ionising radiation, this result is not unexpected given the generally low average radiation exposure found in this study.

**Melanoma**

There was a significant excess of melanoma in RAAF personnel. The occurrence of excess melanoma has been noted elsewhere in aircrew, and occupational exposure to cosmic radiation has been considered as a possible cause. Because of privacy constraints, it was not possible to identify which of the 72 cases in RAAF personnel were air crew. However only 4 of the 22 melanoma deaths in RAAF personnel were known to be air crew. (The occupation of 5 decedents is not known.)
There was no significant trend in melanoma incidence with increasing radiation exposure.

**Colorectal cancer**

Although colonic cancer has been cited as a radiogenic cancer, there was no association between mortality or incidence of this cancer and radiation exposure. Asbestos exposure is a possible contributing factor to the excess of colorectal cancer mortality. Colorectal cancer mortality was significantly elevated in RAN personnel, who also had the highest mortality from lung cancer and most of the cases of mesothelioma, diseases known to be associated with asbestos exposure.

**Head and neck cancer (cancers of the lip, oral cavity and pharynx)**

Both mortality and incidence of these cancers occurred in significant excess. Head and neck cancers are strongly smoking related. Alcohol use is a possible contributing factor to this cancer, but the lack of an excess incidence of liver cancer suggests that alcohol consumption is not excessive in this cohort.

**Prostate cancer**

A possible contributing factor to the excess in this cohort is increased intensity of diagnosis in the military participants. The reported incidence of prostate cancer has risen in recent years following the introduction of PSA (prostate specific antigen) testing. It is plausible that ex-service personnel would be undergone more intensive medical surveillance and care than the general population, so that diagnosis of the cancer from PSA testing is more likely.

**“Radiogenic cancers”**

Radiogenic cancers are a group of cancers which have been shown in the Life Span Study of Japanese atomic bomb survivors to be causally associated with radiation. They are cancers of the thyroid, stomach, colon, liver, lung, breast, ovary, bladder, and leukaemia (excluding chronic lymphatic leukaemia), and non-melanoma skin cancer. Both mortality and incidence of this combined group of cancers was significantly elevated. However no association was found with radiation exposures. Of the cancers classified as “radiogenic”, over 75% were lung or colorectal cancers, and it is likely that the excess of this group of cancers is due to other factors associated with these particular cancers.

387/05

**The effect of a blast protective ensemble on physiological strain and physical capabilities**

**Executive Summary**

The LAND125 Project Office tasked CBRN DC to investigate the human factors issues relating to currently available combat body armour ensembles in order to provide guidance for future procurements. The investigation comprised of two studies. One was designed to assess the ergonomic factors related to wearing the ballistic armour (BA) protective ensembles when conducting criterion infantry tasks. The other study assessed the heat retention properties of the ensembles and the subsequent work capabilities in hot-wet and hot-dry environments. The functional ergonomic assessments were performed over two days on 16 soldiers. Assessments included criterion infantry tasks (basic drill, 10m crawl & weaponsighting) and functional movement activities that examined issues relating to ergonomics, comfort, usability, user acceptance, component integration and task performance. Seven different body armour ensemble configurations were assessed.
The same sixteen infantry soldiers participated in a separate heat stress study. Soldiers were divided into two groups of eight. One group conducted all trials in a hot-wet environment (36°C and 60% relative humidity), while the other group conducted all trials in a hot-dry environment (43°C and 30% relative humidity). The hot-wet group completed three trials in different protective ensembles (CBA, ECBA + ATT and CBA + Blast), whereas the hot-dry group completed two trials wearing the CBA and ECBA + ATT ensembles. Trials consisted of walking on a treadmill at 2 km/hr for 90 min followed by walking at 4 km/hr for 60 min. Core and skin temperatures, heart rate, sweat loss, energy expenditure, psychophysical behaviour and subjective performance were recorded at various intervals throughout all trials. In all trials and assessments, soldiers carried their weapon and wore DPCU, boots, 12 kg of chest webbing and an ECH. CBA, ECBA & PINN vests were rated as the most acceptable body armour ensembles for all functional tasks and activities assessed.

The most significant negative influence was caused by the addition of the attachments. The addition of the attachments and/or the Blast Vest (alone or in combination) reduced a soldier’s survivability and lethality, in terms of speed and range of movement. Similarly, the addition of the attachments and/or Blast Vest to all body armour ensembles affected subjective performance in the criterion infantry tasks with bulkiness, weight, inflexibility of the ensemble and restricted range of movement as the major reasons for performance degradation. Observations from this study highlight the need for correctly fitted body armour vests to be properly integrated with chest webbing, attachments and blast vests to reduce bulk and improve shoulder, arm and neck range of movement. Further, the modularity of the BA systems that have attachments is beneficial such that a single system can be employed and the protection level can be easily modified. However, further work is required to determine the necessary protection levels and coverage areas for attachments. It is possible that reduced protection levels and coverage areas are permissible for the attachments and subsequently reduce bulk, improve integration with the vest and consequently minimise the impact on criterion infantry task performance.

The expected ballistic threats need to be discussed with Army and DMO to determine appropriate protection levels and coverage areas. While the double layer ECBA+Blast ensemble impaired criterion infantry task performance, it is clear that the thicker ECBA and PINN vests did not have a significant effect on performance in relation to the CBA vest. Therefore, the objective is to incorporate ballistic and blast protection into a single ensemble with a thickness similar to the ECBA and PINN vests. This would provide improved protection with minimal effects on criterion infantry task performance. The Blast Vest did not exacerbate the physiological strain or compromise work performance in the hot-wet environment compared to wearing standard CBA. However, the greater skin surface area coverage of the ECBA ensemble resulted in a substantial reduction in work capacity in both hot-wet and hot-dry conditions. The hot-wet condition resulted in greater physiological strain than either EBCA in hot-dry or CBA in either environment. Further, the addition of the Blast Vest did not result in greater physiological strain when compared to the in-service CBA. However, the ECBA resulted in considerably greater physiological strain (only in hot-wet conditions) and reduced work endurance. This was due to the greater skin surface area coverage induced by the attachments that impeded sweat.
evaporation and resulted in greater sweat loss, skin temperatures, heart rate, and perceived thermal sensation, comfort, and exertion. In summary, a working group is required to define threats and likely injury areas. This will determine the level of protection and coverage of BA and attachments. Second, devise construction and method of attachment for peripheral blast components to maintain task performance. Third, integration of blast components, ebbing and a cooling system.

373/04
The effects of heat stress on simulated flight performance

Abstract: It is well known that elevations in body temperature can impair both physical and cognitive performance. For helicopter pilots, the major heat source during flight originates from solar radiation. However, when nuclear, biological and chemical (NBC) protective clothing is worn, metabolic heat generated during the pre-flight period, and during the mission, is trapped, exacerbating thermal strain. In this project, the hypothesis that elevations in body heat content would degrade flight performance was tested. Six helicopter pilots completed three, two-hour flight simulations under three levels of thermal strain, administered in a balanced order. Thermal strain was induced using a water-perfusion garment, worn under flight and NBC clothing, and supplied with water that would elicit skin temperatures of 33°C (control), 37°C (moderate) and 39°C (hot). Each sortie was programmed and controlled by the simulator flight officer (blind to treatment order), and was comprised of eight flight circuits, each involving takeoff and landing exercises. During each circuit, the pilots were required to identify and solve two operational problems, graded as “easy”, “moderate” and “hard”. Terminal core temperatures for each trial were: 37.4°C (±0.13; control), 38.4°C (±0.16; moderate) and 38.8°C (±0.15; hot). This strain was also reflected within the terminal heart rates: 85.0 b.min⁻¹ (±5.2; control), 126.0 b.min⁻¹ (±5.0; moderate) and 147.3 b.min⁻¹ (±6.0; hot). The simulator officer independently graded pilot performance, and while the moderate trial resulted in slightly reduced performance scores, relative to control (P<0.05), scores were significantly lower in the hot trials (P<0.05). Strong correlations existed between the thermal load and both the effort needed to sustain the appropriate flight performance, and the pilots’ own assessment of performance quality. From these data, it appears that mean body temperature may be linked with perceived performance quality, whilst mean skin temperature appears to be linked with effort perception. In both instances, the explained variance exceeded 65%.
Protocol Status as at 30 June 2006

The status of all ADHREC Protocols as at 30 June 2006 is tabulated below. A total of 446 protocols are listed with ADHREC. 66 are currently in progress and 11 are pending further action from the researcher before ethical approval to undertake the research is granted, thus a total of 77 protocols are active.

<table>
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<tr>
<th>Status</th>
<th>Status of New Protocol 05/06</th>
<th>Total Status of Protocols Listed with ADHREC for 06</th>
<th>Active</th>
<th>Inactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Progress</td>
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<td>Completed</td>
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<tr>
<td>Total</td>
<td>52</td>
<td>446</td>
<td>77</td>
<td>369</td>
</tr>
</tbody>
</table>
Publication of complete research

It is a condition of ADHREC approval that the researchers intend to publish the results in an accessible medium, except where security implications prevent this. Research can be published in a number of formats: as a Masters thesis or Doctoral dissertation, in various medical and scientific journals, in technical reports, or as part of a presentation or poster at a seminar or conference.

The graph below represents the proportions of completed research projects that have been published. Of the protocols registered with ADHREC that have been completed, 56% have been published or are in the process of being published.

Publication Status of Completed Protocols

The next graph provides a break down of the media in which this research has been published.

- Published: 49%
- Pending: 29%
- Not Published: 16%
- Unpublished: 6%
Journals in which ADHREC cleared research has been published include, but are not limited to, the following:

- Australian and New Zealand Journal of Surgery
- Aviation, Space and Environmental Medicine Journal
- Journal of Applied Physiology
- Journal of Clinical Infectious Diseases
- Journal of Hand Therapy
- Journal of Medical Entomology
- Medical Journal of Australia
- Military Medicine (USA)
Activities & Initiatives

A new Australian Defence Force Publication (ADFP) -
ADFP 1.2.5.3 - Health and Human Performance Research in Defence -
Manual for Researchers

In response to the need to appropriately manage Health and Human Performance research within the Australian Defence Organisation (ADO), the Defence Health and Human Performance Research Committee (DHHPRC) was developed to oversee and manage this body of research. The DHHPRC, through the development and publication of the annual Health and Human Performance Research Master Plan, identifies and prioritises the areas of Health and Human Performance of greatest concern to the ADF in achieving its strategic goals.

Together, ADHREC and the DHHPRC coordinate and monitor aspects of health and human performance research in the ADO. All health and human performance research requires endorsement from the DHHPRC prior to being considered for approval by ADHREC. The functioning of both committees is closely related, and an ADFP detailing their roles is being drafted. The component on the role and function of ADHREC has been taken from the ADHREC Researcher’s Guidelines that were drafted during 1999 and 2000.

The ADFP details the requirements of researchers when submitting protocols for endorsement by DHHPRC, ethical approval from ADHREC, or both. It provides guidance on when to seek ADHREC approval, detailing the scope of ADHREC’s charter. The ADFP was published in early 2003.

Audit of Research

In 1999, the Committee decided to conduct audits of researchers’ files and practices, as an additional means of facilitating and improving ADHREC’s monitoring of Defence research. This has become a regular activity of ADHREC.

During 2003/2004, the ADHREC Secretariat conducted one audit of ADHREC approved research protocols.

The use of audits to monitor ADHREC approved research has proven to be most beneficial in clarifying with researchers what is required of them as part of ADHREC approval. ADHREC will continue to conduct audits of approved research as standard monitoring procedure, ensuring the continued compliance of Defence research with the NHMRC guidelines.

In 2003/2004 the Secretariat conducted one audit at the Army Malaria Institute in Brisbane. From this audit on the trial titled 249/01 Evaluation of mefloquine for the prophylaxis of malaria in non-immune Australian soldiers.

ADHREC did not conduct any audits during 2004/2005.
In June 2006 the Secretariat conducted an audit at the Army Malaria Institute in Brisbane. ADHREC audited 6 trials titled:

Protocol 292/02: Randomised, double-blind, phase 2 study of the safety, immunogenicity and duration of immunity of Chimervax – JE, live attenuated vaccine in healthy adults (H-040-005)

Protocol 345/03: Randomised, double-blind, phase 2 evaluation of the safety and immunogenicity following administration of live attenuated JE Vaccine (CHIMERICVAX™-JE) and Yellow Fever Vaccine (STAMARIL)

Protocol 344/03: Phase 2 study of the safety and immunogenicity of Chimervax™-JE, live attenuated vaccine in healthy adults previously vaccinated with JE-VAX.

Protocol 213/00: Safety and immunogenicity of two live-attenuated Dengue vaccine formulations in healthy Australian adults (AVENTIS - DEN05299)

Protocol 407/05: Randomised, Double Blind, Multicentre, Placebo Controlled Phase III study of the safety and tolerability following administration of live attenuated JE Vaccine (ChimerivaxTM_JE), including information brochure H-040-10


Protocol 408/05: AMI Cooperation with Qpharm-Acambis Protocol H-040-007 Bridging Study (Randomised, double-blind, placebo controlled phase 2 dose-ranging study of the safety, tolerability and immunogenicity of live attenuated chimerivaxTM JE vaccine (Lyophilizes)
Major Researchers in Defence

Major researchers within Defence who have had protocols considered by ADHREC include:

**Army Malaria Institute (AMI)**
Areas of research include prevention and treatment of vector borne disease through pharmacological agents (e.g. medications - both vaccines and oral medicines, and insect repellents) or physical means (e.g. bed nets, protective clothing).

**Submarine and Underwater Medicine Unit (SUMU)**
Areas of research include prevention and treatment of decompression illness (the ‘bends’), evaluation of equipment and validity of diving tables.

**Royal Australian Air Force Institute of Aviation Medicine (RAAF AVMED)**
Both AVMED and individuals with an interest in Aviation Medicine have studied various effects of hypoxia (diminished availability of oxygen to body tissues) and gravitational forces (+Gz) on aircrew, their physiology and performance.

**Defence Science and Technology Organisation (DSTO)**
Various departments within DSTO have been researching the physiological responses of soldiers under different climatic and work conditions, evaluating equipment for use in the field and investigating options for optimum nutrition of soldiers.

**Directorate of Mental Health (DMH), Psychology Research Technology Group (PRTG) and the Directorate of Strategic Personnel Planning and Research (DSPPR).**
PRTG’s main tasks comprise the assessment of the human factors of the ADO, the development of selection techniques, e.g: psychometric or aptitude tests, and the evaluation of the utility and validity of psychological tests. PRTG also acts as a consultant to other areas of the ADO on matters of selection, training and retention of staff.

DSPPR provides the Defence Organisation with a consolidated personnel research capability to support strategic work force planning and strategic personnel planning. DSPPR also provides advice and assistance in relation to the evaluation of personnel management policies and practices.

**Other**
The majority of other researchers have been individuals completing Masters thesis Doctoral dissertations, and practising clinicians or epidemiologists with a special interest in the area researched. All research involving ADF personnel, as either researchers or subjects, that is brought forward for consideration by ADHREC must have some benefit to the ADF. The development and management of the Defence Health and Human Performance Master Plan makes this benefit more transparent.
Individuals conducting research for their Masters thesis or Doctoral dissertation form the largest group, followed closely by the Defence Science and Technology Organisation (DSTO) and the Army Malaria Institute (AMI). The next largest groups are researchers affiliated with Australian university departments and the RAAF Aviation Medicine Unit at RAAF Base Edinburgh, South Australia. To date, lesser amounts of research have been conducted by a variety of organisations, including other RAAF units, pharmaceutical companies, hospitals, the Department of Veterans Affairs (DVA), the Defence Community Organisation (DCO) and the Defence Material Organisation.

An indication of the areas being researched in Defence is given in the graph below.

**Areas of Research in Defence**

- AMI
- Army
- AVMED
- DCO
- DSTO
- DVA
- Hospital
- Individuals
- National Centre for PTSD
- Navy
- Pharmaceutical Company
- Prev Med
- Psych
- RAAF
- SUMU
- University
- Anthropometric
- Clinical Trial
- Dental
- Drug Trial
- Epidemiology
- Equipment
- Immunology
- Musculoskeletal
- Nursing
- Nutrition
- Physiology
- Psychology
- Social Work
- Surgery
**ADHREC’s Approach to Research Protocols**

ADHREC’s primary function is to assess all submitted protocols to determine whether that research is ethical. ADHREC applies the Privacy Principles to each protocol. The Committee pays particular attention to the issues of informed consent, quantification of risk, voluntary participation and that there be no detriment to the careers or medical care of volunteers whether they choose to participate or withdraw from the project. There are a number of reasons why a protocol may not be approved.

ADHREC does not grant retrospective ethics approval. The Committee is also reluctant to allow ADF personnel to participate in the collection of safety data for new drugs (pharmaceuticals) or participate in drug trials where there is no clear benefit to the individual or to the ADF. The Committee also does not approve protocols which have an inadequate study design, would not produce scientifically valid results, or projects that are likely to have adverse outcomes to the volunteers or their military careers. Similarly, where a researcher requests access to records maintained by the ADF (e.g. medical documents), ADHREC pays particular attention to Section 95 of the Privacy Act 1988.

If ADHREC determines that the benefit of the research does not outweigh privacy considerations, then the protocol will not be approved. Australian Defence Force personnel are in a unique position of receiving and following orders and as such they can be considered a ‘captive audience’. ADHREC is very sensitive to the relationship and importance of the functioning of the commanding officer, and the responsibilities associated with both duty and command. ADHREC balances this relationship with its awareness of the Defence population being a potentially ‘captive audience’, and the potential this has for impacting on research in the ADO environment. ADHREC recognises the operational imperative for the ADF to conduct health surveillance and assessment of efficacy of health protocols in an operational environment.
Future Activities
Australian Defence Human Research Ethics Committee

Number of Meetings
ADHREC conducted seven meetings in period from July 2005 to June 2006 and has planned eight meetings to occur in the period of July 2006 to June 2007 due to the growth of research conducted by, and for, the ADF.

Researcher Audits
The Committee plans to conduct further audits of approved protocols. Auditing facilitates and improves ADHREC’s monitoring of Defence research, in accordance with NHMRC guidelines.

Compliance with the National Statement on Ethical Conduct in Research Involving Humans - National Health and Medical Research Council (NHMRC)
In 1999, the NHMRC issued the ‘National Statement on Ethical Conduct in Research Involving Humans’ (the National Statement) made in accordance with the National Health and Medical Research Council Act 1992.

The National Statement combined a number of previously separately published documents, outlining comprehensively the membership and operations of HRECs, guidelines on the storage, handling and privacy of information held by HRECs, and on various components of health and medical research. It provides guidelines about maintaining the privacy and confidentiality of personal information or material of research participants.

ADHREC has been formed in accordance with the National Statement, and functions in compliance with the guidelines. ADHREC will continue to maintain its compliance with the National Statement, ensuring that ADHREC undertakes best-practice ethical review. ADHREC has developed mechanisms for receiving complaints or comments regarding both the considerations and conduct of the committee.
## Structure as at June 2006

### Australian Defence Human Research Ethics Committee

<table>
<thead>
<tr>
<th>Membership Appointment</th>
<th>Description</th>
<th>Name</th>
<th>Appointment Tenure</th>
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<tr>
<td>The Chair</td>
<td>Surgeon General Australian Defence Force SGADF</td>
<td>RADM Graeme Shirtley RFD</td>
<td>June 2005 – End of period as SGADF</td>
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<tr>
<td>Member</td>
<td>A laywoman not associated with the ADF</td>
<td>Mrs E. Grant, AM</td>
<td>7 Dec 1988-5 May 2008</td>
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<td>Member</td>
<td>A layman not associated with the ADF</td>
<td>Mr D. Dillon</td>
<td>7 Dec 1988-5 May 2007</td>
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<tr>
<td>Member</td>
<td>A member with knowledge of, and current experience in, the areas of research that are regularly considered by ADHREC</td>
<td>Dr A. Twomey</td>
<td>1 Jan 2000-9 Jan 2010</td>
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<tr>
<td>Member</td>
<td>A member with knowledge of, and current experience in, the professional care, counselling or treatment of people</td>
<td>Prof. J.H. Pearn, AM, RFD</td>
<td>1 Jan 2001-9 Jan 2011</td>
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<td>Member</td>
<td>A health graduate from Defence (One of two, one of who is to be a medical graduate)</td>
<td>COL P.G. Warfe, CSC, CStJ</td>
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<td>LTCOL V. Ross</td>
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<td>Member</td>
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<td>CAPT B. Byrne</td>
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<td>LTCOL R.A. Landy</td>
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<td>Ms Tess Winslade</td>
<td>From January 2005 – May 2006</td>
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<td>Ms Georgina Kourtis</td>
<td>From May 2006 - Present</td>
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<td>A staff officer nominated by HDHS</td>
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### Executive Secretary and Assistant Secretary

**Executive Secretary**
- LTCOL R.A. Landy
- N/A

**Assistant Executive**
- Ms Tess Winslade
- From January 2005 – May 2006

**Assistant Executive Secretary and Secretary**
- Ms Georgina Kourtis
- From May 2006 - Present
Attendances 2005/2006
Australian Defence Human Research Ethics Committee

Monday 04 July 2005 at 1630 Hours

Present:
Air Vice-Marshall Bruce Short, AM, RFD
Rear Admiral Graeme Shirtley, RFD RANR
Dr Rosemary A. Landy, RAADC
Mr David Dillon
Mrs Elizabeth Grant, AM
Chief Justice Terence Higgins
Monsignor (Air Commodore) Peter O’Keefe
Professor John H. Pearn, AM, RFD
Dr Alan Twomey, PhD
Group Captain James Ross
Lieutenant Colonel Vicki Ross, RAAMC
Colonel Peter Warfe, CSC, RAAMC
Wing Commander John Hatfield
Ms Tess Winslade

Outgoing Chair
Incoming Chair
Executive Secretary
Observer
Assistant Executive Secretary

Monday 29 August 2005 at 1630 Hours

Present:
Rear Admiral Graeme Shirtley, RFD RANR
Dr Rosemary A. Landy, RAADC
Mrs Elizabeth Grant, AM
Chief Justice Terence Higgins
Monsignor (Air Commodore) Peter O’Keefe
Colonel Kurt McCartney
Lieutenant Colonel Vicki Ross, RAAMC
Dr Alan Twomey, PhD
Colonel Peter Warfe, CSC, RAAMC
Ms Tess Winslade

Chair
Executive Secretary
Assistant Executive Secretary

Guests:
Colonel Tony Cotton

Apologies:
Mr David Dillon
Professor John H. Pearn, AM, RFD
Wing Commander John Hatfield
Monday 17 October 2005 at 1630 Hours
Present:
Rear Admiral Graeme Shirtley, RFD RANR
Lieutenant Colonel Rosemary A. Landy, RAADC
Mr David Dillon
Mrs Elizabeth Grant, AM
Chief Justice Terence Higgins
Professor John H. Pearn, AM, RFD
Dr Alan Twomey
Colonel Kurt McCartney
Lieutenant Colonel Vicki Ross, RAAMC
Colonel Peter Warfe, CSC, RAAMC
Ms Tess Winslade
Colonel (Dr) Jeff Brock

Apologies:
Monsignor (Air Commodore) Peter O’Keefe
Wing Commander John Hatfield

Monday 28 November 2005 at 1630 Hours
Present:
Professor John H. Pearn, AM, RFD
Lieutenant Colonel Rosemary A. Landy, RAADC
Mr David Dillon
Mrs Elizabeth Grant, AM
Colonel Kurt McCartney
Dr Alan Twomey
Lieutenant Colonel Vicki Ross, RAAMC
Colonel Peter Warfe, CSC, RAAMC
Ms Tess Winslade
Wing Commander John Hatfield

Apologies:
Rear Admiral Graeme Shirtley, RFD RANR
Chief Justice Terence Higgins
Monsignor (Air Commodore) Peter O’Keefe

Chair
Executive Secretary
Assistant Executive Secretary
Observer
Acting Chair
Executive Secretary
Assistant Executive Secretary
Permanent Observer
Chair
Permanent Observer
Monday 27 February 2006 at 1630 Hours

Present:
Rear Admiral Graeme Shirtley, RFD RANR                      Chair
Lieutenant Colonel Rosemary A. Landy, RAADC                Executive Secretary
Colonel Peter Warfe, CSC, RAAMC
Professor John Pearn, AM, RFD
Colonel Kurt McCartney, USAF
Lieutenant Colonel Vicki Ross, RAAMC
Monsignor (Air Commodore) Peter O’Keefe, RAAF
Mr David Dillon
Mrs Elizabeth Grant, AM
Chief Justice Terence Higgins
Dr Alan Twomey
Ms Georgina Kourtis
Ms Tess Winslade

Monday 10 April 2006 1630 Hours

Present
Rear Admiral Graeme Shirtley, RFD RANR                      Chair
Lieutenant Colonel Rosemary A. Landy, RAADC                Executive Secretary
Professor John Pearn, AM, RFD
Monsignor (Air Commodore) Peter O’Keefe, RAAF
CAPT Brendan Byrne, RAN
Colonel Peter Warfe, CSC, RAAMC
Lieutenant Colonel Vicki Ross, RAAMC
Chief Justice Terence Higgins
Dr Alan Twomey
Mr David Dillon
Mrs Elizabeth Grant, AM
Ms Tess Winslade

Apologies:
WGCDR John Hatfield
Monday 29 May 2006 1630 Hours

Present:
Rear Admiral Graeme Shirtley, RFD RANR
Lieutenant Colonel Rosemary A. Landy, RAADC
Professor John Pearn, AM, RFD
Colonel Peter Warfe, CSC, RAAMC
Lieutenant Colonel Vicki Ross, RAAMC
Wing Commander Michael Seah, RAAF
Dr Alan Twomey
Mr David Dillon
Mrs Elizabeth Grant, AM
Ms Georgina Kourtis

Chair
Executive Secretary

Assistant Executive Secretary

Apologies:
Captain Brendan Byrne, RAN
Chief Justice Terence Higgins
Monsignor (Air Commodore) Peter O’Keefe, RAAF

Guests:
Wing Commander John Hatfield, RAAF
Colonel Stephan Rudzki, RAAMC
### Expenses 2005/2006

**Australian Defence Human Research Ethics Committee**

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<tr>
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<th>JULY</th>
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Contacts/Information
Australian Defence Human Research Ethics Committee

Contact Details
Contact details for ADHREC are as follows:

Executive Secretary
Australian Defence Human Research Ethics Committee
CP2 - 7 - 129
Department of Defence
CANBERRA ACT 2600

Phone: 02 62663837
Fax: 02 62664068
E-mail: ADHREC@defence.gov.au

More Information
The Defence Health Services (DHS) Defence Intranet web site can be accessed at http://defweb2.cbr.defence.gov.au/dpedhs where there are links to ADHREC. At this site, the ADHREC Researchers Guidelines, ADHREC’s Guidelines for Volunteers as well as information on all the committee members can be accessed.

DHS has developed an internet site at www.defence.gov.au/dpe/dhs. Go to quick click box click on Research then on ADHREC. This site shows the history of ADHREC, its members and the steps required to fill out and submit an application. There are also links to the Psychology Research Technology Group (PRTG) and the Defence Health and Human Performance Research Committee (DHHPRC).