

Mercer's Institute for Research on Ageing



Annual Report 2005

Index

Section	Pages
MIRA Personnel (Past and Present)	2-4
Synopsis of the Annual Report	5-7
The Memory Clinic	8-17
Falls, blackout, Bone Protection and Osteoporosis Unit	18-23
Medical Physics and Bio- Engineering	24-26
Partnership	27
Publications	28-33

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Professor Brian Lawlor
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(Whose published work carried out while in the MIRA is listed in the bibliography)

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Medical Social Worker

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PhD Student

Ms. M. O'Reilly

Synopsis of the Annual Report 2005

The Mercer's Institute for Research on Ageing again had a very successful year in 2005. We are deeply appreciative of the support that we receive from the Mercer's Hospital's Foundation, from the Department of Health and Children and from St James's Hospital. With this ongoing generous support and funding we have been enabled to maintain and develop an increasing range of clinical services and research programmes on behalf of the elderly population that we serve.

Appointment of Professor Rose Ann Kenny

This year with the financial support of Atlantic Philanthropies we saw the appointment of Professor Rose Anne Kenny who assumed the post of full time Professor in Geriatric Medicine in Trinity College. Professor Kenny joined us in September 2005. She is a world expert in the area of falls and blackouts and she has already established a major clinical and research facility in the north east of England. We are most fortunate to have her join us with her valuable expertise, research and clinical skills and we warmly welcome her to St. James's Hospital and to the Mercers Institute.

Presentation to Professor William Watts and the Establishment of the Watts Clinical Research Fellowship

A special function took place in December 2005 in Trinity College Dublin to celebrate the announcement of the Watts Clinical Research Fellowship which will be based in the Mercer's Institute for Research on Ageing at St. James's Hospital. To mark the occasion Professor Davis Coakley, chairman of the Steering Committee of the Mercer's Institute, presented Professor William Watts with a first edition of the *History of the City of Dublin* by Walter Harris, which was published in 1766. It contains the earliest history of Mercer's Hospital which had opened in 1734.

The Mercer's Institute for Research on Ageing (MIRA) was established in 1988 as the major beneficiary of the Mercer's Hospital Foundation. Professor Watts was the first chairman of the Mercer's Hospital Foundation and both he and the Foundation have been strong supporters of the Mercer's Institute since then.

Throughout its long history Mercer's Hospital served the needs of the sick poor of Dublin and before its closure in 1983 both the board of governors and the medical board recommended that the proceeds from the sale of the hospital should be used to help promote a specialised centre of care and research on ageing at St. James's Hospital. In this way both the ethos and the name of Mercer's Hospital would be perpetuated in the new development at St. James's Hospital.

Since its foundation the Mercer's Institute has gone from strength to strength. It developed the first memory clinic in Ireland where many patients have been investigated and treated, using internationally accepted standards. It has also developed a busy

osteoporosis prevention and treatment service and more recently a falls and syncope service and an update on each of these units are included below in this years report.

It has attracted major research grants and has been involved in E.U. collaborative studies. The Institute has encouraged multidisciplinary teamwork in research and service from the beginning and it has advanced the training of numerous young professionals.

The Steering Committee of the Mercer's Institute for Research on Ageing also announced at this function the establishment of the Watts Clinical Research Fellowship to honour Professor Watts and to mark the special contribution he has made to the development of the Institute, as the first chairman of the Mercer's Hospital Foundation. Professor Watts, former Provost of Trinity College Dublin (1981-1991) has a renowned international reputation as a scientist in geological and botanical research. He also served as Chairman of the Health Research Board.

The function was also attended by Mrs. Geraldine Watts, by the current chairman of the Mercer's Hospital Foundation, Mr. Graham Heather his wife Meriel, the secretary Mr. Richard Ensor his wife Hazel and Mr. Desmond Dempsey. The Steering Committee of the Mercer's Institute for Research on Ageing were also present.

The main areas of clinical research continue to be :-

- 1. The Memory Clinic.**
- 2. Falls, Blackout, Bone Protection and Osteoporosis Unit.**
- 3. Medical Physics & Bioengineering.**

Memory Clinic

Over 3,000 patient assessments have now been carried out in our memory clinic since it was established and the service has gained a national and international reputation for its work in the areas of cognition and behavioural management in patients with impaired memory. These conditions include Alzheimer's, Mini Strokes, Parkinson's and Lewy body disease. The neuropsychological testing has become increasingly sophisticated and with more enhanced tools of neuro imaging we are now better able to establish the underlying causes of these conditions. This enabled us to develop treatment programmes which permits the real possibility of delaying and even reversing cognitive impairment in many patients by providing specific treatment for individual cases. It also allows us to target support options which enables better care for the patient in the home environment. Looking at different diagnostic tools, neuropsychological tests and therapeutic options remain at the centre of the memory clinic's work. The Dublin Healthy Ageing study is allowing us to gather a comprehensive set of broad personal, medical and laboratory data and providing us with invaluable information on elderly patients currently active and living in the community. Data from this study will be of value in planning of services for the elderly in the future and will help to identify factors associated with successful ageing.

Falls, Blackout, Bone Protection and Osteoporosis Unit

This year saw the opening of the new Falls and Blackout Unit next to the Accident and Emergency and Cardiac Departments in the main hospital. This has allowed the unit to provide an immediate response service to patients who attend St. James's Hospital with falls and blackouts. It enables an accurate diagnosis of the medical conditions which gave rise to the fall and permits a comprehensive treatment plan to be put into place for each individual patient. Our assessment and support of patients who fall at ward level has expanded with the improved clinical nurse staffing attached to our unit. The aim is to proactively prevent falls and fractures at ward level in at risk patients. We also have expanded our Bone Protection and Osteoporosis treatment service and have established additional clinics in the Mercer's Institute and in the main hospital. The aim is for all patients who attend or are admitted to St James's Hospital with peripheral and hip fractures to receive a comprehensive assessment and a targeted treatment programme to strengthen their bones and prevent further fractures. We also have an increasing volume of patients with severe established osteoporosis referred for specialised advice on the management of their fragile bones.

Medical Physics & Bioengineering

The bioengineering department has seen a major development in its programme and staffing during 2005. The measurement and biophysics of ocular microtremor with application in brain injury, neurological disease and ophthalmic pathology remains a central part of its research activity. Two techniques for recording ocular microtremor are being studied - The piezoelectric electric method and the non contact laser technique. The aim is to minaturise and make portable the techniques used. Close collaboration is currently underway with the Department of Electrical Engineering in UCD. Work in assisted living and wireless sensor networks are underway in collaboration with the National Dementia Information and Development Centre and with the Department of Medicine for the Elderly in St. James's Hospital. Other work on sensor research is being developed with Dublin City University on a portable gait analysis system for detecting falls and monitoring and assessing periods of shuffling in individuals with Parkinson's disease. Close collaborative work is also underway with our Falls and Blackout Unit on developing a sensitive and standardised method of carotid sinus stimulation which will allow for an earlier and more thorough identification of the causes of falls in those patients who suffer from carotid sinus hypersensitivity which is a major cause of falls in elderly patients.

The Memory Clinic

Introduction

A facility for cognitive assessment has become increasingly important as the population in Ireland ages. The Memory Clinic in the Mercer's Institute for Research on Ageing was established in 1991 with the help of a grant from the Irish Health Research Board to assess memory disorders in older people. It was the first memory clinic to be established in the Republic of Ireland and has acquired considerable expertise in assessing and diagnosing cognitive disorders. The Memory clinic remains an essential part of the Department of Medicine for the Elderly as well as Old Age Psychiatry at St. James's Hospital, complementing the services of these departments in providing a diagnostic and therapeutic approach to people with cognitive problems. This clinic assesses patients with a variety of diagnoses including Alzheimer's Disease, Vascular Dementia, Dementia of Lewy Bodies and Frontal-temporal Dementia.

There are a number of components to the Memory Clinic including Patient Assessment sessions, the Intervention Clinic, Family Meetings, Feed-back Meetings and the Memantine Clinic. 14 slots are available on average for general assessments per week. These sessions are currently run by a clinic nurse, three doctors and a psychologist.

The aims of the Memory Clinic are to:-

- a) Establish a diagnosis in patients with memory problems and to provide information to them as well as, if appropriate, their family members.
- b) Initiate appropriate treatment in patients with an established diagnosis of dementia.
- c) Approach suitable patients to participate in research projects in the area of cognitive disorders.

In addition to the clinical services provided, the Memory clinic continues to be active in various research projects including collaborations with other departments and institutions. Formal administrative and research meetings are held regularly, reflecting the ongoing development and expansion of our clinical and research activity. The memory clinic continues to have close links with both the Medicine for the Elderly and Psychiatric Departments of St. James's Hospital, Dublin and Adelaide and Meath Hospital incorporating The National Children's Hospital, Tallaght, Dublin as well as St. Patrick's Hospital, Dublin.

Patient Assessment

Since its inception, over 3000 patient assessments have been carried out at the Memory clinic. Referrals to the clinic come from essentially 3 sources;- within St. James's Hospital, General Practitioners and other tertiary organisations. A change to the discharge policy was implemented in December 2004 and continued in 2005 in order to facilitate a change in the referral pattern.

In addition to receiving increasing numbers of referrals each year, referrals to the memory clinic had also been increasingly challenging and complex with early cognitive deficits resulting in greater demands on time and personnel. Changes were therefore implemented in order to enable new patients who require additional time for evaluation to be seen quicker.

306 patients were seen at the Memory Clinic in the period 2005-06. Of these, nearly half of the patients seen were new referrals.

A comprehensive collateral history, medical assessment, nursing assessment and in-depth neuropsychological testing are carried out at each initial visit which takes approximately 2 1/2 hours. Further haematological, cardiovascular or radiological investigations are organised if required. Each case is then discussed in detail at a weekly consensus meeting and a treatment plan including therapeutic options, management of secondary risk factors as well as control of psychiatric and behavioural disturbances are put in place. New patients requiring treatment with acetylcholinesterase inhibitors are seen at the intervention clinic. Family meetings and feedback sessions are also offered on a regular basis when appropriate.

The majority of return patients reviewed are on an annual basis. Six-monthly assessments are carried out where necessary. The aim of each return assessment is to monitor the rate of progression, to evaluate and manage risk factors as well as to identify and rectify complications including behavioural disturbances in order to minimise the carer burden. A comprehensive medical and nursing assessment, collateral history and repeat neuropsychological testing are usually carried out at each follow-up visit.

In addition to the above, neuropsychological assessments are carried out on referred from other memory units throughout country who had previously had a medical workup. This was to facilitate units with no expertise in Neuropsychological testing.

Table 1 Number of Patients seen at the Memory Clinic 2000 – 06

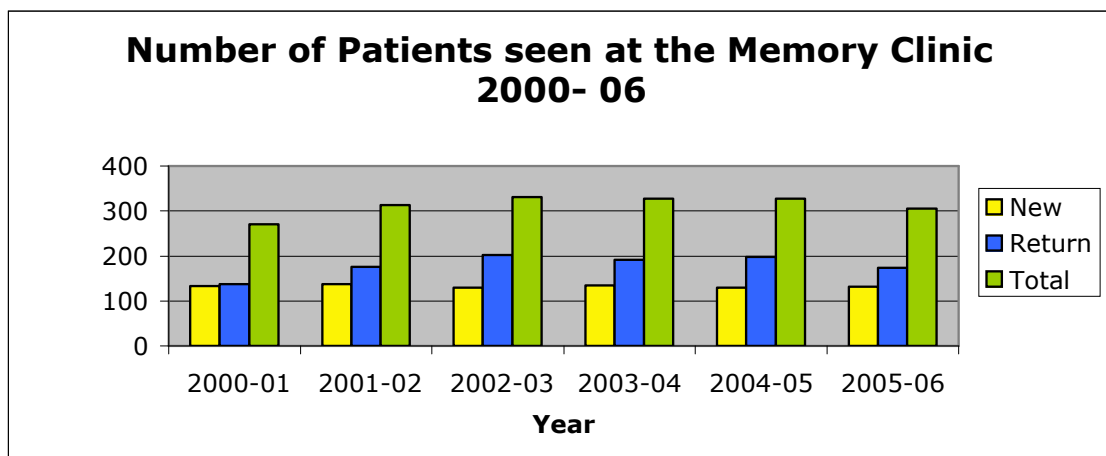
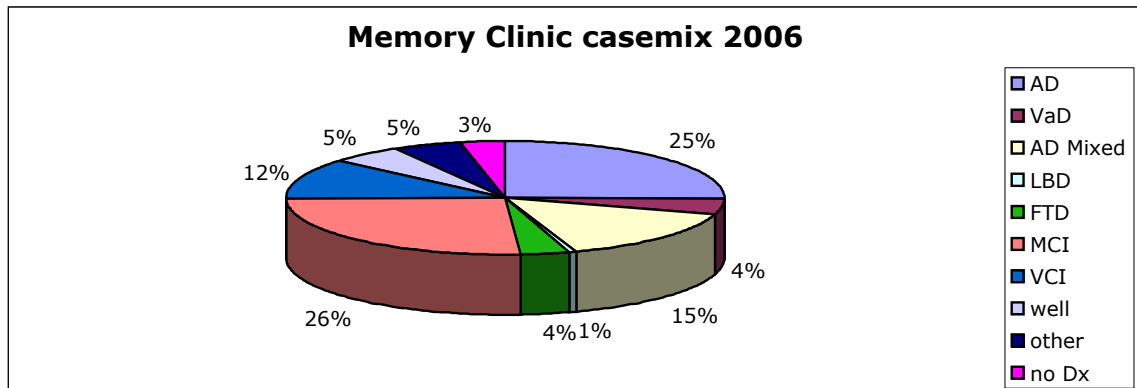


Table 2 Memory Clinic Casemix 2005 – 06



Legend: AD= Alzheimer’s disease, VaD= Vascular Dementia, AD Mixed= Mixed Dementia, LBD= Lewy Body Dementia, FTD= Fronto- temporal Dementia, MCI= Mild cognitive impairment, VCI= Vascular cognitive impairment, well= well, other= other diagnosis, no Dx= diagnosis uncertain

Intervention Clinic

This clinic provides patients commencing on acetylcholinesterase inhibitors and their carers an opportunity to discuss treatment goals as well as other aspects of therapy such as dose escalation and side effects. Each visit is also attended by a social worker in order to provide further information on available social supports. Approximately an hour and a half is allocated to each patient to discuss relevant issues. Further time or another appointment is provided if required. In addition, patients are reviewed after a six month period to evaluate response to treatment as well as assess patient and carer welfare. 59 patients were seen at the Intervention clinic in the period 2005- 06.

Memantine Clinic

Memantine is an NMDA antagonist licensed in November 2002 for use in moderate to severe Alzheimer’s disease. This clinic was first commenced in February 2003. Patients seen at the clinic are reviewed at three monthly intervals to monitor response. Each patient undergoes a full medical assessment as well as a SIB Test. 9 patients were seen at the Memantine Clinic in 2005- 06 and commenced on Memantine.

Family Meetings/ Feedback Sessions

After the initial assessment, the family or carer is offered a meeting when appropriate with the multidisciplinary team. The patient’s diagnosis and prognosis is discussed and explained fully to the family. Practical advice is given on management of problems which could arise as well as information on support services. Legal aspects such as enduring power of attorney are also explained. A handbook is made available to families requiring

further information. Each meeting is chaired by a doctor with a medical social worker also in attendance.

Ongoing/Completed Memory Clinic Research Projects

Topic	Page
The Dublin Healthy Ageing Study	12
Pharmacological Agents	
Vitamin E	12
Memantine	13
Genetics	14
General	
Cognition and Learning	14
Alternatives to MMSE in cognitive screening for patients with language disorders	15
Music stimulation of autobiographical memory in Alzheimer's Disease	15
Clock Drawing Test as an executive screening instrument	16
Genotype-phenotype differentiation among different tauopathies	16
Factors affecting cognition in the Elderly	16
Dietary and lifestyle factors associated with cognition	16
Neurobiological Determinants of depression in COPD	16
Outcome of patients with single domain and multidomain MCI	17
Prospective and Retrospective memory in MCI and VCI	17
Baseline discriminators of slowly versus rapidly progressing individuals with Alzheimer's disease	17
Concordance between cognitive tests and demographic effects in an Irish population	17
Measurement and Biophysics of ocular microtremor	17

The Dublin Healthy Ageing Study

The elderly are the fastest growing population subgroup in the developed world . An estimated 20% of the population will be over 65 years of age in Ireland by the year 2025. It is increasingly important therefore to identify factors that will help the elderly stay healthy and independent as they get older in order to ensure not just longevity but also a satisfactory quality of life.

The Dublin Healthy Ageing Study project is a large population based study investigating the physical, psychological, social as well as cognitive correlates of health in older Irish people living in the community using a comprehensive battery of physical, social, psychological, biological and cognitive measures. It is the only study of its kind being carried out in Ireland at present and once completed will have far reaching implications. Planning for this project began in July, 2002. Ethical approval from both ICGP and FDVH ethics committees was received in Dec 2002. Community assessments initially began in February 2003. 466 participants have since been assessed in their own homes. The duration of each assessment was approximately 2 hours and involved comprehensive documentation of clinical and demographic history, detailed neuropsychological testing, a full neurological examination as well as blood testing providing a very well defined elderly population cohort.

One important aspect of this study was to evaluate the use of as well as the effects of alcohol in the elderly. Initial analysis and results were presented in a symposium at the IPA meeting in Stockholm in September 2005. This study also investigates the impact and associations of vascular risk factors with cognition. This includes assessing the effects of vascular co-morbidities such as diabetes, hypertension, smoking and other factors such as peripheral vascular disease in the elderly, and its association with cognition. In addition to the above, the role of vascular biomarkers such as C- Reactive protein, Haemoglobin A1c, Lipids, Homocysteine in the Elderly and the effects of Tea and other flavonoids will also be assessed. Data analysis is ongoing. The second phase of the Dublin Healthy Ageing Study aims to assess the impact of genetic factors on cognitive performance and due to commence in July 2006.

Pharmacological Agents

Vitamin E Multicentre Trial of Vitamin E in Aging Persons with Downs Syndrome

This is a multicentre double blind placebo controlled study to determine whether the administration of vitamin E which has been shown to delay the progression of Alzheimer's disease, will slow the rate of cognitive/functional decline in older individuals with Downs syndrome.

Vitamin E 1000 IU twice daily plus a multivitamin will be compared to a multivitamin alone in a two-arm parallel group design. The treatment period is over three years and the subjects have 6-month visits and three monthly telephone contacts.

The primary outcome measure is brief test of Praxis.

Secondary outcome measures include 4 additional performance tests of cognition and function:-

1. Fuld Object Memory Test
2. New Dot Test
3. Orientation Test
4. Expressive One Word Picture Vocabulary Test

This is an international study with approximately 20-25 centres and is the first large-scale treatment study of Alzheimer Disease's complicating Downs syndrome. It will be a model for future efforts at applying treatments developed for sporadic Alzheimer's disease to the population of at risk individuals with Downs syndrome.

Subjects with Downs syndrome aged 50 years or over are eligible for enrolment. A total of 400 individuals will be recruited from the various study sites. The Irish centre for this international study is based at The Mercer's Institute . The target for the site is 10 patients in total.

Study Progress

Ethic Committee approval for the study was received in May 2003
DRA Hospital approval was obtained 28/10/2003.

4 subjects had been recruited for this study before enrolment was halted in 2005 due to concerns highlighted in the literature with high dose vitamin E suggesting a possible increase in cardiovascular related mortality. There have been no serious adverse events in our patients to date. An amendment to the protocol and consent form have been submitted to the Ethics committee and recruitment will recommence once this has been approved.

Memantine

Memantine, an NMDA antagonist which modulates Glutamic activity thought important for the formation of memory was licensed for use in Europe at the end of 2002. It promises to be either an adjunct to current acetylcholinesterase therapy or an alternative in patients unable to tolerate acetylcholinesterases. A protocol for its use was developed in 2003 and patients attending the Memantine clinic have been closely followed since to assess its efficacy, effectiveness and side effect profile.

Genetics

Genetics Resource in Late-Onset Alzheimer's Disease

The 'Genetics Resource in Late-Onset Alzheimer's Disease' project is a large multicentre study aimed at collecting a large, well characterised sample of patients over the age of 65 years with late-onset Alzheimer's Disease and cognitively normal controls, for the purposes of future genetic research. It is now just over two years into data collection which remains on target. Other investigative centres are in London, Cardiff and

Cambridge. When completed, this study will yield the largest European sample of its type.

Lab work and data analysis is ongoing.

The Role of Haemochromatosis Mutations in Late Onset Alzheimer's Disease

This is a study designed to examine the role of the genetic determinants of iron metabolism in Late-Onset Alzheimer's Disease (LOAD) in particular, the common genetic mutations for Hereditary Haemochromatosis, an autosomal recessive condition of excessive iron uptake and deposition. The common mutations in the affected gene, HFE, have a particularly high incidence in the Irish population. Recent research has indicated an association between HFE mutations and the development of AD, although these studies have been limited in some respects. Should this study yield positive findings it may aid early detection of susceptible groups with AD and may provide new targets for treatment. This work will form the basis of future postgraduate degrees for research staff and involves collaboration with the Neuropsychiatric Genetics group, TCD.

Genotyping is underway and due for completion.

General

Cognitive Function and Learning

Alterations in electrophysiological activity recorded from the scalp have been found to be associated with the early stages of Alzheimer's Disease. Measures of mean amplitude (AmpM) and amplitude variability (AmpV) derived from event-related potential (ERP) analyses are differentially sensitive to the effects of aging and stimulus processing conditions. It is likely that both measures will be needed to provide a more complete interpretation of age-differences in electrocortical functioning and behaviour performance in response to demands associated with encoding and retrieval of memories.

This aim of this study was principally to assess the utility of measures of electrophysiological and information processing variability in distinguishing between normal age related cognitive decline, Mild Cognitive Impairment and Alzheimer's Disease (AD). The comparative usefulness of AmpM and AmpV indices were explored to understand the underlying brain mechanisms associated with age-related memory impairments that range from mild (i.e., subjective memory complaints) to more severe (i.e. MCI and AD). In addition to the use of indices derived from ERP analysis, other measures that can be derived from the analysis of EEG data acquired during the above implicit and explicit memory tasks (i.e., measures of spectral power and coherence) were investigated to provide additional insight into differential memory performance across individuals and groups.

This work involved collaboration with the Neuropsychiatric Genetics group, TCD and was supported with a Health Research Board grant. Data analysis was completed in 2004 and presented in 2005.

Preliminary results from the study provide some evidence to suggest that measures of AmpV are sensitive to differences in memory performance. It is hoped that results from this study will help improve the ability to identify AD at an early stage as well as advance the ability to evaluate therapeutic options.

Alternatives to MMSE in Cognitive screening for patients with language disorders.

In conjunction with the Speech & Language Therapy Dept., St. James's Hospital, the aim of this study was to evaluate alternatives to the widely used MMSE in screening for cognitive impairment in patients with language disorders. The preliminary analysis of the data accumulated in 2002 led to a refinement of the methodology and the study was modified with incorporation of the Cognitive Linguistic Quick Test. The revised protocol for the study received ethical approval from the Joint Research Ethics Committee in June 2003 and the study was completed at the start of the 2005. Maria Pertl, a Final Year Psychology Student from TCD had been involved in data collection, initially funded through a HRB Summer Student Grant and subsequently unfunded. Data looking at validity of the Cognitive Linguistic Quick Test (CLQT) was analysed and submitted the work as her Final Year Undergraduate Thesis, for which she was awarded a distinction. The findings were presented at the 53rd Annual Conference of the Irish Gerontological Society, Dublin, Sept 2005.

Music stimulation of autobiographical memory in Alzheimer's Disease

This study was commenced in 2002 and completed in 2003. Results were submitted in May 2003 by Ms. Muireann Irish as her Final Year project thesis for which she received 1st Class Honours. The findings were further presented at the 51st Annual Conference of the Irish Gerontological Society meeting in September 2003. Following on from this work, Muireann Irish has since commenced her PhD in MIRA, registered under Prof. Brian Lawlor, Dept. of Psychiatry, TCD, with joint supervision from Dr. Robert Coen. This PhD is funded by the Trinity College Institute of Neuroscience. The proposed study has received ethical approval from the Joint Research Ethics Committee. A novel measure has been developed based on recent conceptual refinements, for which most existing measures are inadequate. A study to validate the new measure is under way. Recruitment of healthy normal cases from active retirement groups is almost complete. Enrolment of patients with Alzheimer's disease is ongoing. A portion of the preliminary work was presented at the 53rd Annual Conference of the Irish Gerontological Society, Dublin, Sept 2005.

Clock Drawing Test as an executive screening instrument

Mr. I. Evans has investigated the Clock Drawing Test as an executive screening instrument (joint supervision: Robert Coen and Dr. Teresa Burke, Psychology Dept.,

UCD). Approval for the study from the Joint Research Ethics Committee was received in June 2003. Data collection was completed in 2004. This work submitted to UCD in pursuit of a Master's degree by research and was awarded a M. Litt. Degree. The findings from this study was presented at the 53rd Annual Conference of the Irish Gerontological Society, Dublin Sept2005.

Genotype-phenotype differentiation among different tauopathies.

Dr. R. Coen continues to work in collaboration with Prof. Ian Robertson, Psychology Dept., TCD, Dr. Tim Lynch, Mater Hospital and colleagues on a proposed study to evaluate genotype-phenotype differentiation among different tauopathies. Data collection is ongoing. Preliminary findings were presented to the 57th Annual Meeting of the American Academy of Neurology. Miami, April 2005.

Factors affecting cognition in the elderly

Review of literature and analysis of data previously collected from the AGE CAT study. Literature review and data analysis was completed in 2004. Findings have been submitted for publication.

Dietary and lifestyle factors associated with cognition in the community dwelling elderly.

The aim of this study was to estimate the effect of factors such as tea and physical exercise in a representative elderly community population in Dublin. A poster based on results of this study was presented at the 53rd Annual Conference of the Irish Gerontological Society, Dublin Sept2005.

Neurobiological Determinants of depression in Chronic Obstructive Pulmonary Disease (COPD)

Data collection for this study investigating neurobiological determinants of depression in COPD is ongoing. Subjects are recruited from COPD outpatient clinics. These subjects are screened for depression and undergo a brief cognitive assessment as well as a semi-structured psychiatric interview. Approximately a quarter of the subjects required have been recruited thus far. This study is a collaborative study between the memory clinic and the respiratory and psychiatry teams, identifying and referring for appropriate treatment patients who have psychiatric illness, identifying and referring for investigation patients with cognitive impairment. Blood samples are also being collected from patients for later batch analysis to measure cytokine levels (IL-6 and TNF-alpha) to determine if these neurobiological factors increase the vulnerability of patients with COPD to depression. An MRI study is also proposed.

Outcome of patients with single domain and multi-domain Mild Cognitive impairment.

This is a prospective study assessing the outcomes of patients diagnosed with single domain mild cognitive impairment and those with multi-domain mild cognitive impairment who have been assessed at the memory clinic. A protocol for this study has been developed. Data assessment and analysis is ongoing.

Prospective and retrospective memory in Mild Cognitive Impairment and Vascular Cognitive Impairment.

This study evaluates various aspects of memory in cognitive impairment of different aetiology. Alberto Blanco has commenced work for his research Thesis in part fulfillment for a Doctorate in Clinical Psychology, UCD (joint supervision: Dr. Teresa Burke, Psychology Dept., UCD and Robert Coen). Data collection is almost complete.

Baseline discriminators of slowly versus rapidly progressing individuals with Alzheimer's disease.

Gillian Cooke, a student on the TCIN PhD 4 year rotation programme analysed data from the Memory Clinic Database under supervision of Robert Coen, as part fulfillment of her placement requirements. The analysis investigated baseline discriminators of slowly versus rapidly progressing individuals with Alzheimer's disease. The findings were presented at the 53rd Annual Conference of the Irish Gerontological Society, Dublin, Sept 2005. A more sophisticated analysis of rate of progression is currently under way.

Concordance between cognitive tests and demographic effects in an Irish population.

Sharon O'Sullivan has commenced work for her research thesis in part fulfillment for a Doctorate in Clinical Psychology, TCD (joint supervision: Robert Coen and Dr. Hugh Garavan, Psychology Dept., UCD). This will entail data extraction and quantitative / qualitative analysis of demographic and cognitive data from both our Memory Clinic Database and AGECA community database. Ethics approval has been obtained from the TCD Psychology Dept. Ethics Committee and the Joint Hospital Ethics Committee.

Measurement and biophysics of ocular microtremor with application in brain injury, neurological disease and ophthalmic pathology

This project is collaboration between the Memory clinic and the Physics Department. It has been granted ethical approval and testing will shortly commence on volunteers. A detailed discussion of this project is included in the medical physics and Bio-engineering section.

Falls, Blackouts, Bone Protection and Osteoporosis Unit

The burden of fall increases when the population ages. Older patients are particularly at risk for falls by virtue of their co-morbidity and increasing frailty. The prominence of the falls and fall-injury prevention service in the MedEL department is reflected by the appointment of Professor Rose Anne Kenny who is a world authority on falls and blackouts who joined us in September 2005. Prior to joining us in St. James's Hospital Professor Kenny had established a major clinical and research facility in this area in Newcastle in England. The following report seeks to highlight some of the initiatives that took place in the past year.

In-Patient Falls and Fracture Prevention Service

At the beginning of 2005 we appointment two new clinical nurse specialists who would link with the acute medical admissions unit and provide a continued expansion of a dedicated fall and bone protection service to the hospital.

Inpatients at high risk for falls are targeted for fall injury prevention once they are admitted under the care of the MedEL department. Each patient is screened for falls risk on admission using a fall risk assessment tool (STRATIFY). High risk patients are thus identified and managed appropriately. We work within a multidisciplinary team to assess, educate and rehabilitate patients to prevent future falls in those at risk. The services provided by the team include balance and strength improvement classes, falls educational programme for staff and patients, hip protector compliance programme, management strategy for agitated confused patients, falls diary on each faller and a nurse-led post-fall assessment and advice.

The initiatives undertaken by the Falls & Injury Prevention Service in 2005 include

- Continuing Education In service Programme on Falls prevention for Nursing and ancillary staff. This extended to staff on the Acute Medical Assessment Unit (AMAU) and Psychiatry of old age in July 2005. General in-services to all SJH staff are also held on a monthly basis in Phase 1C.
- Training programme for nurses on use of STRATIFY. A decision was made by the Nursing Practice Development Unit (NPDU) to incorporate STRATIFY into the nursing admission document this year (for MedEL and AMAU).
- We continue to have quarterly Hip protector audits on acceptance and compliance on each ward. This information is fed back to the wards.
- A total of 355 Clinical Nurse Specialist (CNS) assessments/ reviews were conducted in 2005. Of these 340 represented post-fall assessments and 15 were for those at high risk of falls. (A total of 8 post-fall assessments were carried out in Connolly Norman ward).
- In total 180 patients were assessed by the CNS in 2005. Seventy-four (22%) of these were recurrent fallers on the wards. The range for recurrent falls was: 2-14.

- The CNS post-fall service was introduced to the Psychiatry of old age ward in July 2005.
- An audit was carried out on the appropriate use of bed-rails on the wards. Subsequent audits will be carried out to monitor the effect of education.
- We conducted a pilot programme on the use of an identification bracelet for fallers which was funded by MIRA. This was well received by patients and staff and we plan to introduce it formally into the wards.
- A patient/caregiver Falls education booklet was planned in 2005. We hope that it will go into publication in 2006.
- As a result of the report by the occupational therapy department, appropriate seating was purchased for older persons in the long-stay wards. This was to prevent falls or slippage from the chair of these frail patients.

The Falls and Syncope Service

Apart from the above service, the MedEL Directorate in partnership with MIRA has a dedicated **Falls and Syncope Clinic** specifically geared towards investigating patients with recurrent unexplained falls and blackouts. This service identifies falls from cardiovascular causes. After comprehensive investigations in the clinic, the patients are referred to the cardiology team, Day Hospital, memory clinic or have long term follow up in this clinic for management of Falls and blackouts as appropriate.

The year 2005 saw a remarkable expansion of service. This was accomplished through purchase of extra medical equipment, acquisition of a larger room for investigation and hiring more medical staff to work in the unit. An AMAU syncope initiative was started in February 2005. We launched the initiative by conducting a series of interactive lectures with the staff from AMAU. The referrals are made in adherence to a syncope integrated care pathway. Following that appropriate AMAU patients were offered rapid access to the clinic for diagnosis and management of syncope.

In June 2005, we were able to operate three investigative stations simultaneously. This represented a three-fold increase in capacity to assess patients. We were also able to offer direct access for GPs to refer patients to the clinic. In July 2005, we doubled the medical staffing when another clinical fellow joined our unit. This clinical specialist acts as the emergency department (ED) liaison for syncope. All appropriate patients who presented to ED with syncope will be contacted and offered rapid assessment for diagnosis and management. We increased from two to the three assessment clinics per week from October 2005.

In conjunction with the appointment of Professor Rose Anne Kenny in September, a newly refurbished unit, now re-named the Falls and Blackout Clinic, was relocated to the main hospital unit in close proximity to the Emergency and Cardiology departments. It was officially opened by the Tánaiste and Minister for Health and Children Mary Harney in December 2005.

The increased capacity for assessment of patients brought about by the increased number of patients assessed in the past few years, 2003 (72 patients assessed), 2004 (131) and

2005 (294). Of the 294 patients, two-thirds of them were 65 years and over. It is planned to make this a 5-day clinic.

The auxiliary service of the unit includes ambulatory blood pressure monitoring and event monitoring.

Bone Protection and Fracture Prevention Service

The principal developments which occurred in the Unit in 2005 included the further enhancement of a dedicated Bone Protection Clinic for the management of patients with bone disease. This has been facilitated by the establishment of a Nurse led Specialist Bone Protection and Osteoporosis Pre-assessment Clinic. The appointment of the two additional full time Clinical Nurse Specialists (CNS) has enabled this development to take place.

Nurse Led Pre-Assessment Clinics

On a patient's first attendance at this clinic a full initial screen is undertaken. This includes a DXA scan, a bone ultrasound, a full biochemical and haematological workup and an estimation of serum bone markers. In addition, patients are counseled on the dietary and lifestyle changes necessary to manage osteoporosis, as well as advice on the prevention of falls and the wearing of hip protectors in those with a high risk of fracture.

Dedicated Bone Protection and Osteoporosis Treatment Clinics

These clinics have been further developed and expanded over the past year with dedicated time slots in the main hospital outpatient clinic area. They are led by Professor J. Bernard Walsh and Dr. Miriam Casey together with bone research fellows and clinical specialist registrars. These clinics provide a comprehensive bone health service and a valuable training facility for medical and nursing personnel in the area of fracture prevention and osteoporosis management. They also provide a valuable resource for the indepth study of fragile bones in a Irish population.

All results from the pre-assessment clinics are collated and are available at these specialised clinics so that a "one-stop shop" facility is provided to the patients attending. This clinic also provides the opportunity to managing patients with complex bone problems and advanced osteoporosis. Many elderly severely osteoporotic subjects continue to show impressive benefits from parathyroid hormone injections (PTH) not only in improved Quality of Life but also by demonstrating 300-400% increases in the rate of biochemical bone formation. A dedicated bone service has ensured a high rate of compliance with these bone protection therapies.

In 2005, Our Unit has participated in a multi-center European trial of Parathyroid hormone therapy for patients with advanced established osteoporosis.

Newer interventions such as the use of Vibrating Platforms for the stimulation of bone formation and the prevention of osteoporosis are being studied in the Bone Protection clinic.

Ortho-Geriatric Liaison Service

In addition to our weekly in-patient ward round of orthopaedic patients where over 160 acute hip fractures were reviewed, a considerable number of in-patients with pelvic fractures and acute vertebral fractures were also assessed. This service contributes greatly to preventing further fractures in this population who are 5 to 10 times at higher risk of further bone breakages than a control population who have not experienced a previous hip fracture. We are also collecting a dedicated data set of hip fracture patients which will provide us with a closer insight into the causation, clinical features and bone profile status of this very common and widespread condition among the Irish elderly population.

Colles and Peripheral Fracture Follow up Clinic

All elderly patients presenting to St. James's Hospital with a recent wrist fracture or upper arm (humeral) fracture were followed up in a separate specialised peripheral fracture bone follow up clinic. Their risk factors for further fracture are assessed and they are commenced on a bone protection regimen. This group will also provide the Mercer's Institute with a very valuable data set on peripheral fractures in an Irish elderly population.

DXA Service

In addition to providing a DXA service for the Mercer's Institute and MedEL Directorate patients the DXA unit provided an assessment service for all other patients with osteoporosis in St. James's Hospital and also provided a free service for patients who were referred directly to the DXA unit by their general practitioners from the local catchment area.

In 2005 over 1500 DXA scans were performed with almost 50% demonstrating Osteoporosis.

Bone Marrow and Elderly Renal Transplant Patients

As part of the clinical service and of the follow up of transplant patients our unit has undertaken a comprehensive assessment of the bone status of all patients who have undergone bone marrow transplants in St. James's Hospital. Because all bone marrow transplants in Ireland take place in St. James's Hospital this has allowed us a unique opportunity to assess the bone status of patients who have undergone this procedure and whose bones have been exposed to immunosuppressive and therapeutic agents which can rapidly age their bones. This work is undertaken in close collaboration with the National Bone Marrow Transplant Unit.

In addition we have undertaken a similar assessment and follow up of all renal transplants in the St. James's and Tallaght Hospital catchment areas working closely with the Department of Nephrology attached to both hospitals. These renal transplant patients are

very vulnerable to bone disease and the biochemical, ultrasound and DXA facilities within the Mercer's Institute for Research on Ageing has enabled us to provide this very valuable dedicated service.

It is also providing us with an in-depth insight into bone health in this vulnerable population and we have already presented our research findings to date at bone health and renal meetings.

St. James's Clinical Biochemistry Department and MIRA

Our close links with consultant chemical pathologist Dr. Vivion Crowley and senior biochemist Dr. Martin Healy have been indispensable in enabling us to provide the most comprehensive national bone biochemical service to patients available in this island. These bone markers provide us with critical information on the rate of new bone formation and the rate of bone turnover and bone loss in individual patients. We also gain essential information on patients individual Vitamin D status and bone hormone levels. With the help of this information we are able to make critical choices on the correct therapy for each individual patient where in the absence of this knowledge we would be making these clinical decisions purely on the basis of clinical information and bone imaging. Dr. Martin Healy is a leading international expert in the area of bone biochemistry and Vitamin D and the Mercer's Institute and the patients who attend our Bone Protection Clinics are very fortunate to have the benefit of such a close working relationship with Dr. Crowley and Dr. Healy. We would like to take the opportunity in this year's annual report to specifically thank them for their invaluable support and for giving so freely of their time and expertise.

Development of an Integrated Bone DataBase

In the summer of 2005, we were joined by Mr. John Walsh, a Dr Henry Cooke Drury Student Research Fellow. John's role is to develop an integrated bone database that will incorporate all the clinical and laboratory information with the imaging results from our GE Lunar DXA Scanner into a single dataset which will help streamline patient care and follow up.

"Bone for Life" Group

This is a collaborative research partnership between the Departments of Mechanical and Tissue Engineering in Trinity College, Dublin, the Department of Anatomy in the Royal College of Surgeons and Department of Veterinary Medicine in University College, Dublin. Members of the group include Professor Patrick Prendergast, Professor Clive Lee and Professor David Taylor, Dr. Fergal O'Brien and Dr. Sue Rackard. This work covers research in animal models of osteoporosis and links this knowledge with the study of therapeutic compounds which are used in humans suffering from this disease.

Research from the Falls, Blackout and Bone Protection Unit was presented at international meetings in the USA, Europe, the UK and Ireland during 2005.

Conferences Attended by Unit Clinical and Research Staff

- British Geriatric Society Meeting, Birmingham, April 2005.
- Falls and Postural Instability Conference, Manchester, September 2005.
- Nursing Conference AMNCH: Osteoporosis Conference.
- 53rd Irish Gerontological Society Meeting, U.C.D., Dublin, September 2005.
- Irish Nurses Organisation Workshop, Tullamore, November 2005.
- National Council for Nursing and Midwifery Conference, November 2005.
- European Society for Calcified Tissue AGM.
- Bone and Tooth Society, UK.
- National Osteoporosis Society Meeting, UK.
- American Society for Bone and Mineral Research (ASBMR).
- European Forum on Vitamin D.

Medical Physics and Bio-Engineering

The Medical Physics and Bioengineering (MPBE) Research Program in MIRA is focused on the application of engineering and science to the promotion of well-being in the elderly. A combination of techniques and methods including computational modelling, signal processing, device design, testing, and experimentation are employed in a diverse range of research projects with applications in gerontology ranging from blood pressure measurement to neurosciences.

Recent technological advances show an increasing potential to improve health care and quality of life of the elderly patient. In particular, advances in the computational power of consumer and sensor technologies promise to deliver new paradigms of care in the home when merged with clinical management systems. Continuing advances in telemedicine, medical robotics, pervasive computing and neural engineering are likely to have a major impact in improving the quality of life of the elderly at home. Such applications fall under the umbrella term of 'Assisted Living'. The benefit of 'Assisted Living' is to allow care in some situations to move from hospital to home and/or community increasing accessibility to care resources. The recent increase in resources focused on community care indicates that technologies of this kind have an increasingly important role to play in Irish Healthcare. The same technology also has potential to impact on clinical management within the hospital. This short overview of current and future work demonstrates our interest in the role of such technology in the care for the elderly.

Assisted Living - Pervasive Computing & Wireless Sensor Networks

Advances in computer manufacturing processes have made it possible to develop networks of discrete, wireless, sensor networks at relatively low cost which are wearable or easily deployable in the home. These will have great potential in telemedicine and assisted living of the future as they will allow physiological and/or physical parameters to be assessed remotely in a non-invasive fashion and provide feedback and education to the patient, family, carers and clinical management team, improving overall health. We have developed a prototype system using state of the art "particle computers". A number of demonstration pilot studies are underway in collaboration with our partners in Dementia Services Information and Development Centre (DSIDC) and MEDEL. To date we have used the wireless system to develop a prototype cognitive aid - an object location system for individuals with memory impairments. We have also developed in conjunction with the National Centre for Sensor Research in Dublin City University the initial stages of a portable gait analysis system capable of detecting falls, and periods of shuffling in individuals with Parkinson's disease.

Our future work in this area will focus on the development of a falls, autonomic function and cardiovascular test system - the FACT system. This will be capable of recording clinically relevant parameters in a natural living environment. The prototyping system will also allow environmental monitoring to be performed within a low-cost, safe 'Smart Home' to be developed for elderly patients.

Stroke Rehabilitation

Stroke is a major cause of brain injury and disability in the elderly in Ireland. Our aim is to assess the role technology has to play post stroke in three major areas i.e. 1) Clinical assessment 2) Rehabilitation 3) Independent living. Towards this goal we are working on a number of research projects in this area.

One such project investigates the use of multimedia biofeedback in the rehabilitation of hemiplegic stroke patients. Using a combination of consumer health technologies and web based multimedia we are in the process of developing an internet enabled weighing scales and balance assessment system that provides quantitative feedback of balance parameters to the clinical team. It will also provide goal orientated multimedia feedback which challenges the patient to improve balance over time and act as a motivational tool. Also in the area of stroke we are investigating the utility of PC based diagnosis and biofeedback systems in neural restitutive therapy of an individual with a visuo - spatial attention deficit known as simultanagnosia. To date we have programmed a simple computer based neuropsychological diagnostic tool to assess visual spatial attention. Future work will attempt to develop a novel computer based stimulation package to possibly aid neural restitution in areas of the brain associated with visual attention.

Measurement and biophysics of ocular microtremor with application in brain injury, neurological disease and ophthalmic pathology

Ocular microtremor (OMT) is a high frequency tremor of the eyes, present in all normal subjects even when the eyes are apparently at rest. OMT is of neurologic origin with demonstrated potential as a diagnostic aid in brain disease but by nature of its minute size is a considerable challenge to record accurately. The current OMT research project builds on the considerable multidisciplinary expertise in this area within the department and continues in the valuable tradition of medical physics engineers working closely with clinicians.

Two techniques for recording OMT have been implemented by engineers in MIRA. An eye-contacting piezoelectric probe method was initially standardised and used in the department to investigate OMT in patients with Parkinson's disease, multiple sclerosis, coma and brainstem death. This technique is currently being re-developed and refined for further clinical investigation of OMT as a diagnostic tool. A novel non-contact laser technique originally developed in the department will be miniaturised with the use of fibre optic technology, in collaboration with the Department of Electronic and Electrical Engineering in UCD. Advances in signal processing and rigorous computational analysis of OMT records will allow more accurate feature extraction, increased objectivity and the rational selection of characteristics of OMT with potential for clinical diagnosis. Biophysically realistic models of OMT, neurological and neuromechanical, are being developed to investigate the origin and mechanics of OMT.

The project has been granted ethical approval and testing will shortly commence on volunteers. Features of OMT in patients with neurological lesions and brain injury will

be correlated with defined lesions on MRI imaging and neurophysiological tests (such as electroencephalography). Future work will research the link between OMT and vision. The model of OMT will be used to assess a role for OMT in vision. OMT features in patients with visual deprivation will be investigated and hypotheses generated by the model will be tested against the in vivo findings.

Biophysics and Bioengineering of the Baroreflex with Applications to Syncope, Falls and Brain Ageing

Syncope is a symptom, defined as a sudden, short-term, self-limited loss of consciousness, usually leading to a fall resulting from transient global cerebral hypoperfusion. Syncope is highly prevalent in older adults and is a common cause of falls in elderly patients, particularly patients with neurodegenerative disorders. Hence syncope contributes significantly to the increasing numbers of elderly patients presenting to acute medical services. Carotid sinus hypersensitivity (CSH) is defined by exaggerated heart rate and blood pressure responses to pressure over the carotid sinus and is diagnosed by longitudinal massage over the carotid sinus. Carotid sinus syndrome (CSS) is present when similar haemodynamic responses are the attributable cause of syncope or falls. CSS is clinically important, as it is the most common cause of syncope and unexplained falls in older persons. Our current line of research compliments work underway in the new Falls and Syncope unit.

Carotid sinus massage is one specific tool used to diagnose CSS and CSH in patients with syncope. However this method has some disadvantages and we are developing a safer, more standardised form of stimulation. Wider implications for such a device would include standardised GP screening of CSH/CSS, allowing early detection of these conditions and to reduce their considerable burden on the on national health care system.

We are also developing PC based models in the department which will facilitate physiological understanding of mechanisms of baroreflex function in syncope, and in particular in CSS/CSH. This exploratory process may also identify novel diagnostic and treatment methods.

Thirdly a novel, implantable baroreflex stimulation device is to be investigated which may be a possible treatment alternative to alleviate symptoms in those identified with CSH. The long term goal of this strand of research is to investigate the development of a general blood pressure regulation device that could play an important role in cognitive impairment management and/or hypertension/hypotension management.

Partnerships

St. James's Hospital

Medicine for the Elderly
Psychiatry and Psychiatry for the Elderly
Clinical Biochemistry
Clinical Medicine
Haematology
Renal Medicine
Endocrinology
Dementia Services Information and Development Centre

Trinity College

Department of Medical Gerontology
Department of Psychiatry
Department of Old Age Psychiatry
Department of Psychology
Department of Bioengineering
Department of Mechanical Engineering
Department of Statistics
Department of Sociology
Department of Anatomy
Trinity College Institute for Neurosciences

Tallaght Hospital

Age Related Health Care, Adelaide and Meath Hospital incorporating The National Children's Hospital, Tallaght, Dublin

Department of Psychiatry of Later Life, Adelaide and Meath Hospital incorporating The National Children's Hospital, Tallaght, Dublin

RCSI

Department of Anatomy

St. Patrick's Hospital

UCD

Conway Institute
Department of Veterinary Medicine
Department of Engineering

Publications and Presentations

This consists of publications and scientific presentations carried out by MIRA personnel during 2005. It includes collaborations with other departments.

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Lynch CA, Walsh C, Blanco A, Moran M, Coen RF, Walsh JB, Lawlor BA.

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Moran M, Lynch CA, Walsh C, Coen R, Coakley D, Lawlor BA.

Sleep Med. 2005 Jul;6(4):347-52.

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Ir J Med Sci. 2005 Oct-Dec;174(4):51-4.

Alcohol and heart disease--what do you prescribe?

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Ir Med J. 2005 Sep;98(8):230-1.

What exactly do we mean by "mild cognitive impairment"?

Coen, R.F.

Old Age Psychiatry 2005, 37, 10-11.

Screening for dementia in an Irish community sample using MMSE: a comparison of norm-adjusted versus fixed cut-points.

Cullen, B., Fahy, S., Cunningham, C.J., Coen, R.F., Bruce, I., Greene, E., Coakley, D., Walsh, J.B., Lawlor, B.A.

International Journal of Geriatric Psychiatry 2005, 20, 371-376.

Driving cessation in patients attending a memory clinic.

Talbot, A, Bruce, I., Cunningham, C.J., Coen, R.F., Lawlor, B.A., Coakley, D., Walsh, J.B., O'Neill, D.

Age and Ageing 2005 34(4), 363-368.

Suicide in older people.

O'Connell H.

IPA Bulletin April 2005

Alcohol use disorders in older people.

O'Connell H.

Old Age Psychiatrist Spring 2005

The Struldbruggs.

O'Connell H.

Old Age Psychiatrist Spring 2005

Investigation of auditory stimulation of Autobiographical memory in Alzheimer's disease: exploration of potential mechanisms.

M. Irish, C. Cunningham, J.B. Walsh, D. Coakley, B.A.Lawlor, R.F. Coen

Brain Repair, 6(2), 124-125.

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R.F. Coen, H. O'Connell, A.V. Chin., C. Cunningham, F. Hamilton, J.B. Walsh, D. Coakley, B.A. Lawlor,

International Psychogeriatrics, 17(Suppl 2), 28

Alcohol use in older people – an overview.

H. O'Connell, A.V. Chin., F. Hamilton, R.F. Coen, C. Cunningham, J.B. Walsh, D. Coakley, B.A. Lawlor,

International Psychogeriatrics, 17(Suppl 2), 27

Alcohol use and personality type.

H. O'Connell, A.V. Chin., F. Hamilton, R.F. Coen, C. Cunningham, J.B. Walsh, D. Coakley, B.A. Lawlor,

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The cognitive linguistic quick test: its appropriateness for Irish populations and aphasic stroke patients.

M. Pertl, R.F. Coen, A. Lawlor, C. Cunningham, S.M. O'Mara, J.B. Walsh, D. Coakley

Irish Journal of Medical Science, 174 (Suppl 2), 26.

Rates of progression in Alzheimer's disease.

G. Cooke, R.F. Coen, J.B. Walsh, D. Coakley, B.A. Lawlor

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Clock Drawing and executive function in Alzheimer's disease.
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M. Irish, R.F. Coen, B.A. Lawlor, J.B. Walsh
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Investigation of markers of auto-noetic consciousness accompanying episodic autobiographical recall.
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Acta Neurobiologiae Experimentalis, 65 (Suppl), 54.

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[Oral Presentation [BM] 57th Annual Meeting of the American Academy of Neurology. Miami, April 2005]

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[Poster presentation, International Neuropsychological Society Meeting, Dublin, Sept 2005].

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Does Teriparatide adversely affect the Lipid Profile?
Healy MJ, Cox G Casey MC, Crowley VEF Walsh JB.
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Geraghty O, Robinson DJ, Healy M, Thornton E, Walsh C, Casey MC, Coakley D, Cunningham C, Walsh JB.
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fracture.
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The relationship between vertebral fractures and hip bone mineral density in hip fracture
patients
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Neuropsychological aspects of Frontotemporal dementia.

Coen, R.F.

(In Press, Dementia Bulletin. Old Age Psychiatry)

Investigating the enhancing effect of music on autobiographical memory in mild Alzheimer's disease.

Irish, M., Cunningham, Walsh, J.B., C.J., Coakley, D., Lawlor, B.A., Robertson, I.H., Coen, R.F.

(In Press, Dementia and Geriatric Cognitive Disorders)

Chapter on "Depression in severe dementia" in book "Severe Dementia" edited by Alistair Burns, due to be published in April 2006.

K. Bielinski

Papers submitted

Impaired insight and neuropsychological functioning in Frontotemporal dementia, Corticobasal Degeneration, and Progressive Supranuclear Palsy patients.

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