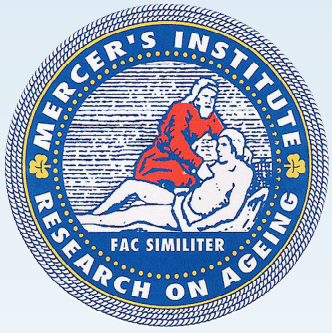

Mercer's Institute for Research on Ageing

Annual Report 2007

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Section Pages

MIRA Personnel

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Prof. Davis Coakley (Chairman)
Prof. J. Bernard Walsh (Director)
Prof. Brian Lawlor
Dr. Conal Cunningham
Prof. Jim Malone
Mr. Desmond Dempsey
Dr. Miriam Casey
Prof. Rose Anne Kenny
Dr. Joseph Harbison
Dr. Elaine Green
Ms Carol Murphy (Administrator)

Watt's Clinical Research Fellow
Dr. David Robinson

Memory Clinic Research Fellows
Dr. Conor O'Luanaigh
Dr. David Robinson

Lecturer
Dr. Clodagh O'Dwyer

Falls and Osteoporosis Unit
Dr. Joseph Brown
Dr. Tara Coughlan

Clinical Neuropsychologists
Dr. Robert Coen
Dr. Marie McCarthy

Research Psychologist
Ms. Muireann Irish

Assistant Psychologist
Ms. Erin Tehee

Clinical Nurse Manager
Ms. Irene Bruce

Senior Social Worker
Mr. Matthew Gibb

Biostatistician
Dr. Cathal D. Walsh

IT Consultant and Technology Adviser
Mr. Vincent Quinn

Falls and Osteoporosis Clinical Nurse Specialists
Ms. Niamh Maher
Ms. Nessa Fallon
Ms. Georgina Steen
Ms. Kara Fitzgerald
Ms. Dympna Hade
Ms. Lisa Byrne

Senior Radiographer
Ms. Eilish McDermott

Medical Physics and Bio-Engineering
Dr. Niamh Collins
Dr. Gerard Boyle
Mr. M. Al-Kalbani
Mr. C. Finucane

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Ms. Patricia Malone, Project Manager
Dr. Roman Romero, Medical Research Fellow
Dr. Lisa Cogan, Medical Research Fellow
Mr. Tim Foran, Senior Medical Physicist
Ms. Claire Somerville, Senior Social Scientist
Ms. Sheila Callinan, Assistant Pyschologist
Ms. Deirdre Finnegan, Assistant Pyschologist
Ms. Maura O'Sullivan, Senior Physiotherapist
Ms. Clodagh Cunningham, Clinical Nurse Manager II
Ms. Roisin Brophy, TRIL administrator

The Irish Longitudinal Study of Ageing (TILDA)
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Dr. Hilary Cronin, Research Fellow
Dr. Amilcar Moreira, Research Fellow
Dr. Yumiko Kamiya, Research Fellow
Ms. Claire O'Regan, Clinical Research Nurse

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Ms. Linda Warren, Administrator
Ms. Lisa Crosby, Clinical Nurse Specialist
Ms. Merridth Hodder, Clinical Nurse Specialist
Ms. Clare Mooney, Clinical Nurse Specialist

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Dr. Orla Collins, Clinical Research Fellow
Dr. Christian Kerskens, Research Fellow
Ms. Sheila Dillon, Clinical Research Nurse

Secretaries

Ms. Deirdre Cummins
Ms. Martha Gavin
Ms. Rachael Farley
Ms. Heather Bailey
Ms. Lisa Masterson

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(Whose published work was carried out while working in the Mercer's Institute for Research on Ageing details of which appear in this year's annual report or in recent reports produced by the Mercer's Institute)

Research Registrars

Dr. C. Connolly
Dr. A. Denihan
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Dr. A. Eustace
Dr. C. Fallon
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Dr. H. Lee
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Dr. G. Swanwick
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Research Psychologists:

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Ms. B. Cullen
Mr. N. Kidd
Ms. S. O' Doherty
Ms. E. Palombella
Ms. L. Carolan
Mr. I. Evans
Ms. F. Hamilton

Medical Social Worker

Ms. M. Headon

PhD Student:

Ms. M. O'Reilly

Director's Report and Executive Summary.

2007 has seen further major expansion in the clinical and research work of the Mercer's Institute for Research on Ageing.

The expansion of Consultant staff to eight (six in Medical Gerontology and two in Old Age Psychiatry) has given further impetus to the development of all the clinical and research areas. Our three "Latest Arrivals" Prof Rose Anne Kenny, Dr Joe Harbison and Dr Elaine Greene have brought great energy and new ideas to the work of the Institute and have greatly added to our ability to deliver quality care to our elderly patients.

Prof Kenny has been particularly successful in translating her energy and enthusiasm to become a prime mover in achieving major grant awards such as the TRIL programme (IDA/Intel), TILDA, GSK and Roskamp studies and the HRB translational research award described below. She has also joined Dr. Conal Cunningham to further enhance the Falls and Blackout service which he had originally started in St. James's Hospital.

The awarding of an IDA/Intel grant has enabled the establishment of a Technology Research for Independent Living Programme (TRIL) whose mission is to discover and deliver technological innovative solutions which promote and support independent ageing, ideally in a home environment. The Trinity College element is led by 3 lead Principal investigators; Professor Rose Anne Kenny, Prof Brian Lawlor and Prof Ian Robertson and the programme is based in the Mercer's Institute.

The Irish Longitudinal Study on Ageing (TILDA) was launched in November 2006 by the Minister for Health Mary Harney and is led by Prof Rose Anne Kenny. The study is being undertaken by a cross institutional, multidisciplinary team of experts and its central office will be based in TCD. The main report contains further information on this major study.

Other developments currently underway include the establishment of a translational research centre for Alzheimer's disease. This centre is part of a larger programme that has received support from Glaxo Smith Kline.

Below I describe a summary of the clinical and research work carried out in each of the areas of the Mercer's Institute. A more comprehensive discussion of the work of each unit is available in the main report.

New Centre of Excellence for Successful Ageing

The planned new Centre of Excellence for Successful Ageing has seen significant further developments in 2007.

An International Advisory Group for the Centre was established and a major presentation was made to the new advisory group when they came to St. James's Hospital to review the project in December. The International Advisory Group is headed up by Dr. Jeremy Playfer who is a recent past President of the British Geriatrics Society and a Consultant Physician in Geriatric Medicine from the Royal Liverpool University Hospital.

The members of the International Advisory Group (IAG) are as follows:-

Dr. Jeremy Playfer, ***(Chairperson)***
Consultant Physician,
Royal Liverpool University Hospital
Past President of the British Geriatrics Society

Professor Irene Higginson
Professor of Palliative Care and Policy
King's College London

James P Smith
RAND Corporation
Santa Monica, California

Dr. Finbarr Martin
Consultant Geriatrician
Guys & St Thomas's Hospitals London

Professor Alistair Burns
Professor of Old Age Psychiatry
University of Manchester

Dr. Kenneth Rockwood
Professor of Geriatric Medicine
Dalhousie University, Halifax
Canada

Dr. Terrance J. Dishongh, Ph.D.
Intel Corporation
Senior Principal Engineer Digital Health Group

Rodd Bond
Architect
Director Netwell Centre
Dundalk Institute of Technology.

The International Advisory Group will act as a best practice advisory group for the new centre and we are very appreciative of the time and commitment which individual members are giving towards the development of the new Centre of Excellence for Successful Ageing.

In December, we also received a cost benefit analysis report on the new centre from DKM Economic Consultants. They were commissioned by the Health Service Executive to look in depth at the development plan for the new centre and to assess its overall benefit to the Health Service and to the community from a socio-economic point of view.

The report was extremely positive and strongly supported the development of the Centre. It concluded that the development was a very robust project with significant socio-economic positive outcomes.

The final DKM report concluded that the proposal to build a new centre would still show a strong positive outcome even if the cost were eight times higher and the benefits were as low as 23% of that estimated in the report. This strongly positive cost benefit analysis by DKM Consultants is a very significant contribution to the plans for the new development.

The new Centre will include state of the art diagnostic and treatment facilities and will incorporate a comprehensive range of outpatient, ambulatory care and rehabilitation units.

New modern wards will replace the current in-patient admission and rehabilitation wards situated in Hospital 2 and 4. A completely new build of the Mercer's Institute for Research on Ageing incorporating the research and teaching pillars of the centre will be a central part of the new development.

We look forward to further developments on the new Centre of Excellence for Successful Ageing in 2008.

The Memory Clinic

The Memory Clinic in the Mercer's Institute for Research on Ageing was established in 1991 with funding from the Mercer's Hospital Foundation and 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.

2007 has seen a major expansion in its activities with a continuing increase in clinical activity and close working with other clinical and research units in the Mercer's Institute. Increasing collaboration also took place during the past year with fellow researchers in Trinity and other hospitals and universities in Ireland.

The research programme continues to expand and an increasing number of postgraduate students from medicine, psychiatry and psychology are undertaking their masters and doctorate studies and main research within the memory clinic. A number of staff and students working in our memory clinic successfully completed their Ph.D. studies during 2007.

A HRB Translational Research Award in 2007 has also enabled a 5 year longitudinal study of older persons with Mild Cognitive Impairment examining the influences of Neurocardiovascular instability (NCVI) on cognition at baseline and on progression /transition to dementia over 3 years follow up.

Ongoing Memory Clinic Research Projects

- The Dublin Healthy Ageing Study
- The impact of social factors on health and quality of life
- Fear of Falling
- Development of a novel measure of autobiographical memory
- Prospective Memory studies.
- Tauopathy study of Frontotemporal Dementia, Corticobasal Degeneration, and Progressive Supranuclear Palsy.
- The Utility of MMSE, Clock Drawing and the Delayed Word Recall (DWR) test in screening for Early Stage Alzheimer's disease (AD).
- Concordance between cognitive tests and demographic effects in an Irish population.
- Post–stroke outcomes in the community.
- Awareness in Traumatic Brain Injury and Frontotemporal dementia.
- Verbal Fluency, Age of Acquisition (AoA) as a predictor of cognitive decline.
- Efficacy of a Cognitive Stimulation Programme.
- Development of an Electronic Locator device.
- The subjective experiences of new patients and their primary caregivers attending a national memory clinic
- Genetics Resource in Late Onset Alzheimer's Disease
- Roskamp Study on Alzheimer's Disease - This is an open label evaluation of the safety and efficacy of Nilvadipine in mild to moderate Alzheimer's dementia. All these studies and clinical research areas are discussed in depth in the Memory section of the main report.

Stroke Research and Clinical Services.

Dr Joe Harbison's arrival as a senior lecturer and consultant to St James's Hospital and MIRA has given a major boost to clinical services and research in stroke disease.

- A full time Clinical Nurse Specialist in Stroke Medicine, Ms. Suzanne Walsh has been appointed who will coordinate training of staff across the hospital in aspects of stroke care and assist in the running of Neurovascular and Stroke clinics.
- A Transient Cerebral Ischaemic (TIA) clinic has been expanded to run daily, permitting the review of patients with TIA or Stroke within one working day of stroke onset. Two hundred and thirty five patients were seen in the TIA clinic in 2007.
- A stroke thrombolysis protocol is in operation and the Stroke service organised the first national Thrombolysis Education day in The Royal college of Physicians in October to try to increase use of the therapy across Ireland.
- An Acute Stroke Unit in St James's is expected to open in early 2008 on the Acute Medical Admissions Unit. This will enable the delivery of specialist, protocol based medical, nursing and therapy care to all stroke patients admitted to St James's.
- The MedEL acute stroke service now performs daily ward rounds reviewing all stroke patients admitted to St James's. We now increasingly review patients in the Emergency department to provide expert care from the moment of admission. Since the establishment of the Acute Stroke Service in St James's in 2006, one month mortality for stroke patients has dropped by more than 25% and median length of stay has dropped by 7 days.
- The service is involved in the development of a new Diploma in Cerebrovascular Medicine with the Royal College of Physicians of Ireland.

Stroke Research:

Research projects which have been undertaken by the stroke service include

- A study of the nature and associations of fatigue in patients with cerebrovascular disease (paper submitted for publication).
- A study of the use of actimetry to increase accuracy of nocturnal ambulatory blood pressure monitoring.
- A study to determine if an association exists between nocturnal hypoxaemia and clinical diagnosis of dysphagia.
- A study of the utility of the ROSIER stroke recognition instrument in Irish hospitals (in press).
- A study of the change in bone biomarkers in ambulatory patients with stroke (joint study with Bone and Osteoporosis service)
- A study of adherence to secondary prevention therapy of patients with stroke and TIA.
- A joint study with the Department of Renal Medicine, examining changes in autonomic function in patients receiving erythropoietin for anaemia of renal failure in older subjects.

Falls , Blackout, Bone Protection and Osteoporosis Service

The service accepts referrals of patient diagnosed with osteoporosis or have risk factors for osteoporosis and fractures, and provides a comprehensive and multidisciplinary approach to the prevention and management of osteoporosis and its related problems.

Ongoing Service and Research Areas Include

- Assessment of all patients with falls admitted to the acute medical assessment unit.
- Twice weekly Pre-Assessment Osteoporosis Clinics – this is a nurse led clinic and enables an initial assessment and diagnostic workup for patients with severe osteoporosis. These patients are subsequently reviewed in a weekly dedicated bone health and osteoporosis treatment clinic.
- Nurse-Led Falls review service for inpatients under Medicine for the Elderly. This service has enabled an accurate documentation of all falls in our admission, rehabililatation and extended care wards and provides a comprehensive advice service on falls prevention.
- In the Blackout and Syncope Unit 1,868 patients were seen in 2007 which is a 48% increase in the patient throughput compared to 2006.
- Bone Densitometry (DXA) scanning service. Since its inception in the Mercer's Institute in 2002 over 6,200 scans have been performed. The unit provides a free service for patients within the local catchment area and also carries out lateral morphometry imaging on all patients thus enabling a more accurate assessment of bone fragility in every patient referred for assessment.
- A comprehensive bone biochemistry and bone marker service which provides bone formation and bone resorption information on all patients who are seen in our bone health clinics thus adding significantly to our clinical, ultrasound and DXA imaging information on patients with severe osteoporosis and bone fragility.
- Orthogeriatric and Hip Fracture Liason Service – Patients admitted with hip and other osteoporotic fractures are reviewed by our specialised bone health nursing and medical staff.
- Management of patients on PTH treatment which is an anabolic bone therapy which stimulates new bone formation in patients who have severe osteoporosis and who have experienced bone fractures. The unit is participating in a large European study on the the use of this compound in patients with vertebral fractures.
- Management of Bone Health in Patients who have had Bone Marrow Transplants Many of these patients are subject to "premature ageing" of their bones because of the treatments they have received including immunosupression and steroid therapy. They are part of a collaborative study looking at the longitudinal effects of bone marrow transplant on bone health.
- In the past year a number of major studies on hip fractures have begun looking at the histomorphometry, densitometry, biochemical, and bioengineering properties of fractured hips in patients admitted to St James's hospital. Dr Joe Browne our bone health fellow is taking a lead role in these studies. The studies involve close

collaboration with the Dept of Mechanical and Bioengineering in Trinity, Orthopaedics, Biochemistry and Histology in St James's Hospital and the Dept of Anatomy in RCSI.

- Niamh Maher, a Clinical Nurse Specialist in Bone Health and Falls, has recently been rewarded a major Health Research Board grant to undertake a study leading to a Ph.D on identifying and treating the factors involved in falling in patients who are admitted with hip fractures.
- A further community follow up study by Kate McNulty a research physiotherapist on assessing the regain of independence by patients with hip fractures has also begun.
- A Major prospective Colles's fracture study is ongoing which is looking at all patients seen in our emergency department who have suffered a fracture of their distal radius. All patients are fully assessed, risk factors for falling are investigated and treated and bone protection therapy is instituted.

Medical Physics and Bio-Engineering

The Bioengineering unit has developed a number of research streams looking at the value of assistive technologies to improve the quality of life and health of the older person. The key to this process is the integration of clinical knowledge and engineering expertise working closely with the elderly person and his/her family. Suitable technology for these projects was designed, built or sourced through the MIRA engineering lab. Equally important, these projects helped us explore how best to manage diverse skills and knowledge sources to deliver useable, useful devices for the older person.

- A Simple Balance Assessment Tool for Clinicians and In-Home Balance Assessment in collaboration with physiotherapists in UCD and our own clinical department, the unit is evaluating the usefulness of wearable accelerometry as a means of assessing posture and gait as an alternative to clinical balance scales in the elderly. A simple 20-second test for balance was devised as an alternative to the Berg Balance scale, which typically takes up to 15 minutes to perform. A Master's thesis in Physiotherapy and journal paper have also been submitted as part of this work.
- A Biofeedback System to Improve Gait in Older Adults with Parkinson's disease Parkinson's disease can lead to decreased gait stability, and subsequently increased likelihood of falls. In Collaboration with Physiotherapists from MedEL, we have shown that 1) periodic auditory stimuli improve gait parameters in older Parkinson's patients 2) outputs from a wearable wireless tri-axial accelerometer are capable of detecting these gait changes during periods of periodic stimuli in an unobtrusive manner. It is hoped that these subsystems will now be combined to provide a complete wearable biofeedback system to improve gait in Parkinson's patients.
- A Software Guided Homework Package for Lee Silverman Voice Treatment
  The vocal loudness of Idiopathic Parkinson's patients is often significantly reduced as a result of pathological neurodegenerative processes, which can affect speech production, proprioceptive, and auditory sensory feedback.

- This project is conducted in collaboration with the Dept. of Speech and Language Therapy, and the Dept. of Electronic Engineering, TCD. We are using software technology to aid Voice Training in patients with Idiopathic Parkinson's Disease.

Locator System

Losing everyday objects in the home was identified as a source of frustration for the MIRA patient group. The overarching aim of this study is to design and develop an intuitive, easy to use lost object locator that is suitable for Older Adults and individuals with Mild Cognitive Impairment (MCI).

Eye Tremor Research

Dr Niamh Collins and Mohammed al-Kalbani are pursuing PhD's in the study of ocular microtremor (OMT). The eye tremor measurement system originally designed at MIRA has now been redesigned and rebuilt at the MIRA engineering lab. MIRA researchers carried out much of the original basic scientific and clinical investigation of OMT and this new device will allow MIRA to continue as a leading centre in OMT research. The device redesign brings the system up to date with current electronic and signal processing techniques.

In parallel, the design of an alternative system founded on a non-contact optical design originally conceived in MIRA for measuring OMT is continuing in collaboration with the Department of Electronic and Electrical Engineering in UCD.

Application of Bioengineering in the Diagnosis and Treatment of Blackouts and Falls
Carotid sinus massage is currently the clinical tool of choice when diagnosing Carotid Sinus Syndrome which is a major cause of blackouts.

We have designed and implemented a non-invasive, digital signal processing technique as an alternative to Carotid Sinus Massage (CSM) for the diagnosis of Carotid Sinus Syndrome.

To further this work, we were recently awarded the Noel Hickey Bursary Grant from the Irish Heart Foundation and Pfizer to further the development of this system and also in August 2007 with a Marie Curie European Research Scholarship in Biophysical Modelling.

We have built a virtual tilting environment that allows us to mimic the perceived visual and auditory affects of tilt-table testing and their influence on autonomic function. This system has now been advanced from last year to include a Virtual reality headset, wireless EMG, ECG, respiratory and motion monitoring using the SHIMMER telemetry data acquisition platform. Ciarán Finucane, a bioengineer is pursuing a PhD in this area.

Technology Research for Independent Living - TRIL Programme

TRIL *(Technology Research for Independent Living)* is a virtual centre of expertise and research to explore technological innovations which would improve the health and happiness of older people. TRIL's mission is to discover and deliver technological innovative solutions, which promote and support independent ageing, ideally in a home environment. The objective is to improve the quality of life of older citizens while reducing the burden on carers and on the healthcare system.

TRIL is not a single project, but a centre of excellence, which delivers a range of focused research projects by combining the skills and expertise of multi-disciplinary teams of scientists from the third-level sector, clinical specialists and industrial researchers and testing these innovations in a controlled and focused patient setting.

There are three strands to this program which focus on the three key elements of ageing, cognition, falls and social connectivity. The Trinity College element is led by three lead principal investigators, Professor Rose Anne Kenny, Professor Brian Lawlor and Professor Ian Robertson. A multi-faceted team of professionals from both the academic and medical fields has been assembled to work exclusively on this program based at St James's Hospital.

There are three main strands to this programme – Falls, Cognitive and Social

TRIL Programme - Falls Strand

Medical and Falls Assessment will be a central part of the examination of each patient. This will take place in the TRIL Clinical Research laboratory based in MIRA.
The first component of the assessment involves screening for orthostatic hypotension which is a measure of Neurocardiovascular instability using sensitive electronic sensors (Finometer®).

The measurement of Gait Biomechanics will use a system that we have designed using a Shimmer® technology, Gait Rite® and a Tactex® gait mat and video technology to quantify the spatial and temporal parameters of gait. We also aim to define the optimum length of walk which will accurately measure parameters of gait stability in an older person.

We will also compare static and dynamic postural stability using the Berg Balance scale and kinematic measures.

The study of Neurocardiovascular stability will also be a central part of the assessments using Portapress® equipment.

Other areas that will be studied in the TRIL project "Falls Strand" include blood pressure and muscular contractions, Physiological measure of Fear of Falling, Tilt illusions and the relationship between orthostatic hypotension and measures of attention.

TRIL Programme - Social Strand

There were six stated aims of the social connection strand detailed in the original proposal: to understand the taxonomy of social engagement and activity among older people and determine the impact of social engagement on health; to explore the relationship of social activity and networks with depression and personality; to identify opportunities for technology interventions within the social, care and activity networks; to examine reciprocal relationships between falls and cognition with indices of social engagement and health; to iteratively develop technological interventions to help older people and their carer's to improve social engagement and examine impact of such interventions on health. All the projects which were designed to achieve the above aims are discussed in depth in the main report.

TRIL Programme - Cognitive Strand

The research in the Cognitive Strand is continuing in the three original proposed projects:

1) **Dear Diary**: developing a system for identifying speech markers of mood and cognitive function.
2) **Engineering Alertness**: developing a system, with a mobile interface, to increase alertness and prevent accidents such as falls that could compromise independence.
3) **Life Mapping**: developing a system for measuring and motivating engagement in real life activities likely to enhance cognitive functioning, emotional health and independence.

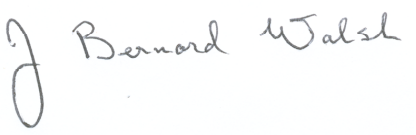
I refer you to the main report for in depth discussion of the different projects in the Cognitive strand of the TRIL Progamme.

Acknowledgements

We would like to acknowledge the financial support the Mercer's Institute for Research on Ageing continues to receive from The Board of The Mercer's Hospital Foundation. This funding has been the cornerstone of each new initiative and development to date and remains our main source of flexible income. The increasing success of the work of The Mercer's Institute is a witness to the vision of the Board of The Mercer's Hospital Foundation and we are deeply appreciative of their invaluable support over the past twenty years.

We also wish to thank the Board and Executive of St James's Hospital who have encouraged and facilitated the integration of the work of The Mercer's Institute with the hospital from its foundation in 1988. They have also fully supported and enabled all stages of the planning of the new centre for successful ageing and it is now one of the priority developments of the hospital.

Finally, we express our deep appreciation to Atlantic Philanthropies for their commitment to the development of the new centre for successful ageing. This commitment has given major impetus to the realisation of plans that have been over twenty years in gestation.



J. Bernard Walsh
Director

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. It remains an essential part of the Department of Medicine for the Elderly and 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, Intervention Clinics, Family Meetings, and Feed-back Meetings. 14 slots are available on average for general assessments per week. A multi-disciplinary team including nurses, doctors, a psychologist and social worker currently runs these sessions.

The aims of the Memory Clinic are:

a) to establish a diagnosis in patients with memory problems.
b) to provide information and support to patients and their family members.
c) to initiate appropriate treatment in patients with an established diagnosis of dementia.
d) to monitor progression of patients who are likely to progress to dementia.
e) to provide patients and families with information regarding research projects in the area of cognitive disorders**.**

Patient Assessment

Since its inception, over 3,600 patient assessments have been carried out at the Memory Clinic.

In the past 12 months 336 individuals were assessed, of whom 149 were new and 187 repeat assessments. The majority of referrals were from St James's hospital, with the remainder referred by hospital consultants and general practitioners throughout the 26 counties. The return patients consist mainly of clients with Mild Cognitive Impairment who are being monitored for progression to dementia, or clients where the diagnosis is unclear.

Each new referral is seen in the memory clinic on two separate occasions: initially for assessment and subsequently for feedback and intervention where indicated. This allows for more time for psychosocial support and access to information for patients and their families.

Prior to assessment a questionnaire is sent to the patient and is completed by a family member or somebody well known to the patient. This questionnaire is then returned to the clinic by post, providing valuable information before the patient attends. This allows the team to tailor the assessment to the patient's specific needs.

A comprehensive collateral history, medical assessment, nursing assessment and in-depth neuropsychological testing are carried out at each initial visit, taking

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 instigated, which includes therapeutic options, management of secondary risk factors as well as control of psychiatric and behavioural disturbances. This meeting is supported by Dr Colin Doherty, Consultant Neurologist who attends bi-monthly to add his expertise. New patients requiring treatment with acetyl cholinesterase 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 are reviewed 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.

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

Intervention Clinic

For those patients commencing acetylcholinesterase inhibitors, this clinic provides an opportunity to discuss treatment goals and 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 is allocated per patient to discuss relevant issues. Further time or another appointment is provided if required. Unless further issues are identified, patients are discharged to appropriate follow-up.

Family Meetings/ Feedback Sessions

All new patients are now offered a feedback session to disclose diagnosis and offer appropriate support. With the patient's permission, diagnosis and prognosis are discussed and explained fully to patient and 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. A doctor chairs each meeting with a medical social worker in attendance. All return patients receive telephone feedback from the assessing doctor. Patients who have worsened such that they require treatment are invited back to the clinic for intervention. Feedback was provided to 124 patients in the clinic setting in 2007.

Research

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 monthly. 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 the Adelaide and Meath Hospital, Tallaght as well as St. Patrick's Hospital Dublin.

Ongoing/Completed Memory Clinic Research Projects

- The Dublin Healthy Ageing Study
- The impact of social factors on health and quality of life
- Fear of Falling
- Measurement and biophysics of ocular microtremor with application in brain injury, neurological disease and ophthalmic pathology
- Development of a novel measure of autobiographical memory
- Prospective Memory studies.
- Tauopathy study of Front temporal Dementia, Corticobasal Degeneration, and Progressive Supranuclear Palsy.
- The Utility of MMSE, Clock Drawing and the Delayed Word Recall (DWR) test in screening for Early Stage Alzheimer's disease (AD).
- Concordance between cognitive tests and demographic effects in an Irish population.
- Post–stroke outcomes in the community.
- Awareness in Traumatic Brain Injury and Front temporal dementia.
- The Irish Longitudinal Study of Ageing (TILDA)
- Verbal Fluency, Age of Acquisition (AoA) as a predictor of cognitive decline.
- Efficacy of a Cognitive Stimulation Programme.
- Development of an Electronic Locator device.
- The subjective experiences of new patients and their primary caregivers attending a national memory clinic
- Genetics Resource in Late Onset Alzheimer's Disease

The Dublin Healthy Ageing Study

Overview

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 grow 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. The second wave of the Dublin Healthy Ageing Study commenced in August 2006. In addition to factors examined in the first wave of the study, this phase has seen the introduction of two important aspects:

- Genetic influences on cognitive ageing and cognitive decline in older people
- A more comprehensive focus on the impact of social factors on the cognitive and physical health and quality of life of the elderly, with the introduction of several new social measures, which include social network, social resources, social engagement, social intimacy, and loneliness.

DHAS1, Alcohol and Cognition.

Dr. Robert Coen, in conjunction with Dr. Henry O'Connell and Dr. Cathal Walsh (Statistician, TCD), is currently completing a reanalysis of the data pertaining to the impact of alcohol intake on cognition, particularly addressing the question as to whether or not regular intake of low levels of alcohol is associated with health benefits (i.e. any evidence of better cognition compared to teetotallers and moderate/heavy drinkers).

The impact of social factors on health and quality of life

Progress so far

To date, the DHAS has assessed 226 participants, since August 2006. Allowing for deaths, refusals and loss to follow-up, a maximum of 275 patients will be assessed. This is an attrition rate of 41 %. Currently, it is estimated that data collection for the second phase will be completed in February 2008.

Erin Tehee is responsible for the coordination and recruitment for the Dublin Healthy Ageing Study, in addition to the administration of neuropsychological tests during participant assessments. As data collection on the second phase of the Dublin Healthy Ageing Study nears its end, she intends to broaden her involvement in the project to include the analysing of data and the writing up of papers for publication. She recently commenced the M.Sc. in Applied Psychology, as well as the Diploma in Statistics, at Trinity College Dublin in Autumn 2007.

David Robinson was appointed as the first Watts Clinical Research Fellow to assist in completion of the DHAS. He is examining cross-sectional and longitudinal correlations between vitamin B12 and cognition and other factors in the DHAS cohort under the supervision of Dr. Conal Cunningham. He has co-authored a paper with Ai-Vrin Chin examining vascular biomarkers and cognition in the DHAS wave 1 data. This paper is now under review by the journal Age and Ageing.

Conor O'Luanaigh is working alongside David and Erin in collecting data for wave 2 of the Dublin Health Ageing Study. His area of focus/interest is that of loneliness and its effects on both mental and physical health in the elderly. He has recently completed a comprehensive review paper on loneliness entitled "Loneliness and the health of older people". This has been submitted for publication to the International Journal of Geriatric Psychiatry. He is currently working on a paper looking at the association of loneliness with personality using data from DHAS 1 and hopes to have this ready for submission soon.
Separate from his work with the Dublin Healthy Ageing Study, Conor has contributed a chapter entitled "How drugs affect competence in dementia" for the recently published book "Assessment of competence in Dementia by the European Dementia Consensus Network. He has also provided a clinical review of dementia to the GP Forum journal, which was accepted for publication in their January 2008 edition.

Fear of Falling

Dervila Hennelly has obtained ethical approval to study prevalence of fear of falling in a cohort of outpatient fallers over 65yrs attending services at St. James Hospital and to ascertain the effects of combined falls interventions on their fear of falling.

Development of a novel measure of autobiographical memory

Muireann Irish completed her PhD in MIRA in October 2007, registered under Prof. Brian Lawlor, Dept. of Psychiatry, TCD, with joint supervision from Dr. Robert Coen and Dr. Shane O'Mara, in the Trinity College Institute of Neuroscience. A novel measure, the Episodic Autobiographical Memory Interview (EAMI), was developed based on recent conceptual refinements, and was found to robustly dissociate between healthy elderly controls and patients with mild Alzheimer's disease, in terms of the level of contextual detail recalled and the accompanying recollective experience. The role of visual imagery and emotional re-experiencing emerged as significant predictive indices of an autonoetic reliving experience, with such behavioural markers notably impoverished in the Alzheimer group. A second study investigating autobiographical memory and its neuropsychological correlates in Mild Cognitive Impairment (MCI) revealed further discriminative validity between healthy elderly controls and amnestic MCI participants, with the MCI group representing a transitional state between healthy and pathological ageing, in terms of the level of contextual detail recalled and the behavioural markers of autonoetic consciousness. Findings from both studies have been presented at national and international Scientific Meetings, including the Rotman Research Institute Annual Meeting (Toronto, March 2007), and the Irish Gerontological Society Annual Meeting, (Dublin, September 2007). At present, Muireann is preparing a number of manuscripts based on findings from her PhD research, for submission to scientific journals.

Prospective Memory studies.

Prospective and retrospective memory in Mild Cognitive Impairment (MCI) and Vascular Cognitive Impairment (VCI). This study entailed development of a novel measure of Prospective Memory (remembering to do something in the future) and its application in MCI/VCI. Alberto Blanco completed this work in 2006, which he submitted for his research Thesis in part fulfilment for a Doctorate in Clinical Psychology, University College Dublin (joint supervision: Dr. Teresa Burke, Psychology Dept., UCD and Dr. Robert Coen). He was awarded a distinction and has qualified as a Clinical Psychologist. Findings were presented at the Irish Gerontological Society Annual Meeting, (Galway, September 2006) and Psychological Society of Ireland Annual Meeting (Galway, November 2006). The main findings were written up and submitted for publication but are still being revised based on reviewer comments. At this stage three separate publications are likely.

Tauopathy study of Front temporal Dementia, Corticobasal Degeneration, and Progressive Supranuclear Palsy.

Robert Coen worked in collaboration with Prof. Ian Robertson, TCIN, Dr. Tim Lynch, Mater Hospital and colleagues on a study to evaluate genotype-phenotype differentiation among different tauopathies. Data collection was completed in 2005 and part of the work was submitted as part of Fiadhnait O'Keeffe's PhD thesis, which she was subsequently awarded. Findings were presented at the Psychological Society of Ireland Annual Meeting (Galway, November 2006). In 2007 the first paper from this study, addressing loss of insight in FTD, CBD and PSP was published in Brain.

The Utility of MMSE, Clock Drawing and the Delayed Word Recall (DWR) test in screening for Early Stage Alzheimer's disease (AD).

Sharon O'Sullivan has completed this research, which entailed examining data from our Clinical database (individuals with AD) and AGECAT database (community dwelling healthy control individuals). The work was submitted as her research Thesis in part fulfilment for a Doctorate in Clinical Psychology, Trinity College Dublin (joint supervision: Dr. Robert Coen and Dr. Hugh Garavan, Psychology Dept., UCD). She was awarded a distinction and is now qualified as a Clinical Psychologist. A publication is being prepared.

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

Sharon O'Sullivan is nearing completion of this research which will be submitted as her research Thesis in part fulfilment for a Doctorate in Clinical Psychology, TCD (joint supervision: Robert Coen and Dr. Hugh Garavan, Psychology Dept., UCD). The work entailed data extraction and quantitative / qualitative analysis of demographic and cognitive data from both our Memory Clinic Database and AGECAT community database. Data collection is completed and the work is at the write-up stage.

Post–stroke outcomes in the community.

Dr. Robert Coen collaborated with Dr. Conal Cunningham and Dr. Frances Horgan on a study investigating post–stroke outcomes in the community. Claire Tobin, a Final Year Psychology Undergraduate undertook the work, which was successfully submitted as her Final Year Research Thesis in addition to producing a report for the Voluntary Stroke Scheme (VSS) by whom the research was sponsored. Claire Tobin presented the report to the VSS. It was also presented at the Irish Heart Foundation Conference (Dublin, May 2007) and at the Irish Gerontological Society Annual Meeting, (Dublin, September 2007). A paper has been accepted by the Irish Journal of Medical Science for publication in 2008.

Awareness in Traumatic Brain Injury and Front temporal dementia.

Dr. Robert Coen was a co-applicant with Dr. Fiadhnait O'Keefe and colleagues in the National Rehabilitation Hospital and University College Dublin (Dr. Simone Catron, NRH, Principal Applicant) for a study of rehabilitation of awareness deficits in Traumatic Brain Injury (TBI) and Front temporal dementia (FTD). A HRB Partnership grant was awarded. Ethics approval was obtained. Mary Fitzgerald (Higher Diploma in Psychology) was employed as the primary researcher. A novel computer-based attention rehabilitation procedure was developed and piloted, in collaboration with colleagues in UCD, TCIN, and the Nathan Institute, New York, making modifications to the DART (Dual-task Attention to Response Task) incorporating multimodal feedback. Data collection on the study proper commenced in November 2007 and is ongoing.

Verbal Fluency, Age of Acquisition (AoA) as a predictor of cognitive decline.

In light of recent research indicating that age of acquisition (AoA) was the aspect of semantic category fluency that best discriminated individuals with Alzheimer's disease (AD) from healthy elderly controls, Vanessa Buckley, a Final Year Psychology student in TCD, is carrying out research under supervision of Dr. Robert Coen and Prof. Shane O'Meara, examining AoA in AD using data from our Clinical database. Control participants will be recruited from DHAS2 participants who were agreeable to be contacted regarding further research studies. Ethics Approval has been obtained and data collection / analysis is ongoing. Part of the work was supported by a HRB Summer

Studentship grant obtained by Dr. Coen. The work will be submitted as her Final Year Research Thesis.

Efficacy of a Cognitive Stimulation Programme.

This is a research study devised by and jointly supervised by Dr. Robert Coen and Dr. Jennifer Edgeworth (Senior Neuropsychologist, Beaumont Hospital) in collaboration with the Occupational Therapy Dept, St. James's Hospital (SJH) and Residential Care staff in Beaumont Hospital. Recent research has indicated that the results of structured Cognitive Stimulation Therapy (CST) compare favourably with drug trials for dementia in terms of improved cognition and quality of life (Spector et al 2003). The present research is a preliminary case-control evaluation of CST in individuals with mild to moderate dementia in day hospital and residential settings. Ethics approval was obtained and data collection is ongoing.

Development of an Electronic Locator device.

Memory-impaired individuals frequently misplace items, which can be highly frustrating both for themselves and for their caregivers. This research aims to develop a Locator device that would address the needs of this population. The work is a joint collaboration between Dr. Robert Coen, Ciaran Finucane and colleagues in the Medical Physics and Bioengineering Dept, SJH, and Matthew Gibb & Dr. Suzanne Cahill (Dementia Services Development and Information Centre, SJH). A Focus Group has been completed, the findings from which have informed the next step which relates specifically to design issues. Regarding this a detailed protocol has been devised and submitted for Ethical approval (currently awaited).

The subjective experiences of new patients and their primary caregivers attending a national memory clinic

Matthew Gibb has written a paper on the experience of patients and caregivers who are seen in the Memory clinic. This is expected to be published later this year. He has developed information leaflets for patients and caregivers in the areas of dementia and driving, and dementia and employment. His current research on patients[1] attitudes and experiences of anti-dementia drugs is near completion and will be submitted for publication in the near future.

Genetics Resource in Late Onset Alzheimer's disease

Analysis and presentation of the findings of this study is ongoing in MIRA and with our collaborators in the UK. Over the last year there have been some interesting findings from the MIRA sample on the effect of various genes on neuropsychological deficits in Alzheimer's disease, as well as the role of iron in Late Onset Alzheimer's Disease (see recent publications and presentations). There is further analysis to be completed over the coming months.

Dr Aoibhinn Lynch has completed Higher Training in Old Age Psychiatry and is due to take up a temporary consultant post in Old Age Psychiatry. Her MD thesis is due to be submitted by May 2008. She was awarded the Senior Registrar Research Prize, Royal Academy of Medicine in Ireland, 2007 for her presentation on 'The Role of Iron in Late – Onset Alzheimer's Disease'.

Roskamp Study on Alzheimer's disease

Title

Open label evaluation of the safety and efficacy of Nilvadipine (Nivadil) in mild to moderate Alzheimer's dementia.

Study objectives:

The objectives of this study are to (i) investigate the safety of Nilvadipine. (ii) to investigate the effects of Nilvadipine on cognition. (iii) to examine the effects of Nilvadipine on plasma and serum levels of beta amyloid. (iv) to examine the effects of Nilvadipine on cerebral vascular haemodynamics as measured via trans cranial Doppler. (v) to examine the effects of Nilvadipine peripheral haemodynamics in patients as measured with active stands, twenty-four hour blood pressure monitors, etc.

Study design:

This study employs an eight week open label design.

Study duration:

Two year duration.

Size:

150 subjects with Alzheimer's dementia. 100 to be treated with Nilvadipine and 50 in the no treatment group.

Number of study sites:

The patients will be recruited via collaboration network of the Dublin Aging Research Network, which is a group composed of Consultant Geriatricians, Consultants in Old Age Psychiatry and Consultant Neurologists in the Dublin area. Collaborators are based at Beaumont Hospital, James Connolly Memorial Hospital Blanchardstown, St. Columcille's Hospital Loughlinstown, Mater Hospital, St. James's Hospital, St. Vincent's Hospital and the Adelaide Meath National Children's Hospital Tallaght among others. All the collaborators have an interest in the care of subjects with Alzheimer's dementia.

Cognitive Studies Clinic: to facilitate the recruitment of subjects for these trials a cognitive studies clinic has been established on a Thursday morning in the Falls and Blackout unit of St. James's Hospital. On average five subjects are screened each Thursday. They receive a comprehensive history and physical examination and following this have a thorough neuropsychological evaluation. They are then referred where appropriate for further neuro-imaging. Following this all these subjects are discussed at the Consultant led consensus meeting in the MIRA Memory Clinic at St. James's Hospital.

Clinic commenced on 9th November, 2006. We have screened approximately 200 subjects to date. These subjects come from a wide geographic spread but are primarily from Dublin city and surrounding counties. The subject's age range is from fifty to ninety years of age. Referrals are received from general practitioners and physicians in the DARN collaboration.

Subject type:

For the purpose of the Roskamp study we are recruiting subjects with mild to moderate Alzheimer's dementia MMSE range 14 – 27.

Test drug dosage:
Nilvadipine 8 mgs sustained release capsule for the treatment group taken once a day at lunch time. There is no drug treatment in the control group.

Study Parameters:
Parameters will be measured prior to, during and at completion of the study period.

Primary diagnostic efficacy:
will be based on changes in cognitive function, changes in CSF/plasma and / or serum levels of Alzheimer's beta amyloid as measured by enzyme linked immunosorbent assay (ELISA). In addition safety will be assessed by physical examination, electro-cardiogram (ECG) and clinical laboratory tests which will include phasic orthostatic blood pressure measurement, twenty-four hour ambulatory blood pressure measurement and transcranial Doppler measurements of middle cerebral artery blood flow.

Number of visits:
There are six visits in total. The objective of this study is that most of the visits are preformed in the subject's home. Two visits to perform the laboratory tests are preformed in St. James's Hospital. The remainder are performed in the subject's home. Where a subject prefers it we can perform all the visits at St. James's Hospital.

Number of staff for study:
One research fellow, two research clinical nurses and study secretary.

Study to date:
As of 21st Jan 2008 we have recruited 51 subjects into the study. 40 of those have completed the study period.

Web Link: http://www.rfdn.org/

HRB Translational Research in Neurovascular Instability

Project Title:
Neurocardiovascular Influences on Cognitive Functioning: Basic & Clinical mechanisms

Summary:
This is a 5 year longitudinal study of older persons with Mild Cognitive Impairment examining the influences of Neurocardiovascular instability (NCVI) on cognition at baseline and on progression/transition to dementia over 3 years follow up. The relationship between NVCI and deep white matter hyperintensities on MRI is also being examined.

Participants are enrolled through the Cognitive Studies and Memory Clinics at St James's hospital. Following enrolment all participants have annual cognitive and neurocardiovascular assessments. Neuroimaging is performed following enrolment and at 3 years follow up. Clinical assessments take place in St James's hospital and neuroimaging takes place in the Trinity College Institute of Neurosciences (TCIN). In parallel, animal responses to cardiovascular and heart rate challenges are been examined in TCIN.

This study commenced in October 2006. Over 80 participants have been enrolled to date. Preliminary results have been presented at the Irish Gerontological and British Geriatric Society meetings in 2007. It has also been accepted for publication.

This study has been approved by the SJH/AMNCH and TCIN/Psychology Research Ethics committees. It is funded by the Health Research Board (1.5 million euros). This study will continue until September 2011.

Translational research accelerating the development of novel therapies for Alzheimer's disease – GSK Programme

Glaxo Smith Kline (GSK) is a global pharmaceutical marketing numerous pharmaceutical, vaccines and consumer healthcare products worldwide. GSK employs over 100,000 people in 40+ countries and has sales in excess of $37bn pa. In Ireland GSK is based in Dungarvan, Cork and Dublin.

In 2001 GSK established the Neurology and Gastrointestinal Centre of Excellence for Drug Discover (NGI CEDD, Harlow, UK). Since its inception the NGI CEDD has been very successful in developing a rich and broad preclinical pipeline of assets in 3 core disease areas including AD.

This program is a further extension of GSK's strategy for developing translational research programs.

Clinical Facilities at St James's Hospital

This trial will take place in a clinical trials facility based at St James's Hospital. This area is centrally located close to the main hospital concourse and adjacent to the radiology department. The project team will also have access to a sound proof room in the outpatients department where the ECG testing will take place.

Staffing:

1 Physician
2 Research Nurses
2 Research Assistants
1 Clinical Co-ordinator

The funding for this program will be transferred to St James's from Trinity College

Year 1 to 2

Clinical Deliverables

- A set of novel ERP and cognitive markers that reliably discriminate between normal, elderly, younger controls and Mild Cognitive Impairment (MCI) subjects.

- A completed randomised controlled trial of the short-term effects of two licensed AD compounds on a subset of the above markers in normal elderly and MCI participants.

Preclinical Deliverables

- Characterisation of novel cognitive neuropharmacological and neurophysiological phenotypes after treatment with aricept, memantine and rosiglitazone.

- Confirmation of the ability of rosiglitaxone to attenuate age-related synaptic deficits in comparison to an additional novel Peroxisome Proliferator Receptors Agonists (PPAR) compound and gold standard treatments for AD.

- Assessment of the affects of rosiglitazone an additional PPAR compound, aricept and memantine on AB-induced toxicity.

Years 3 to 5

Clinical Deliverables

- Completion of a combined Event Related Potentials (ERP)/ Functional MRI (fMRI) study of variability and sustained attention normal and young.

- A second phase of completed randomised controlled Experimental Medicine studies of the shorter term effects of existing licensed AD or novel compounds of ERP markers of cognitive impairment, previously identified in years one and two, contrasting normal elderly, MCI and/or AD subjects.

- Two completed randomised controlled Experimental Medicine studies of the shorter term effects of existing licensed AD or novel compounds on new ERP and MRI markers of cognitive impairment, contrasting normal elderly and/or AD subjects.

Preclinical deliverables

- Characterisation of novel cognitive neuropharmacological and neurophysiological phenotypes for 6 additional novel agents.

- Characterisation of the affects of a further novel PPAR on age-related synaptic deficits.

- Assessment of the effects of rosiglitazone on AB-induced toxicity in APOE 3 & 4 Tg mice.

Stroke, Research and Clinical Services

2007 saw continued developments and innovations in the stroke service.

Service developments:

- We appointed our first Clinical Nurse Specialist in Stroke Medicine, Ms. Suzanne Walsh. Suzanne's role involves coordinating training of staff across the hospital in aspects of stroke care, assisting in Neurovascular and Stroke clinics and running the secondary prevention clinic for cerebrovascular disease.

- The TIA clinic has been expanded to run daily, permitting the review of patients with TIA or Stroke within one working day of stroke onset. Two hundred and thirty five patients were seen in the TIA clinic in 2007.

- The stroke thrombolysis protocol is still in operation and the Stroke service organised the first national Thrombolysis Education day in The Royal college of Physicians in October to try to increase use of the therapy across Ireland.

- Continued progress has been made in the development of an Acute Stroke Unit in St James's and it is expected to open in early 2008 on the Acute Medical

Admissions Unit as a joint initiative between the medicine for the elderly, GUIDE, GEMS and Scope directorates. This will enable the delivery of specialist, protocol based medical, nursing and therapy care and assessment to all stroke patients admitted to St James's.

- The MedEL acute stroke service now performs daily ward rounds reviewing all stroke patients admitted to St James's and in the last year has taken over inpatient management of more than 120 complex stroke patients to provide specialist care. We now increasingly review patients in the Emergency department to provide expert care from the moment of admission. Since the establishment of the Acute Stroke Service in St James's in 2006, one month mortality for stroke patients has dropped by more than 25% and median length of stay has dropped by 7 days.
- A training programme has been developed for medical staff in AMAU and the Emergency department to improve the diagnosis and management of acute stroke.
- The service is involved in the development of a new Diploma in Cerebrovascular Medicine with the Royal College of Physicians of Ireland.

Research:

A number of research projects have been undertaken by the stroke service including:

- A study of the nature and associations of fatigue in patients with cerebrovascular disease (paper submitted for publication).
- A study of the use of actimetry to increase accuracy of nocturnal ambulatory blood pressure monitoring.
- A study to determine if an association exists between nocturnal hypoxemia and clinical diagnosis of dysphasia.
- A study of the utility of the ROSIER stroke recognition instrument in Irish hospitals (in press).
- A study of the change in bone biomarkers in ambulatory patients with stroke (joint study with Bone and Osteoporosis service)
- A study of adherence to secondary prevention therapy of patients with stroke and TIA. (Masters awarded to Mr David Walsh, Pharmacy Department, on the basis of this work. It is being prepared for publication.)
- We have recently undertaken our first pharmaceutical trial in Stroke, the PERFORM study of a novel anti-platelet agent in stroke.
- We have recently been awarded a 100,000 project grant by Shire pharmaceuticals to perform a joint study with the Department of Renal Medicine, examining changes in autonomic function in patients receiving erythropoietin for anaemia of renal failure in older subjects.
- The service has recently submitted seven abstracts to the 2008 European Stroke Congress in Nice and will be submitting a similar number to the world Stroke Congress in Munich this autumn. An abstract from the department entitled 'MR scans following CT: The value of additional imaging in older patients with suspected cerebrovascular disease.' won second prize in the poster competition of the Irish Heart Foundation National Stroke Scientific Meeting.

Falls, Blackout, Bone Protection and Osteoporosis Service

Review of Falls and Blackout Service 2007

A Falls, Osteoporosis and Blackout Service was established by the Medicine for the Elderly department in St. James Hospital in 2003.This is a brief summary of outcomes for 2007.

In-patient Falls Prevention Program

This is a nurse led inpatient falls prevention program where ongoing education of MeDEL ward staff in falls prevention is coupled with standardised falls prevention measures, regular un-announced audits and ongoing review of patients who fall. It was the first of it's kind in the country when it was introduced in 2003 and is the most successful to date. All falls are recorded locally by the hospital and reported to the Clinical Indemnity Service (CIS) who compile a National Database. A review of the first four years of the program shows:

- In-patient falls documentation is now 100% accurate
- Compliance with falls prevention measures has increased by 161%
- In-patient falls for MedEL in 2007 were the lowest since we started the service in
- 2003 and were down 28% on 2006 (354 vs. 495 falls). This reduction was seen across all wards (acute, rehabilitation and extended care).

In recognition of the fact that MedEL has the most successful in-patient falls prevention service in the country we were asked to write an article about our service for the September 2007 CIS newsletter (1) and presented details about our service at the inaugural CIS Symposium on Falls prevention in December 2007 (2).

Bone Protection and Osteoporosis Service

In 2007, there has been a further expansion of the Bone Protection and Osteoporosis Service in both clinical and research aspects. The service includes secretarial support, 4 Clinical Nurse Specialist, a Senior Radiographer, Clinical Fellow in Bone Health, and 2 supervising consultants, namely Dr MC Casey and Prof JB Walsh.

The service accepts referrals of patient diagnosed with osteoporosis or have risk factors for osteoporosis and fractures, and provides a comprehensive and multidisciplinary approach to the prevention and management of osteoporosis and its related problems.

The service includes:

- Assessment of patients within the Acute Medical Assessment Unit
- Twice weekly Pre-Assessment Osteoporosis Clinics
- Weekly Dedicated Bone Health Clinic
- Nurse-Led Falls review service for inpatients under Medicine for the Elderly
- DXA scanning
- Orthogeriatric Liason Service
- Management of patient on PTH treatments
- Management of Bone Health of Patients who have had a Bone Marrow Transplant
- Medical Cover for the Community Re-ablement Unit

Kara Fitgerald: Studying in Derby University on a Masters in Osteoporosis and Falls Management
Nessa Fallon: Falls and their Implications in a Colles Fracture patients
Georgina Steen: Compliance and Tolerance of Osteoporotic Patients with medication

Acute Medical Assessment Unit (AMAU) Liason

This service started in 2005 and focused on patients who are 65 years and older who are medically stable and able to manage at home with support services. It facilitates the acute medical assessment a service that can assessed patients If suitable the patients are referred to Robert Mayne Day Hospital. It incorporates a clinical nurse specialist visiting the unit 3 times per week to assess identified patients for early discharge.

Patients are assessed by the nurse specialist and many are followed up in the Robert Mayne Day Hospital and by other units within MIRA.

Falls Service

Falls are a common problem in elderly populations with rates of 30 to 50% of community dwelling elderly falling each year. Approximately 5% of falls are associated with fracture hip. Hip fracture is most serious consequence of falls and osteoporosis however wrist and other peripheral fractures can also have a devastating effect. Falls are not only associated with physical injury, but also can have an impact on the confidence of a patient and impact negatively on their well-being and can cause social isolation.

The presence of a Nurse Led Falls Review Service has added greatly to the prevention of falls on the Medicine for the Elderly wards including Connolly Norman Ward. There has been a dramatic decrease in the number of recurrent fallers, with a substantial decrease in injurious falls.

Patients who are admitted to the Medicine for the Elderly Department are assessed on admission for falls risk using "STRATIFY" tool on ward level and those deemed at a high risk of falling are identified with an ID bracelet, bedside notification, and also are offered External Hip Protectors. Patients who have a fall while an inpatient are further assessed by a Falls Clinical Nurse Specialist (CNS). This involves a full assessment including history of falls, polypharmacy, balance problems, orthostatic hypotension, acute illnesses and environmental risk factors. From these findings, the CNS can make recommendations to the patient and staff on how to prevent future falls. The role of the CNS also includes an educational component that entails the development of on-going staff training in falls prevention and a regular in-patient audit program looking at the effectiveness of the service.

Since commencing the service there has been a dramatic reduction in the number of fallers with the number of recurrent fallers also been reduced.

Falls and Blackout Unit

This is an out-patient assessment clinic that runs five days a week where patients with unexplained falls and blackouts are investigated using state of the art cardiovascular technology. Once diagnosed patients can link into existing hospital resources (including referral to our Day hospital for gait and balance retraining or referral to the cardiology services) but the vast majority are dealt with solely by the clinic and discharged back to the community.

Year	New patients seen
2003	72
2004	127
2005	292

The Clinic moved to a new expanded site beside Emergency Department in December 2005.

Year	New patients seen
2006	1,262
2007	1,868

Activity continues to increase significantly with the majority of patients being referred from the community (and in particular the Emergency Department). There was a 48% increase in patient throughput in 2007 (compared to 2006) with 1,868 patients seen.

Median patient age seen was 62.5 year (range 15 to 89 year). 54% were aged under 65 and 46% were greater than 65 years and 59% were female.

Orthogeriatric Service

The Orthogeriatric service was set up in 2004 with the specific aim of capturing all hip fractures attending the hospital. This service has grown to incorporate all fracture patients over the age of 50 years attending the hospital. These patients are offered a detailed screening for osteoporosis, including DXA scan, biochemical markers and follow up in the bone health clinic. These patients are also reviewed regards risk factors for falls and preventative measures are taken.

Hip Fracture

As Mentioned earlier, hip fractures are an increasingly common, serious problem that occurs mainly in older. All patients with a hip fracture are reviewed by the ortho-geriatric service including a dedicated clinical Nurse Specialist in Falls Management and Osteoporosis and Senior Medical review on the orthopaedic wards.

The aging population and an increasing number of hip fractures worldwide have made prevention of hip fractures a matter of importance. Hip fracture is a worldwide clinical problem common in the elderly and set to double by the year 2040. It constitutes a major clinical and financial burden to health services accounting for 20% of orthopaedic bed stays worldwide. Many potential risk factors for hip fracture, such as lower body weight, cigarette smoking, caffeine intake, use of long-acting sedatives, and inactivity, have been identified in case–control and prospective studies.

Recurrence of hip fracture occurs in approximately 10% of patients with original hip fracture in 10 years. The recurrence of these hip fractures stems from falls and other co-morbidities that the patient may have suffered since have the original hip fracture.

In 2007 we reviewed 167 hip patients. These patients will undergo further assessment at the Pre-assessment for their risk factors for osteoporosis and falls risk.

Table 2. Number of Hip fractures admitted to St James's Hospital.

Year	2005	2006	2007
No of hip fractures	164	196	167

In 2008, new research projects have begun with particular interest in patients who have had hip fractures and looking at factors that caused these fractures with particular interest in the prevention of falls, compliance of medications, and preventative measures such as gait analysis and exercise training.

Niamh Maher, Clinical Nurse Specialist in Bone Health and Falls, has recently been rewarded with a Health Research Board Grant for the her study which will identify the factors involved in these patients falling and follow-up on the diagnosis of osteoporosis.

Colles and Peripheral Fracture

All elderly patients presenting with a peripheral fracture, particularly those who present with colles fracture are offered a follow-up appointment at a Specialised Osteoporosis Clinic, which occurs every 2nd Thursday morning. This nurse-led clinic reviews risk factors for falls and osteoporosis. Patient is commenced on treatment as indicated by the results of their assessments.

77 Colles fractures attended St James's Hospital and Specialised Falls and Osteoporosis Clinic for assessment of Risk factors for falls and osteoporosis.

Nurse Led Pre-assessment Clinics

This aspect of the service has become first line in treating patients who have been referred to the Bone Health Service. This is often the first contact a patient will have with the service. Our clinical nurse specialists in osteoporosis review and counsel patients in regards to a diagnosis of osteoporosis. Various aspects of the person's background history, which includes risk factors for osteoporosis and falls, are reviewed and treated. This includes 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 that are at high risk of fracture.

Another aspect of this clinic is that we are able to perform biochemical screens, DXA scanning, heel ultrasound and review of medications, so as to provide one of the most comprehensive osteoporosis review clinics available in the Republic of Ireland. We relay available information on the day to the patient but all information is sent to the patient's GP also. If a patient is deemed to have severe osteoporosis or have risk factors for progression of the disease, they are referred to our bone health clinic for further opinion and management of their osteoporosis.

With the increasing use of PTH within the service, we give the necessary time to the patient to train them into self-administration of the PTH injections. This clinic also facilitates the timely review of patients who are at risk of developing complications related to PTH therapy, such as raised serum calcium and urinary calcium. Patient's adherence to treatment is monitored and feedback is given to patients' to encourage compliance with PTH therapy.
For 2007, a total 497 patients were seen, which included patients who had a hip fracture or other peripheral fractures. 422 new patients to the Bone Health Service were seen, with a further 75 patients being assessed and managed for osteoporosis and falls.

Specialised Bone Health Clinics

These clinics 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 and management. They also provide a valuable resource for the in depth study of fragile bones in an Irish population.

All results from the pre-assessment clinics are collated and are available at these specialised clinics. 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 Qualify of Life but also demonstrating 300-400% increases in the rate of biochemical bone formation. A dedicated specialised service has ensured a high rate of compliance with these bone protection therapies.

Expansion of Intravenous Zoledronic Acid Use

The role of IV zoledronic acid in the treatment of osteoporosis has increased in the previous 12 months. There have been 2 large studies demonstrating the benefits of this intravenous bisphosphonate in high-risk patients versus placebo, with a 70% reduction in subsequent vertebral fracture. It offers an alternative to oral therapy, which may not be well tolerated by some of our patients.

Currently, the Bone Health Service has over 100 patients requiring yearly infusions of zoledronic acid and attend the Robert Mayne Day Hospital for this infusion.

Parathyroid Therapy

Over 160 patients have finished or on treatment with PTH. This involves patients who have severe osteoporosis or vertebral fractures, and possibly both. These patients are monitored at 3, 12, and 18 months while on treatment. Recently, we have started using 1-84 PTH therapy which continues for 24 months.

Our unit has previously participated in a multi-centre European trial of PTH with patients with advanced established osteoporosis.

Bone Marrow Transplant Patients

As part of our clinical service, patients who have undergone bone marrow transplantation are referred to the osteoporosis service for Bone health Assessment. This service was commenced in January 2003. These patients are followed by Dr E. Vandenberge (Consultant Haematologist) in the Late-Effects Clinic. These patients as a group are at increased risk of further progression due to the nature of these blood disorders and the treatments they receive including immunosupression and steroid therapy.

To date, 301 patients have had a DXA performed for assessment of osteoporosis with a further 95 requiring further scanning due to the risk of progression of this disease in the subsequent years. These patients are reviewed in our Bone Health Clinic if they demonstrate severe osteoporosis or worsening bone health and quality.

MIRA DXA (Clinical Densitometry) Service

This service is available to the consultants within St James hospital and attached hospitals, and also to General Practitioners in the community. DXA scanning is useful in the diagnosis of osteoporosis and also assessing patient's response to treatment. To date, there have been over 6,200 scans performed since 2002. It provides a free service for patients within the local catchment area.
This remains one of the most active facets of the osteoporosis service with 2007 being the busiest year to date, 1786 scans being done in 2007, which is an increase of 7.6% on last year's total scans.

Table 3. Number of DXA scans performed in 2007

	No of DXA (Percentage)
Inpatient Referrals	230 (13%)
Outpatients Referrals	1015 (57%)
Other Referrals (GP Referrals, pre-assessment clinics etc)	539 (30%)*
Total	1786 (100%)

**Approx 20% of referrals were from General practitioners.*

Bone for Life Group

This is a collaborative research partnership between the Departments of Mechanical and Tissue Engineering in Trinity College, Dublin and the Department of Anatomy in the Royal College of Surgeons and Department of Veterinary Medicine in University College Dublin

Dr Joe Browne, Bone Fellow and Specialist Registrar in Medicine for the Elderly is undertaking a major study on The Risk Factors and Causes for Hip Fractures in Older Patients in both Osteoporotic and Non-osteoporotic Bone using Novel Techniques in the Diagnosis of Osteoporosis. This work will be a central part of the collaborative research programme of the Bone for Life Group and will see a close working partnership between clinical partners and our Bio-Engineering and Basic Sciences colleagues.

Conference Attended by Unit Clinical and Research Staff

British Geriatric Society Meeting, Brighton, 2007 (Spring)
British Geriatric Society Meeting, Harrogate, 2007 (Autumn)
National Osteoporosis Society Meeting, UK. Nov 2007
Irish Osteoporosis Society, Oct 2007
Irish Gerontological Society, Sept 2007
IOF Advanced Training Course on Osteoporosis, Lyon, January 07
American Society for Bone and Mineral Research (ASMBR), Sept 2007
Falls and Postural Stability Conference – Birmingham Sept 2007
Osteoporosis Conference Edinburgh, May 2007
Clinical Indemnity Scheme Conference Dublin 2007
International Stroke Conference, San Francisco, Feb 2007

Talks/Lectures

Falls in-service to all MedEL wards.
FETAC Course for Healthcare Attendants
Pulmonary Rehabilitation Groups – every 2 months
Osteoporosis and Falls risk
BNS Students
MSC Gerontological Nursing, Trinity College Dublin
Clinical Indemnity Scheme Conference, Dec 2007

Medical Physics and Bio-Engineering

Health Technology Research Activity at MIRA

There is considerable interest at present in the potential for technology to help improve the quality of life of the older person and their carers. Consumer technology has reached a point where unobtrusive, user friendly and useful 'health technologies' can be practically implemented. Off the shelf consumer devices such as mobile phones contain so much processing power that their adaptation for an assistive role can be considered.

Efforts in this area in the last year at MIRA have focussed on further building upon a process already established to develop, test and deploy assistive technologies, which are of genuine benefit to the end user. The key to this process is the integration of clinical knowledge and engineering expertise with input from older people and their carers. All these resources are available in MIRA, placing it in an excellent position to make a positive contribution to quality of patient life through appropriate technology.

Following consultation on problems faced by the older person, a number of pilot projects were adopted. Suitable technology for these projects was designed, built and/or sourced through the MIRA engineering lab. Equally important, these projects helped us explore how best to manage diverse skills and knowledge sources to deliver useable, useful devices for the older person.

A Simple Balance Assessment Tool for Clinicians and In-Home Balance Assessment

M. O Sullivan, C. Finucane, G. Boyle, Catherine Blake

Our continuing work on a wearable Falls, Autonomic, Cardiovascular Test (FACT) system, has proven to be very fruitful this year. In collaboration with Physiotherapists in MedEl and UCD, we have evaluated the usefulness of wearable accelerometry as a means of assessing posture and gait as an alternative to clinical balance scales in the elderly. A simple 20-second test for balance was devised whereby a patient stands on a soft, compliant mat, while wearing a torso-mounted accelerometer to assess balance. This approach proved to be a successful patient friendly, alternative to the Berg Balance scale, which typically takes up to 15 minutes to perform. Results of this work have been presented to national and international audiences, a Master's thesis in Physiotherapy and journal paper have also been submitted as part of this work.

A Biofeedback System to Improve Gait in Older Adults with Parkinson's disease

D. Phelan, C. Finucane, M. O Sullivan, F. Hegarty, T. Foran, G. Boyle

Parkinson's disease can lead to decreased gait stability, and subsequently increased likelihood of falls. It has been shown that external, periodic auditory cues provided by a metronome can be used to initiate, maintain and improve gait stability in the Parkinson's patient. However as far as we are aware no convenient solutions currently exist that may

detect altered gait patterns and provide auditory stimuli to the patient when he/she most requires biofeedback. In collaboration with Physiotherapist's from MedEl, we have shown that 1) periodic auditory stimuli improve gait parameters in older Parkinson's patients 2) outputs from a wearable wireless tri-axial accelerometer are capable of detecting these gait changes during periods of periodic stimuli in an unobtrusive manner. It is hoped that these subsystems will now be combined to provide a complete wearable biofeedback system to improve gait in Parkinson's patients. Furthermore this study highlights the value of promoting non-traditional collaborative interactions across hospital-based services to provide innovative patient care solutions. This work was presented at an in-house meeting. Conference and journal papers are now in preparation for publication.

A Software Guided Homework Package for Lee Silverman Voice Treatment

C. Finucane, P. Murphy, C. Wang, G. Boyle, M. Burke, D Coakley

This project is conducted in collaboration with Dept. of Speech and Language Therapy, and Dept. of Electronic Engineering, TCD. In this work we aim to utilize software technology to aid Voice Training in Idiopathic Parkinson's patients with reduced vocal loudness in the home.

The vocal loudness of Idiopathic Parkinson's patients is often significantly reduced as a result of pathological neurodegenerative processes, which can affect speech production, proprioceptive, and auditory sensory feedback.

This research designed and produced a user-friendly software package suitable for home use, which can assist patients in speaking at the correct decibel level in a discrete manner. The system requires the user to speak into a microphone, which has been calibrated to mimic perception of vocal loudness. If the patient begins to speak at a level below a predetermined loudness the system gives auditory, or visual cues to indicate that they should speak louder together with pre-programmed clinician feedback and encouragement in the form of video feedback. It is hoped that this system will improve vocal retraining effectiveness, and help patients regulate vocal level in the community without carer assistance, improving self-confidence, independence and communication ability. Conference and journal paper have been prepared for submission. This work advanced with the support of a HRB summer student grant.

Locator System

C. Finucane, S. Cahill, M. Gibb, R. Coen, G. Boyle, F. Hegarty, T. Foran, J. Rabbitte, B. Flynn, D Coakley

Losing everyday objects in the home was identified as a source of frustration for the MIRA patient group. While devices are commercially available for 'tagging' and locating objects such as reading glasses and wallets, they are not in general designed with the older person in mind. The overarching aim of this study is to design and develop an intuitive, easy to use lost object locator that is suitable for Older Adults and individuals with Mild Cognitive Impairment (MCI). Our current work is aimed at identifying usability issues that impair/enhance the usefulness of a proposed device in older adult and MCI populations. The outcome of this study will be twofold. It will firstly inform development of a User Friendly Assistive Device suitable for individuals with cognitive impairment and secondly inform future assistive technology design for Elderly and MCI populations by way of publication.

Syncope and Falls

Ciarán Finucane is pursuing a PhD in MIRA, studying syncope and falls, under joint supervision of Professor Rose Anne Kenny, Dept. of Medical Gerontology, TCD, and Dr Gerard Boyle, Medical Physics and Bioengineering, St James's Hospital.

The theme of this research strand is the design and development of novel research tools and techniques that compliment ongoing research into NeuroCardiovascular Instabilities (NCVI's) in the Falls and Blackout Unit (FABU).

One of our core research themes is technological innovation in Carotid Sinus Syndrome, a major contributor to syncope and unexplained falls in the elderly. Carotid sinus massage is currently the clinical tool of choice when diagnosing Carotid Sinus Syndrome. We have designed and implemented a non-invasive, digital signal processing technique as an alternative to Carotid Sinus Massage (CSM) for the diagnosis of Carotid Sinus Syndrome. This has stemmed out of initial exploratory simulation studies, which have seen the development of biophysically realistic models of the baroreflex. This technique is standardized, safe and suitable for elderly patients. The proposed system has undergone initial clinical trials in FABU. Findings on this approach were made at local, national and international scientific conferences in 2007. Studies to improve the diagnostic potential of this approach are ongoing in collaboration with Dr. Orla Collins and Dr. Clodagh O'Dwyer in the Falls and Blackout unit.

To further this work, we were recently awarded the Noel Hickey Bursary Grant from the Irish Heart Foundation and Pfizer to further the development of this system and in August 2007 with a Marie Curie European Research Scholarship in Biophysical Modelling.

In parallel we have continued to refine a technical framework and analysis tools for conducting early pilot studies as part of the TRIL Falls and Mu Sensory research strand. We have built a virtual tilting environment that allows us to mimic the perceived visual and auditory affects of tilt-table testing and their influence on autonomic function. This system has now been advanced from last year to include a Virtual reality headset, wireless EMG, ECG, respiratory and motion monitoring using the SHIMMER telemetry data acquisition platform.

Eye Tremor Research

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

Dr Niamh Collins and Mohammed al-Kalbani (Bio-Engineer) are both pursuing a PhD studying ocular microtremor under joint supervision of Professor Davis Coakley, Dept. of Medical Gerontology, TCD, and Dr Gerard Boyle, Medical Physics and Bioengineering, St James's Hospital. Ocular microtremor (OMT) is a minute eye movement related to brainstem function, with diagnostic and prognostic potential in brainstem disease. A device to measure ocular microtremor has been developed and validated in normal subjects. The characteristics of normal ocular microtremor are being studied in detail using novel signal processing techniques. Studies are underway to examine the correlation between ocular microtremor and electroencephalography (EEG) in healthy subjects. Studies to investigate the diagnostic and prognostic potential of OMT in stroke, traumatic brain injury and ocular motor disorders, are progressing well with data collection ongoing. Further studies are planned in 2008 to examine the effect of caffeine and alcohol on OMT.

The eye tremor measurement system originally designed at MIRA has now been redesigned and rebuilt at the MIRA engineering lab and has gone into use as a research tool. The device allows the investigation of OMT (Ocular Microtremor), a very rapid eye movement that carries diagnostic and prognostic information on brain function. MIRA researchers carried out much of the original basic scientific and clinical investigation of OMT and this new device will allow MIRA to continue as a leading centre in OMT research. The device redesign brings the system up to date with current electronic and signal processing techniques.

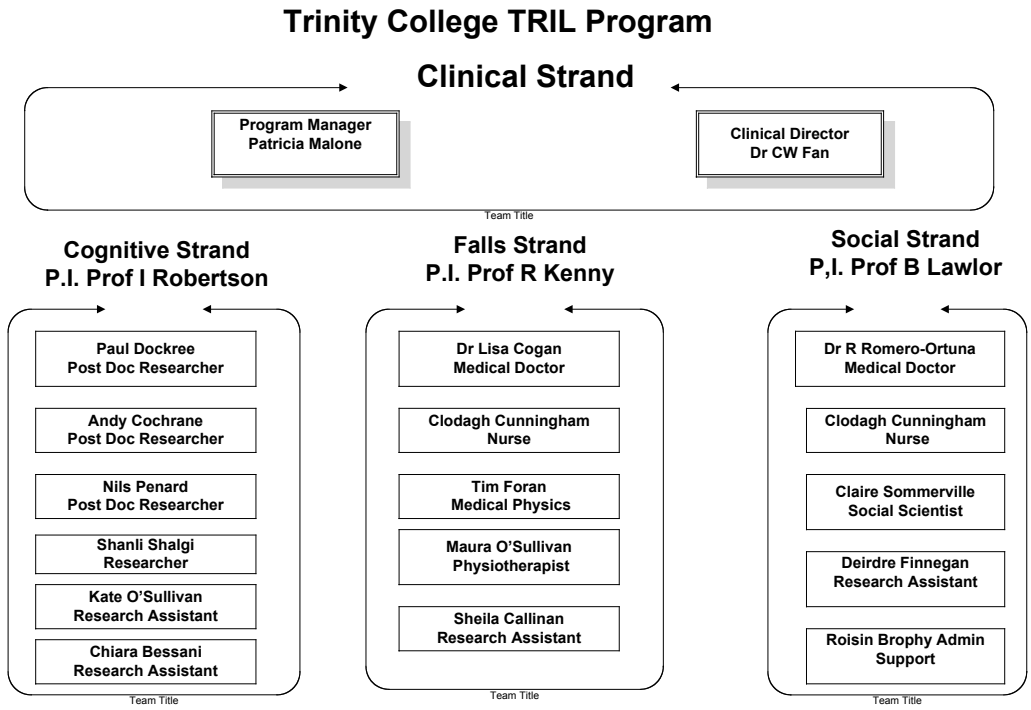
In parallel, the design of an alternative system for measuring OMT is continuing in collaboration with the Department of Electronic and Electrical Engineering in UCD. This work is founded on a non-contact optical design originally conceived in MIRA. Current work is aimed at refining and miniaturizing this design. To further improve the sensitivity of this technique, future work in this area will be carried out to rigorously characterise the interaction of laser light with scleral layers of the eye.
Findings from these studies have been presented at national and international scientific meetings, including the European Conference on Eye Movements (Potsdam, August 2007), the British Ocular Motor Group (London, November 2007), Irish Heart Foundation Stroke Study day (Dublin, May 2007), Royal Academy of Medicine Ophthalmology Spring meeting (Limerick, March 2007); IEEE Engineering in Medicine and Biology Society (Lyon, August 2007), IEEE International Conference on Signal Processing and Communications (Dubai, November 2007), Association of Physical Scientists in Medicine, (Dublin, May 2007) and the Bioengineering in Ireland Conference (Fermanagh, January 2007). Further details of Mohammed al-Kalbani's work are included in the Medical physics and bioengineering section.

TRIL – *Technology Research for Independent Living*

TRIL is a virtual centre of expertise and research to explore innovations, which would improve the health and happiness of older people. TRIL's mission is to discover and deliver technological innovative solutions, which promote and support independent ageing, ideally in a home environment. The objective is to improve the quality of life of older citizens while reducing the burden on carers and on the healthcare system.

TRIL is not a single project, but a centre of excellence, which delivers a range of focused research projects by combining the skills and expertise of multi-disciplinary teams of scientists from the third-level sector, clinical specialists and industrial researchers and testing these innovations in a controlled and focused patient setting.

There are three strands to this program, which focus on the three key elements of ageing, cognition, falls and social connectivity. The Trinity College element of this program has a budget of 4.9 million and is lead by 3 lead Principal investigators; Professor Rose Anne Kenny, Prof Brian Lawlor and Prof Ian Robertson. A multi-faceted team of professionals from both the academic and medical fields has been assembled to work exclusively on this program based at St James's Hospital and can be contacted at 4103863 or at tril@stjames.ie.



Falls Strand of TRIL Programme

Introduction

A fall is defined as 'an event whereby an individual inadvertently comes to rest on the ground or another level with or without loss of consciousness. This definition encompasses falls associated with accidental slips and trips, falls due to deficits in sensorimotor function and the 50% of non-accidental falls or blackouts due to cardiovascular dysregulation in particular disorders or medications that lead to transient drops in blood pressure.

Our strand goal is to develop, validate and use unobtrusive systems to monitor patient status at home and in the wider community in these studies. The widespread adoption of in-home/community systems for monitoring motor behaviour and cardiac regulation will create both a new class of home health device and substantial new data streams. In equal measure the answers provided by this programme will provide key information for the subsequent specification, design and validation of a platform for the early detection of falls risk factors to enable targeted interventions to be implemented before the fall event occurs, thus stemming a cascade of events which ultimately threaten independence and quality of life in the older population To expand our knowledge base of the *multiple biological, behavioural and environmental factors* which *integrate* to cause falls so that we can develop new and adapt existing *technologies* in a *cost effective* manner to prevent *falls and disability*, thereby ensuring *independent living* for older persons. The falls strand research programme has a number of components.

Medical and Falls Assessment

There are several dimensions to the medical and falls assessment. The main part of the assessment takes place in the TRIL Clinical Research laboratory. Each patient gives full informed consent to proceed with the assessment. A detailed falls history is taken followed by a general physical examination. The first component of the assessment involves screening for orthostatic hypotension, a measure of neurocardiovascular

instability. A Finometer® measures beat-to-beat haemodynamic parameters on the patient as they move from a lying to standing position (Active Stand). The next component of the assessment involves measurement of gait biomechanics. Four separate technologies are used. These include the use of Shimmer®, Tactex® sensor mat, Gait Rite® mat and video analysis. Temporal and spatial parameters of gait are recorded. Patients complete a Timed Get Up and Go test, which is a clinical measure of mobility, and this is recorded using Tactex® and video technology. After this grip strength is measured using a Dynamometer and Berg Balance assessment records static balance and stability. Multisensory assessment of vision and hearing are recorded. All patients without hearing aids undergo a pure tone audiogram.

A research programme, comprising of nine projects, has emanated from the falls and assessment strand. Below is a brief description and outline of these projects.

Project 1 - Gait Biomechanics

Hypothesis
Older persons who fall have different gait parameters compared with age match controls

Aim
To use the TRIL gait analysis system, comprising of Shimmer®, Tactex® gait mat and video technology to quantify the spatial and temporal parameters of gait. Parameters, which are the most discriminating in identifying persons with a proneness to falls, will be identified (n=600)

Project 2 - Comparison of a 4 metre walk with a 30 metre walk

Hypothesis
A 30-metre walk is the optimum distance to measure parameters of gait variability in older persons at risk of falls.

Aim
To define the optimum length of walk which will accurately measure parameters of gait stability in an older person. Measurement of gait spatial and temporal parameters will be done using Tactex® mat and Gait Rite® over a 4 metre distance. Shimmer® technology will measure these same parameters over a 30-metre distance. Comparison of both measurements will help identify if the 30-metre walk has higher sensitivity for detection of at risk older persons. The adequate distance necessary to capture a profile of risk in older fallers will be identified (n=100).

Project 3 – Comparison of static and dynamic postural stability

Hypothesis
Older persons who are prone to falls have postural instability during standing and walking evidenced by increase sway over stability limits compared to age-matched controls

Aim
To examine postural stability during Berg balance testing (varying stability limits) and whilst walking and turning. Static balance will be measured using the Berg Balance scale (14 task score) and kinematic measures recorded using Shimmer®. Measurement of sway of centre of mass over stability limit during these tasks will be measured. Temporal, spatial and centre of mass parameters will be recorded during walking (n=300)

Project 4 – Neurocardiovascular stability

Hypothesis
There are dynamic differences in gait parameters and haemodynamic profile in patients with orthostatic hypotension compared to those without orthostatic hypotension.

Aim
The purpose of this study will be to look at the haemodynamic profile and gait and balance measures in TRIL subjects while they perform a sub optimal exercise test (six minute walk). Haemodynamic measures of heart rate variability and blood pressure variability will be recorded using Portapress® equipment. Shimmer® technology will record gait and balance parameters (n=75).

Project 5 – Blood pressure and muscular contractions

Hypothesis
The degree of muscle contraction of the large muscles of the lower limb during standing is proportional to the induced rise in blood pressure

Aim
Surface muscular contractions of the hamstring, quadriceps femoris, and gastronemius on both lower limbs will be recorded using EMG. The association between muscular contractions and blood pressure changes during orthostatic change will be measured. Sympathetic activity, as measured by the galvanic skin response, will be recorded during the physical counter-manoeuvres during supine and upright position will be measured using the galvanic skin response (n=75).

Project 6 – Measure of turning during Timed Get Up and Go Test

Hypothesis
Older persons prone to falling turn differently to age matched case controls

Aim
To measure the quality of the "turning" using the validated Dite score as captured by video and then to apply technology to objectively measure the Dite turn measure. The Dite turn measure is used to determine turning stability during the turning in timed up and go test. Shimmer® technology will measure gait and balance parameters (n=150).

Project 7 – Physiological measure of Fear of Falling

Hypothesis
Older persons with fear of falling are more anxious while walking, more anxious with a narrow base of stability and exhibit a cautious gait

Aim
To compare the bio-physiological profile of older persons with and without fear of falling during walking and with variation of stability limit (narrow or broad base). Sympathetic response will be measured using galvanic skin response (GSR). Gait and balance parameters using Shimmer® will be measured. Heart rate variability will be measured using Portapres®. Quantitatative measures of fear of falling will recorded using the modified Tinetti falls efficacy scale (n=50).

Project 8 – Tilt illusions

Hypothesis
Visual stimulus of head up tilt affects cardiovascular parameters in young and older people

Aim
To examine the interactions between the gravitational and visual effect on autonomic control of blood pressure in healthy subjects. Haemodynamic measures of blood pressure and heart rate will be captured by the Finometer®. Recording of muscle contraction of the quadriceps femoris, hamstring and gasronemius will be measured by EMG. Sympathetic response will be measured by galvanic skin response (n=40, 20 in each group).

Project 9 - Relationship between orthostatic hypotension and measures of attention

Hypothesis
Patients with orthostatic hypotension show impaired measures of attention and concentration

Aim
All patients will be screened for orthostatic hypotension when performing the active stand. The Finometer® will measure continuous beat-to-beat blood pressure. Measures of attention and concentration will be recorded by the choice reaction time and sustained attention task time (SART) (n=100)
Research Achievements:
In excess of 100 participants will have completed a falls assessment by the end of 2007.

Social Strand

There were six stated aims of the social connection strand detailed in the original proposal: to understand the taxonomy of social engagement and activity among older people and determine the impact of social engagement on health; to explore the relationship of social activity and networks with depression and personality; to identify opportunities for technology interventions within the social, care and activity networks; to examine reciprocal relationships between falls and cognition with indices of social engagement and health; to iteratively develop technological interventions to help older people and their carer's to improve social engagement; and, examine impact of such interventions on health.

Projects

Clinical cohort social connection assessments (n=600);

The clinical cohort assessments at TRIL's facility in St James's hospital, Dublin, began on the 22nd August 2007. We obtained ethics approval for these activities to commence and determined the selection criteria for recruitment. The social connection strand selected, piloted and finalised the use of a variety of validated scales to be administered during the assessment (n=600) as well as devising, piloting and finalising an in-house semi-structured interview schedule to be administered on half of the cohort participants following randomisation between in-depth cognitive and social connection assessment (n=300) . We have achieved an innovative balance of quantitative and qualitative data collection that aims to provide us with sufficient diversity and quality of data with which to produce an extensive analysis suitable for addressing the questions outlined in our stated aims. To date, the team have assessed nearly 100 participants in the clinic and

exceeded expectation in conducting nearly 50 clinic-based in-depth interviews based around our own semi-structured interview schedule.

Over this period we have collaborated with the technology teams in UCD and Intel to develop an MS Access Database for our assessment tools for use in-clinic. This system was being deployed in-clinic before Christmas and has allowed us to combine data collection and inputting during the assessments. The database will also be used for in-home trials in 2008. Going forward into next year we shall extend our clinic data collection to include home visits to TRIL participants. These visits will provide more in-depth data and will provide us with an opportunity to conduct a methodological study: *Social Network Scales In-home Ethnographic Validation* where we will evaluate the sensitivity of established, validated measures of social network type administered in-clinic with observational and interview data gathered within the home.

Building Bridges:

This is our first in-home technology trial. The aim of this program of in-home trials is to explore new ways to maintain and increase the social connections and interactions of ageing populations through the use of both existing and new technologies. These trials will explore, develop and test new ways of using technologies to keep the social lives of elders stimulated, purposeful and re-generative. This year we have completed a number of background tasks that were essential for progress into full in-home trials. These included applying for ethical approval for in-home trials (awaiting outcome); a comprehensive literature review and the development of a full research proposal. In addition we have begun the first stage of data collection and technology testing: we held the first of a series of focus groups with TRIL participants to explore initial responses to communication technologies for improved social connection and we have also begun a series of expert interviews with existing service providers; for example, we have already interviewed managers from Headway and a Friendly Caller Service in Dublin, and also the Upstream centre in the UK. We will continue interviewing experts from friendly-caller services, social telephony services, befriending schemes into 2008.

For our first trial, we will be using an off-the-shelf technology (*skype*) to explore the acceptability and usability to the target population. We are currently undertaking a friendly pilot trial of this technology and will expand this, in line with our proposal, into a program of home based trials in the early months of 2008.

Research Achievements

On-going Projects

Social Connection Clinical Cohort Assessments

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2) Building Bridges to Health, Learning and Fun

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3) Secondary Data Analysis: Automated Geriatric Examination for Computer Assisted Taxonomy (AGECAT) package

The Agecat dataset contains data from 1334 community dwelling older people in Dublin. Data inputting was undertaken over three months during summer 2007. With some initial statistical guidance from Ronan Conroy and Jeanette Golden from the Royal College of Surgeons of Ireland (RCSI) and some background research with MIRA, we have conducted a **bivariate** analysis of two variables (unpaired data), followed by ordinal regression model for the five outcomes of interest. We explored the differential impacts of social contact versus social engagement, social isolation and loneliness on physical and mental well-being.

Initial primary findings from the AGECAT dataset confirm that good social networks are associated with healthy ageing including decreasing risk of cardiovascular disease.
We are currently preparing core findings for publication.

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Cognitive Strand

The research in the Cognitive Strand is continuing in the three original proposed projects:

1. **Dear Diary**: developing a system for identifying speech markers of mood and cognitive function.
2. **Engineering Alertness**: developing a system, with a mobile interface, to increase alertness and prevent accidents such as falls that could compromise independence.
3. **Life mapping**: developing a system for measuring and motivating engagement in real life activities likely to enhance cognitive functioning, emotional health and independenceProject 1: Dear Diary

The Dear Diary project investigates the relationships between mental state and speech and seeks to identify speech characteristics, which indicate cognitive status.

Research Activities and Achievements

In collaboration with the TRIL Clinic strand, cognitive, emotional and speech measures have been collected on 75 elderly individuals - 24 from the School of Psychology panel, and 51 from the TRIL Clinic participants. A series of voice recordings are acquired from each individual. The voice recordings are automatically processed to extract acoustic features (fundamental frequency, 1st and 2nd formants, intensity, jitter, shimmer, number of pauses, mean pause/utterance duration, total recording time, total length of pauses/utterances, mean energy/s, mean vocal pitch, variation of energy/vocal pitch). Frequently updated statistical analyses of the combined datasets are being conducted at the Trinity College Institute of Neuroscience and UCD with a view to identifying preliminary markers of mood state and cognitive state changes from voice recordings. Several promising factors have already emerged from these analyses.

Academic / Industrial Collaborations (Teamwork/Dynamic)

The Dear Diary project involves excellent collaboration between the Trinity College Institute of Neuroscience (TCIN) and the Biomedical Signal Processing group at UCD, both for the extraction of the acoustic parameters and the analysis of the data. Moreover, collaboration between TCIN and St James's Hospital is crucial for building an environment conducive to participants' involvement and quality data collection.

Demos/Online collateral

A poster abstract is scheduled for submission to the British Psychological Society Annual Conference, Dublin, 2-4 April 2008.

Project 2: Engineering Alertness

The Engineering Alertness project aims to develop and validate technologies, which detect and correct lapses in alertness. This has clear applications, for example while cooking.

Research Activities and Achievements

The first Engineering Alertness study was completed in December 2007. This study tests the viability of a self-alert training protocol deigned to increase alertness in the elderly. Twenty healthy, community dwelling older adults (60-75 years) were randomly assigned, after controlling for age and gender, to either a Self Alert Training (SAT) group or placebo condition. The SAT group learnt to modulate their electro-dermal activity (a marker of alertness) using a biofeedback training procedure. They were trained to increase their arousal levels at regular intervals (as measured by a rise in skin conductance levels of at least 0.02 S) in order to offset any momentary lapses of attention.

Preliminary results show that all participants in the SAT group were able to generate at least five skin conductance responses during training without any external prompting or visual feedback. It is likely that an elderly population will require longer periods of training for the required response to become fully automatic and translate into an improved performance on a measure of sustained attention. A single-blind randomised controlled trial of an extended self-alerting paradigm, with real-life outcome measures, will be carried out during 2008.

Academic/Industrial Collaboration

Ongoing collaboration between TCIN and the Biomedical Signal Processing group at UCD is focused on 'friendly' feedback methods for self-alert training and the development of analysis software suitable for home pilot.

As with the previous project, while there has been little imperative to engage closely with the TTP strand in the first year of the project, it is anticipated that a good deal of interaction and technology transfer (in both directions) will occur in 2008.

Demos, online collateral

Two poster presentations outlining the first study are scheduled for next year:

- Twenty-sixth European Workshop on Cognitive Neuropsychology, Bressanone, Italy, 20-25 January 2008
- British Psychological Society Annual Conference, Dublin, 2-4 April 2008

Project 3: Lifemapping

There are two related components to the Life mapping project:

- The first component concerns the development of home-based devices (feedback displays generated by journal and sensor systems) designed to measure and motivate an older person's engagement in activities that they enjoy and value. The general principle is to reinforce meaningful life activities.

The second component is a more specific implementation of a valued mentally engaging situation – a computer-based game Soduko – with the aim of picking up and feeding back electrophysiological signals predictive of mentally-beneficial engagement with a view to increasing engagement and mental stimulation.

Research Activities and Achievements

Identifying key activities for life-mapping

The initial phase of *Life mapping* involves home-based interviews with a cross-section of older people in order to identify key goals and valued activities, and the gap between what people aspire to do and what they are able to do (currently and as they age). There are gold standard measures of independence (e.g., IADL inventories), but not yet any personally tailored measures of life engagement.

To meet this need the research is proceeding from ethnographic research to structured interviews and possibly to an online survey. The identified activities will be reflected in the feedback display described below. Five in-depth ethnography interviews were conducted to understand aspirations and barriers in the lives of several elders. The activities discussed in these interviews were integrated with an inventory of life domains that emerged from previous ethnographic research in the U.S. and Europe conducted by Intel PI and colleagues. A structured interview protocol was then developed using a card sort methodology to validate this inventory. Several pilot interviews were conducted. It is envisaged that approximately 30 interviews will be conducted between now and the end of January. An analysis of these interviews will inform the possible use of an on-line survey that will enable information to be gathered on a larger scale.

The **key achievements** of this component to date include the following:

- catalogued life activities based on previous and current ethnography
- completed ethnographic interviews
- developed structured interview guide and plan of online survey
- conducted pilot structured interviews
- developed principle of different feedback displays depending on nature of disengagement (e.g. attention lapses, anxiety, impaired problem-solving abilities).
- generated examples of possible feedback displays.
- conducted concept feedback interview with participant from ethnographic sample

Feedback displays – Life maps

A set of possible feedback display concepts were developed. These include the solar system idea tested in the Intel social health pilots, variations on a life globe and orb-like reflections of specific activities. These concepts were tested in an interview with a previous ethnography participant and are being incorporated into the 'activities of engagement' interviews.

Electrophysical Measures of Goal Directed Behaviour

The team plans to use behavioural analysis and signal processing methods to develop a robust index of cognitive effort, and to use this index to improve goal-directed behaviour. The specific mentally engaging situation chosen was the computer-based game of Sudoku. Data collection for the Sudoku project is currently on going.

The participants are asked to answer demographic questionnaires before the setup of an EEG apparatus (head cap and electrodes). The Sudoku Project features the recording of EEG activity (i.e., the electrical activity on the scalp) while participants are solving Sudoku puzzles on a computerized interface. The motor activity of these participants is also recorded by measuring mouse movements during the experiment. Additional

control measurements are also recorded (VEP task, i.e., visual evoked potentials), in order to insure that the participants exhibit normal visual processing. The goal of this project is to establish whether rhythmic activity of the brain (alpha, theta or beta waves) and/or amplitude variations can be correlated with the moment the brain is finding a solution, or making a mistake. The result would be brain markers signalling particular cognitive activities which may be correlated with other electrophysical signals in order to develop devices for monitoring older persons when performing cognitive activities. Another potential consequence of the project is the creation of a device implementing biofeedback from EEG activity to help the elderly when they perform cognitive tasks.

As participants may use very different strategies to solve Sudoku puzzles, the team developed a protocol that controls the strategy needed to solve the puzzle. The introduction of a baseline motor task has helped to de-correlate a subject's motor activity during the task from the activity under investigation. In parallel, mouse movements and clicks are also recorded.

TILDA – *The Irish LongituDinal Study on Ageing*

TILDA: 2007 REVIEW

The Irish Longitudinal Study on Ageing (TILDA) was launched in November 2006 by the Minister for Health and Children Mary Harney. TILDA, the most comprehensive study on ageing in Ireland, will provide a study of a representative cohort of up to 10,000 Irish people over the age of 50 years charting their health, social and economic circumstances over a 10-year period. The study is being undertaken by a cross-institutional, multidisciplinary team of experts from the Dundalk Institute of Technology, the Economic and Social Research Institute, the National University of Ireland Galway, the Royal College of Surgeons in Ireland, Trinity College Dublin, University College Cork and University College Dublin. TILDA's funders are Atlantic Philanthropies and Irish Life.

Ageing on the scale we will experience in the near future is an unprecedented phenomenon in Irish history. In stark contrast to the evident importance of ageing, there is an acute shortage of social, economic and health information on older persons in Ireland. In addition, we need to have better understanding of the changes that have taken place in recent years. The data from TILDA will help to fill this gap and will provide policy-makers in the fields of health, social care, pension planning and biotechnology with a unique knowledge base. TILDA is essential to underpin planning and to ensure a 'healthy and happy' life span for the people of Ireland.

Ireland differs from other European countries in a number of important ways with regard to ageing. In the first place, its population is much younger than the European average. Ireland will age more slowly and its relatively low old age dependency ratio will persist for some time (OECD 2006). The age at retirement is also comparatively high. Secondly, the Irish State pension system is much less generous than in most advanced European countries and is flat rate rather than income related. This poses problems with regard to adequacy and ensuring a good standard of living in retirement, but it makes the system much more likely to be sustainable than the heavily stressed systems seen in many other countries. Third, in a comparative perspective, old age poverty rates as conventionally measured are relatively high in Ireland (partly as a consequence of the pension system). Ireland is also characterised by a number of other important social and demographic features, such as the very high level of owner occupied dwellings, the low divorce rate and a recent surge in immigration.

Most of these features indicate a relatively benign outlook for ageing in Ireland since they mean ageing is posing problems less immediately in Ireland than elsewhere. They afford us a vital window of opportunity in which to take steps to avoid many of the problems neighbouring countries will encounter sooner and in a more exaggerated form. TILDA will provide the research base on which this planning can be conducted.

To develop an environment for ageing well the study will be invaluable for:

- Policy-makers and public sector service planners
- Voluntary sector actors engaged in activities that seek to enhance the social integration of older citizens
- Many private sector companies in the insurance and services industries
- Biotechnology companies
- Bioscience companies

Furthermore the study will deliver quality cutting edge research consistent with the emerging national initiative towards a "knowledge society" built on innovations in science and technology.

Major developments in TILDA during 2007

The following has been put in place:

- A highly-qualified research team, including a very experienced research director
- Governance structure
- The plans for the main study, including in-depth work on instrument development, sample design and fieldwork
- Linkages with cutting-edge Irish research in related areas, including technological research aimed at facilitating independent living, research on cognitive function and research on the measurement of poverty and deprivation in old age
- Substantial contact to establish collaboration with the leading international longitudinal studies of ageing (two presentations at an international meeting on harmonisation of longitudinal studies) and to identify candidates to the international scientific advisory committee
- Collaboration and coordination with the Irish component of the Survey of Health and Retirement in Europe (SHARE)
- Establishment of links with key government stakeholders with the purpose of making the study respond to needs of policy makers (in progress)

Events

- Social Policy Home Care for Ageing Populations: International Comparisons of Domiciliary Care Policies for Older People – Conference (March 2007)
- The Lived Life: "Telling Stories, Telling Truths" – A symposium celebrating creativity in ageing (April 2007)
- TILDA/ASPEN (Active Social Policies European Network) conference "Active Ageing & Labour Market Trajectories" (June 2007). This conference brought together a number of world-renowned experts from both Europe and the US and a group of papers that covered some of the most relevant topics in this domain.

The Paul Beeson Fellowship Award

The Atlantic Philanthropies and the American Federation for Ageing Research (AFAR) extended the Paul Beeson Career Development Awards in Ageing Research Programe to the Island of Ireland.

The cornerstone of this award is the provision of significant financial and career development support for outstanding junior faculty committed to academic careers in ageing-related research, teaching, and practice.

The Paul Beeson Fellowship is a highly prestigious fellowship peer reviewed and awarded by NIH in USA- only on average 5 awards made annually. It is made to physicians with an interest in ageing to develop high impact research studies on ageing. It has never before awarded outside of the USA.

In June 2007 Dr. Patricia Kearney was awarded The Paul Beeson Fellowship. She will be developing research from **The Irish Longitudinal Study on Ageing (TILDA)** study on the cardiovascular risk factors of ageing and the interaction between heart and blood pressure disorders and development of memory problems and dementia - this work will inform new studies for treatments to prevent dementia. Her work is entitled ***"Biopsychosocial Factors and Vascular Disease in an Ageing Cohort of Irish Adults"*** and will be based at the Institute of Neurosciences, TCD and will be jointly supervised by Professor Rose Anne Kenny at TCIN and Professor Ivan Perry, Department of Epidemiology, University College Cork.

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

Publications and Presentations

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Do Adequate Vitamin D Levels Ensure Normal Bone Turnover? Autumn 2007 BGS Poster Presentation

Cronin, H., Brewer, L., Walsh, C., Walsh, JB., Casey, MC. *The Prevalence of Chronic Kidney Disease in an Osteoporotic/Osteopenic Population and it's Effect on Fracture Risk*
Spring 2007 BGS Poster Presentation

Cronin, H., Brewer, L., Walsh, C., Helay, M., Fitzgerald, K., Walsh, JB., Casey, MC.
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Irish, M., Coen, R.F., Lawlor, B.A., O'Mara, S.M. *Investigation of episodic autobiographical memory retrieval using the EAMI assessment in healthy young and elderly controls, and patients with mild Alzheimer's disease.* Brain and Cognition (in press)

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Prior, C., Lynch, A., Swanwick, G.
Delivery of Community Old Age Psychiatry Services: patients' views at first contact
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