

# **The Ageing Population**

**Report of a symposium organised by the Royal  
Society of Edinburgh and the Lloyds TSB Foundation  
for Scotland and held in Edinburgh on 26 April 2006**

## Introduction:

In 1999 the Lloyds TSB Foundation for Scotland decided to fund research into human ageing and entered into a partnership with the Royal Society of Edinburgh (RSE) to identify research proposals that had the potential to improve the quality of life of our ageing population. Since then, the Foundation has invested £2.4 million in projects covering a wide range of activities including the the medical, psychological, sociological and economic consequences of ageing.

Awards are made annually for three-year postgraduate studentships, three-year postdoctoral research fellowships and one-year sabbatical fellowships. This symposium heard details of work carried out by one current and three former recipients of the awards. It demonstrates the important contribution that this partnership between the Lloyds TSB Foundation and the RSE is making in advancing our understanding of the ageing process and its impact on millions of people around the world.

## Technology

*The application of information and communication technology to alleviate the effects of dementia*

Dr Norman Alm  
Support Fellow from April 2000 – March 2001  
Department of Computing, University of Dundee

Dr Alm and colleagues have been investigating how computer-based technology can help support and improve the lives of people with dementia. That has involved work in four specific areas – improving personal safety; memory prompting; aiding communication; and providing entertainment. He said it involved the imaginative application of technology and, crucially, the active involvement of potential users at every stage of the research process.

- Improving safety – injuries caused by falling in the home are a significant problem among older people, particularly those with dementia. They are a major cause of older people losing their independence and having to move into a residential home. It is important, therefore, to try to prevent falls and to move in quickly once they occur. Dr Alm's team has developed a ceiling mounted camera and computer software that can track a person around a room and raise an alert should they fall. The software "learns" to recognise areas where the person may be stationary for long periods (such as sitting in a chair) and other areas where lack of movement is a cause for concern.
- Memory prompting – a system that can prompt people with dementia to carry out basic daily living tasks has the potential to improve their lives. Dr Alm explained the work going on in Dundee to develop such a system that could be delivered through interactive television. He said there are many questions that still need to be addressed to make this technically possible and this work is continuing.
- Aiding communication – dementia destroys short term memory and makes conversation difficult with those affected. However, their long term memory can be relatively well preserved. The Dundee team has developed a system

known as CIRCA that can tap into these long term memories and promote positive communication around what happened in the past. It is a large touch screen system that can be used to view old photographs, listen to music or watch video. Dr Alm said it has proved to be remarkably successful in helping both people with dementia and their carers.

- Providing entertainment – work in this area was prompted by a dementia expert who urged the team to help people with dementia have fun. The challenge has been to develop an entertainment system that can be used and enjoyed by people who have no memory. Work on this is still in the early stages but, like CIRCA, it is based on a touch screen format. The team has developed an “explorable garden” using computer graphics that can be navigated around by using the touch screen. Users can visit the garden pond to see fish swimming around, see the birds in the trees, plant seeds in a greenhouse or do some work in a shed.

Dr Alm said funding from the Lloyds TSB Foundation had helped to start much of this work. Discussions are continuing with commercial manufacturers about making some of the products available for sale to public organisations and individuals to ensure the greatest possible benefit. All this work has relied on the contribution of many different professionals including computer scientists, mathematicians, psychologists, software engineers, multi-media designers and even actors who were involved in testing the safety technology.

## Medicine

*The molecular and genetic basis of ageing and disease related changes in the functional adaptation of bone.*

Dr Val Mann

Current Personal Fellow since October 2003

Scottish Mechanotransduction Unit, University of Edinburgh

Bone strength diminishes as people age and the risk of fractures increases. One in two women and one in five men over the age of 50 can expect to suffer a fracture. Spinal and hip fractures are the most common. It is a problem that costs the NHS an estimated £1.7 billion a year in the UK and has a serious impact on the quality of life of affected individuals. Half of all hip fracture patients, for example, lose the ability to live independently.

Dr Mann’s work is involved in studying the self repairing properties of normal, healthy bones to see if this can point to ways to prevent bone degeneration in the elderly. She said bone is the ultimate smart engineering system and is ideally adapted for its function, being both light and strong. It responds to stress where it is needed which explains why footballers’ legs, tennis players’ arms and gymnasts’ wrists all have greater concentrations of bone. It is this ability to respond to stress and self repair that is lost as people age and research has shown that is related to a reduction in specific bone cells, called osteocytes. The aim of Dr Mann’s research is to find ways of maintaining these cells as we age.

It involves laboratory experiments on bone donated by patients after orthopaedic operations. Fragments of bone are subjected to stress similar to that induced by exercise to study how new bones cells are formed. This has shown that bone that is

not exercised loses osteocytes at a faster rate than bone that is exercised. That is a clear message of the benefits of regular exercise in maintaining skeletal strength. However, Dr Mann said exercise is not an option for many elderly people due to illness. However, if the signalling process that determines the new formation of bone can be identified it could lead to the development of therapeutic drugs that could have some effect on bone degeneration.

Certain genes are known to be involved in this reaction and Dr Mann and colleagues have searched 38,000 genes and been able to narrow it down to 260. This is the first time that genes have been discovered in human bone that are responsive to exercise, she said. They are the ones that may offer a target for new therapies.

The award from the RSE/Lloyds TSB Foundation has been important in progressing this work, she added and had provided a springboard to obtain additional funding for the research. Reducing age-related fracture risk is extremely important and these developments may offer a new way forward in helping to strengthen bone in old age.

## **Psychology**

*Predictors of successful ageing: findings from the longitudinal follow-up of the Lothian Birth Cohort 1921*

Dr Alan Gow

Postgraduate Student from October 2002 – September 2005

Department of Psychology, University of Edinburgh

Our cognitive powers, such as thinking and memory skills, decline as we age. This is a major contributor to loss of independence in later life. However, there is a huge variation between individuals with some older people maintaining these cognitive powers well into old age. Dr Gow said this suggests there may be protective factors that promote healthy and successful ageing. These could include genetic and medical influences; educational background; and lifestyle and psychosocial factors. He said lifestyle and psychosocial factors are important as they are potentially modifiable.

A recent review has suggested that people who are more active may show reduced decline in later life. Activity in this context can mean any physical, social or intellectual pursuit such as golfing, playing bridge or being a member of a reading club. The general conclusion from research studies is that people who are more active show preserved abilities into older age. However, most of these studies have looked at participation in activities at a fixed point in time rather than over the course of their lifetime. It may be that there is a cumulative effect going back as far as an individual's youth.

Dr Gow and colleagues have been trying to address some of these issues through the Lothian Birth Cohort 1921. This is a unique group of people who sat a mental ability test in 1932, along with every other 11-year-old in Scotland. Their test score from that time can be compared with today to track levels of decline. Lifestyle factors can also be studied to identify any potential differences between members of the group.

In 2000, 550 members of the cohort were recruited, aged 79, and asked to sit the same mental ability test they completed in 1932. This exercise was repeated four years later when they were aged 83. The average test scores at age 79 and 83

showed only a small change but the research team was interested in what may be causing that change. The members of the group were asked about the frequency of participation in 17 different activities and assessed in terms of intellectual engagement, physical activity, walking behaviour and membership of groups or clubs. They were also asked to rate how active they had been at age 20-35, 40-55 and 60-75.

The results showed that people who scored well on the mental ability test were a bit more active and more likely to be intellectually engaged. A scoring system was developed to assess factors that may be important in the small decline recorded from ages 79-83 and the only factor that was found to be statistically significant was walking behaviour. The people who walked a lot declined less.

Dr Gow accepted that walking may not be the cause of this reduced decline as it may simply indicate that those who walk a lot lead healthier, more active lives. The study is continuing to track members of the 1921 cohort over time and the longer they are followed up, the more certain researchers can be about the factors that may protect people against decline in later years.

## **Sociology**

*The importance of social support networks for people with dementia*

Dr Heather Wilkinson

Personal Fellow from October 2001 – December 2003

Centre for Research on Families and Relationships, University of Edinburgh

Dr Wilkinson had been working in the field of dementia for a number of years before being awarded the RSE/Lloyds TSB Fellowship. She described it as a tremendous opportunity that allowed her time to build up a broad picture of the important social issues facing people with dementia. She was able to follow up a group of newly diagnosed individuals and their carers for two years or more to find out what life was like for them after being diagnosed.

She said diagnosis is crucial, even though the illness has a lot of stigma surrounding it. Getting a diagnosis is essential to the social well being of the person with dementia as it allows a real process of engagement to begin to help them deal with it. Despite this, there is a problem both in Scotland and around the world in getting the condition diagnosed.

Dr Wilkinson's work has shown the serious impact dementia can have on relationships. Some of the couples in her study had been together for 30-40 years or longer and had a very long established way of life. That was destroyed by dementia. She described the period immediately after diagnosis as a time of trauma as couples re-negotiated their roles. This could also be a period of fear, resulting in carers and the person with dementia withdrawing from each other for a time. Risk also had to be re-assessed and, often, people were denied tasks they had carried out for years because these activities were now considered too risky. Giving up driving, for example, could be a big issue for men.

She said people with dementia are one of the most excluded groups in society because of the nature of the condition itself and the response of other people. This raises important issues for research, policy and practice. It also poses questions

about how best to meet the financial, social, emotional and health issues created by progressive cognitive impairment. The need for answers will become ever more pressing as it is estimated there will be 855,000 people with dementia in the UK by 2020. The financial costs associated with dementia are already high and rising as are the emotional and human costs.

Dr Wilkinson said the best people to decide on what is needed are people with dementia themselves. Solutions also need to be set within a framework of families and relationships because that is where everything happens. She is now developing a Dementia and Social Relationships research programme to take forward these ideas. In addition to people with dementia, it will focus on people with learning disabilities who are more likely to suffer from dementia-related conditions.

Policy and practice responses need to be grounded within a more detailed understanding of the impact of dementia on families and relationships, Dr Wilkinson concluded.

## **Summary**

Professor John Coggins, Vice President of the RSE, thanked all four speakers for an illuminating series of presentations. He said the purpose of the symposium was to showcase the wide range of activities that has been funded by the Lloyds TSB Foundation. That diversity shone through and, although the presentations related to very different areas of work, it was possible to see connections across all four. One of the intentions behind the partnership between the RSE and the Lloyds TSB Foundation was to invest in work that may, in the past, have struggled to secure funding. He said he hoped the audience agreed that the partnership has stimulated some of these areas and produced interesting findings along the way. It also remains clear, however, that there are a huge number of unanswered questions and much work remains to be done.