Redefining old age: Baby Boomers to rewrite the books.

When Dylan Thomas wrote “Do not go gentle into that good night”, it is unlikely he had the Baby Boomer generation in mind. And yet Thomas’s invocation may well serve as an apt ageing motto for a generation that has consistently challenged the status quo.

At the turn of the 20th century, life expectancy in Australia was 55 years for men and 59 years for women. Thanks to medical breakthroughs and technological advances, the average Australian woman can now expect to live to 84 while life expectancy for men is 79. Between 2010 and 2050, the number of Australians aged 85 and over is projected to more than quadruple to nearly 1.8 million people. This trend will be a major driver of aged care services over the next 40 years, with important implications for health care and end-of-life planning.

But with the Baby Boomer generation – those born in the post-Second World War years – on course to become the face of ageing Australia, it is likely that the very process of ageing, along with the support and value attached to it, will need to be redefined in keeping with the changes this generation has ushered in over a lifetime.

Many social commentators have suggested that the Boomer generation is in denial about getting older. This is reflected in the vast numbers who are delaying retirement and the significant number who now say they’ll never retire. Ask a Baby Boomer how old they feel, and chances are they’ll nominate an age at least 10 years younger than they actually are. This is an interesting phenomenon not without some basis. Today’s 60-year-old has had access to comprehensive health care, good nutrition, abundant health information and a significant improvement in living standards, leading to much better health and wellbeing outcomes compared to what their parents might have expected when they were 60. Much of this is the fruit of medical research.

Of course, some of them are working out of necessity, having seen the value of their investments wiped out by the global financial crisis, but the very fact that they are able to participate in the workforce past the retirement age is testimony to the benefits of good health.

With this new-found sense of longevity comes a redefining of what it means to be and grow old.
A 2011 Nielsen survey asked participants to define ‘old’. On average, 22 per cent of respondents thought 80 plus was ‘old’ while 34 per cent of respondents considered 60-69 to be ‘old’. Could it be that the extension of a person’s active years well into their 80s will inspire a rethink of age-related labels and the values we attach to these? The marketing strategists are already on to this and have started to segment retirees and the elderly into more flattering stereotypes to take account of the Boomers’ consumer clout.

In a similar fashion, aged care facilities and related industries are responding to these emerging demographics and changing expectations of what it means to grow old in Australia. This is evidenced by the emergence of glamorous ageing facilities located in desirable suburbs such as Sydney’s Bondi, with in-house chefs and concierge services backed by major health insurance companies. The ‘clientele’ at these facilities aren’t likely to want boiled lamb and mashed potato and certainly don’t expect to be patronised or reminded that they are ageing.

Of course, this is not the case across the board, and while there will be plenty of Baby Boomers willing to spend their offspring’s inheritance to ensure a comfortable retirement, there will be plenty more who will not have the means to pay for such luxuries, nor the health to enjoy them.

There are a number of acute, chronic conditions associated with ageing. These include arthritis, vision impairment, dementia, cardiovascular disease and diabetes. Other conditions to which the aged are particularly vulnerable include loss of muscle mass (frailty), memory loss, sleep disruption and depression.

But these are not a given and we know that the seeds of chronic disease are sown early in life. If we can catch the signs early enough through better screening and prevention, it would be far more cost-effective and result in much better quality of life for those planning an active retirement.

The process of ageing and its associated health challenges cuts across a lot of Baker IDI’s research. And while there is inevitability to the general trajectory of age, compounded by genetics, our work confirms that ageing is a process that’s susceptible to intervention. For example, the work of our scientists and others around the world has contributed to greater understanding of a progressive, incurable genetic cardiovascular disorder called Marfan Syndrome. There is no cure, but increased understanding of this syndrome, particularly around diagnosis and treatment, has seen the life expectancy of a person with Marfan Syndrome increase from the mid 40s to the 70s.

The benefits of our increasing capacity to prevent and manage disease is highlighted in a recent report by the British Office for National Statistics that predicts that as many as 35 per cent of the 826,000 babies born in the UK this year will still be alive 100 years from now.

But good health, underwritten by science, is just one pillar of successful ageing. Longevity needs to be supported by a shift in the way we structure and deliver services for the elderly. Previously, you were either in or out of a nursing home. However, the gap and variety of options between living independently and end-stage care has expanded significantly and it is likely that the demand for greater diversity in health and accommodation services will continue to grow – driven in part by the Boomer generation.

This will necessitate an expansion in the aged care workforce – not just in numbers but in the skills required to service changing expectations about quality of care and accessibility. Health services for the elderly require specific, high-level medical expertise and yet it is no secret that geriatric care is all too often regarded as a ‘Cinderella’ specialty. This is slowly changing and we’re now seeing the emergence of hospital emergency rooms dedicated to the elderly. Earlier this year, Mount Sinai Hospital in New York opened a geriatric emergency department, modelling it after another dedicated facility opened in the States in 2009, with plans for dozens more to follow shortly.

According to the hospital’s administrators, the response from patients and their families has been overwhelmingly positive.

**Longevity needs to be supported by a shift in the way we structure and deliver services for the elderly.**
In Australia, the shift to a greater variety of specialised aged services is being driven by demographic change. The next generation of elderly are better educated and more digitally savvy than ever before. Increasingly, they represent a significant block of voters, consumers and retired corporate heavyweights who will demand better services, more accountability and better quality of life. Many of these expectations will no doubt be borne out in the Government’s National Conversation on Aged Care Reform consultations. We welcome the Government’s focus on aged care issues and the channelling of research funds into areas such as dementia research.

But despite the changes being ushered in by the Boomer generation, our current health system still has a 20th century focus on the management of illness when it arises, as opposed to long-term healthy ageing with a preventive focus. Ultimately, the best way to tackle diseases of the aged is to tackle the health of the young.

Looking further ahead, the biological processes of ageing are beginning to feel within our reach. If we can understand these even better and intervene at critical points, who knows, Methuselah may become a favourite name for babies sometime this century!

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Challenges for dementia research in Australia: aligning the health research funding system with health needs.

Dementia is a terminal condition that affects almost 280,000 Australians. It places enormous strain on the health and aged care systems and on the estimated 1.2 million family members and friends who provide countless hours of unpaid support and care.

GLENN REES
CEO, Alzheimer’s Australia

As the population ages and risk factors including hypertension and diabetes increase, so too will the prevalence of dementia. Modelling from Deloitte Access Economics shows that there will be over 500,000 people in Australia with dementia by 2030, and close to 1 million by the middle of the century. At these rates, the costs of dementia will exceed any other health condition by the 2060s.

Dementia is set to become one of the major chronic diseases of the 21st century.

Research is our first line of defence against the looming dementia epidemic, yet in terms of prevalence, disability burden and economic impact (See Disability Adjusted Life Year comparisons), dementia research remains dramatically underfunded compared to other chronic conditions. In 2011-12, the National Health and Medical Research Council projected expenditure was $24 million on research into Alzheimer’s disease and other forms of dementia. Over the same period, the investment was $159.2 million on cancer research, $92.4 million on cardiovascular disease and $71.2 million on research into diabetes.

Sadly, Australia is not alone in this disparity, with similarly low investment in relative terms in the US, the UK and other countries.

Arguably, the competitive nature of health and medical research funding could be seen to favour disease areas that have established infrastructure, networks and development pathways. These are areas such as cancer and heart disease, where Australian researchers have been pioneering new knowledge and making important advances at the cutting edge of medical science for decades.

We cannot detract from the importance of this research. However, the capacity of such areas to attract funding and deliver training can result in
them being seen as more promising career options than emerging areas where research funding, especially for new researchers, can be difficult to come by. And without talented new researchers, emerging health priorities such as dementia can struggle to gain a research foothold.

Alzheimer’s Australia believes this is one of the central issues before the Strategic Review of Health and Medical Research in Australia being led by 2011 Australian of the Year, Simon McKeon. The review must ask the question: “How can the health research funding system be better aligned with health needs?”

We believe that prioritisation needs to happen at three levels.

First, the Government must allocate funding to health and medical research in a way that better reflects current and future health priorities. To this end, we have called on the Government to increase funding for dementia research by an additional $40 million to $60 million per year over the next five years.

Second, we need a concerted effort to break down research silos to facilitate collaborative and interdisciplinary research. We know that diabetes and vascular disease are two of the strongest modifiable risk factors for dementia, but we are yet to see extensive research addressing the links between these and other chronic diseases.

Third, we need prioritisation in the development of the research agendas within specific fields. Research funding is primarily awarded on the basis of a researcher’s track record and the academic merit of their research ideas. In basic biomedical science this is a sensible approach that allows those who know most about the important questions to get on with their task of trying to answer them.

In clinical and health services research, however, the researchers framing the questions are not always intimately connected with the health care system. Furthermore, the clinicians, care workers and consumers at the delivery end of health care rarely have an opportunity for direct input into the research agenda that ultimately affects them.

The Government and the National Health and Medical Research Council (NHMRC) are beginning to address this issue through Partnership Centres that bring together researchers, consumers and representatives from the health care industry to collaboratively address critical health system issues through research, implementation and capacity building.

Alzheimer’s Australia is proud to be a partner in the first of these Centres, on Cognitive Decline in the Ageing. This Centre will investigate some of the challenging health system issues that will be faced as a result of increases in dementia over the coming decades.

Beyond funding and prioritisation of resources, there are many challenges within the field of dementia research. Although the puzzle of dementia is enormously complex, it is clear what we must do.

First, we must develop tests to identify those most at risk of developing the condition. In Australia, we have a number of excellent research programs working on this challenge. The multi-million-dollar CSIRO-led Australian Imaging, Biomarker and Lifestyle (AIBL) Flagship Study is looking to better quantify the risk factors for Alzheimer’s disease through brain scans and blood biomarkers, the Personality and Total Health (PATH) Through Life population-based longitudinal study is linking early modifiable risk factors with later cognitive decline, and there are others.

In developing interventions that halt or delay disease progression at the pre-symptomatic stage, there lies a related challenge. The neurological hallmarks of dementia appear decades before the symptoms start to appear, yet our current treatments only address the symptoms in the later stages when the brain is often damaged beyond repair. With new brain scans and biomarkers, researchers will at last have the ability to develop early pharmacological and psychosocial interventions.

Second, we need to recognise the links between physical and brain health in setting priorities: for instance, between heart disease, diabetes, obesity and dementia. Further research into these links, and translation of that research into multi-faceted prevention programs, is vital.

Third, care research is essential to ensure support for family carers and the development of new and more effective models of care in the aged, acute and primary care sectors. In this area in particular, we need a focus on getting research into practice.

We know, for example, that dangerous antipsychotic drugs are routinely used to sedate or control the behaviour of a large proportion of people with dementia in nursing homes, even though more effective and less invasive non-pharmacological therapies exist. Researchers would do well to answer the question why.

Despite under-funding, Australia has punched above its weight in the global dementia research field over the past three decades. From Colin
Masters’ discoveries regarding the amyloid-beta protein to Scott Henderson and Tony Jorm’s epidemiological research, and from Kaarin Anstey’s work on risk reduction to Henry Brodaty’s work on screening and assessment and family carers, Australia has contributed greatly to our understanding of dementia.

As the demands on medical research funding increase, it is essential that the Australian Government prioritises available funding to create real improvements in the lives of Australians. The McKeon Review will set the stage for medical research for the next decade and provides a unique opportunity for Australia to steer the medical research environment into unchartered waters.

I hope that, through this review, we are brought into a new era of priority-driven research funding, collaborative research agenda setting and a focus on consumer involvement and knowledge translation.

Glenn Rees has worked at senior levels in the British and Australian public services, and has been CEO of Alzheimer’s Australia since 2000. In October 2011 Alzheimer’s Australia launched the ‘Fight Dementia’ campaign for more research funding and better services. Alzheimer’s Australia also provides grants and scholarships to students and early career researchers through the Alzheimer’s Australia Dementia Research Foundation. Visit www.fightdementia.org.au for more information.

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Indigenous ageing: walking backwards into the future.

The notion of walking backwards into the future describes the value we can derive from remembering and understanding our past, in order to best prepare for a better tomorrow. We can’t do this without properly caring for our elders.

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The high prevalence and early onset of chronic diseases such as heart, kidney and lung disease and diabetes in Aboriginal and Torres Strait Islander people is well documented and results in earlier mortality and morbidity. As a result, Aboriginal Australians and Torres Strait Islanders can show common signs of age-related diseases as young as their mid 40s.

But Aboriginal and Torres Strait Islander people do not age at an accelerated rate per se. Rather, they are subject to a greater burden of conditions at an earlier age that lead to the premature onset of complications typically seen with ageing in non-Indigenous Australians. The ultimate aim of addressing the gross health disparity between Indigenous and non-Indigenous Australians should not be acceptance but the pursuit of equivalent life expectancy comparable to non-Indigenous Australians in their 80s.

At the coalface of health care delivery in remote communities, the challenges can be significant. Faced with a plethora of health issues, the health workforce, and the community more generally, may have little awareness of how lifestyle factors such as alcohol, smoking and trauma can influence and accelerate conditions and complications associated with much older non-Indigenous Australians.

This lack of recognition can mean Indigenous Australians are less likely to seek medical help and health providers are less likely to recognise the development of these complications in a relatively young population.
Aboriginal and Torres Strait Islander people do not age at an accelerated rate per se. Rather, they are subjected to a greater burden of conditions at an earlier age.
Australians who need them. This can be delivered with a bit of innovative thinking.

Further development of trans-professional care strategies, as is happening in the Northern Territory, is one such innovative approach that should be explored further. Under this model, allied health professionals are trained to deliver their own speciality – for example, speech pathology – but are also equipped with the skills to make first-stage diagnoses of other allied health-related conditions and provide basic, urgent treatment where necessary.

This multi-skilling of allied health workers provides opportunity to better utilise the currently disparate workforce and to allow health professionals to spend more time in communities building relationships and trust among residents. This not only improves the quality of care being delivered but also enhances cultural understanding and appreciation.

These sorts of initiatives must be combined with further rollout of other remote health strategies, such as the provision of adequate numbers of appropriately skilled primary health providers in remote communities, telehealth, and aged care and disability-relevant specialist outreach to ensure that services can be delivered as much as possible in the communities where people live.

This approach, while costly, recognises the principle of a ‘fair go’ for all Australians and the importance of cultural respect. It ensures that Aboriginal and Torres Strait Islander people are able to maintain their familial links and continue to fulfil the important elder role that is so valued in the community.

There must be ongoing investment and innovation to facilitate the delivery of specialised age care and disability services ‘in Country’ now, while we prepare Aboriginal and Torres Strait Islander children to provide future care. That way we can continue to walk backwards into the future, knowing that there are healthy elders whose knowledge will help to lay the path we cannot see.

The private sector may need to play a greater role in the Australian health care sector of the future.

Australia is facing a future where a higher proportion of our taxes is likely to be spent on health care than ever before.

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Governments are grappling with the question of how to maintain the affordability of our world-class health system into the future without compromising quality or access to care. Modelling by Deloitte Access Economics indicates that Australian Government expenditure on health care will rise from around 12 per cent of total government expenditure in 2011-12 to over 21 per cent in 2049-50 (excluding interest payments). This is in line with the Treasury’s Intergenerational Report, which projected that expenditure on health, age-related pensions and aged care would rise from a quarter of total expenditure in 2009-10 to almost half in 2049-50. Deloitte Access Economics also estimates that the states and territories, which currently spend 25 per cent of their combined budgets on health care, will increase this to more than 39 per cent by 2049-50.

Australia’s ageing population is a well-established driver of health care costs, primarily due to the higher prevalence of chronic disease requiring high care levels among older people. The Australian Institute of Health and Welfare found that 21 per cent of total allocated health expenditure was attributable to people aged 75 years and over. In other words, for every $100 spent on health care, $21 went to people aged 75 years and over. Deloitte Access Economics’ demographic projections indicate that this cohort will grow from 6.2 per cent of the Australian population in June 2011 (ABS) to 9.7 per cent in June 2031.
Other key cost drivers include improvements in medical technology, which provide access to new treatments and therapies but can be costly, and the preference of individuals to live longer, healthier lives by consuming more health care services.

For the Australian Government, the fastest rise in costs is expected in primary and community care services including general practitioner (GP) services, followed by pharmaceuticals and hospitals. For the states and territories, hospital services are the most significant source of growth and already comprise more than three quarters of their expenditure.

To try and address this, recent reform measures have been pursued through the Council of Australian Governments. In August last year, the National Health Reform Agreement was established to deliver what it called ‘major reform around the organisation, funding and delivery of health and aged care’. The agreed outcomes include:

- The Australian Government is to fund 45 per cent of the increase in ‘efficient’ public hospital costs from 2014-15, rising to 50 per cent from 2017-18. In most cases, activity-based funding will replace current arrangements with ‘efficient’ prices to be set by the Independent Hospital Pricing Authority.

- Enhanced targets for emergency department and elective surgery access will require patients of different acuity to be seen within certain specified timeframes.

- Investments in sub-acute beds will occur as a lower-cost alternative for patients occupying (but not requiring) acute beds.

- The establishment of GP Super Clinics and Medicare Locals aims to better match service provision to local care needs and alleviate pressures on emergency departments.

- The Australian Government will wholly fund the Home and Community Care program in all jurisdictions, except Victoria and Western Australia.

The Deloitte Access Economics projections referred to earlier took into account the impact of the reform measures above. Unfortunately, by drilling down to look at these reforms individually, it can be seen there is only a very minor reduction in spending. For example, without the first measure around activity-based funding of hospitals, the Australian Government would spend 20.7 per cent of expenditure on health care, and the states and territories 40 per cent. Thus, while this reform does deliver an estimated reduction in expenditure for the states and territories, the impact is extremely small (less than 1 per cent impact on each tier of government).

In terms of the other reforms, while the underlying principles of these agreements are based around efficiency and affordability, to date the only certain budgetary impacts have been on the cost side. Sources of these costs include establishing the new administrative tiers: Medicare Locals (and the national overseeing network), Local Hospital Networks, the Independent Hospital Pricing Authority and the Australian National Preventive Health Agency; additional capital and recurrent expenditure in hospitals (sub-acute beds to replace and to meet the enhanced targets for emergency department and elective surgery access); and new system infrastructure.

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Figure 1: IGR 2010 and 2007 projections of Federal Budget position

![Figure 1: IGR 2010 and 2007 projections of Federal Budget position](source: IGR 2010, Treasury)
(means-testing the private health insurance rebate, although ultimately this latter initiative will realise greater availability of public funds). The Australian Government has committed some $22.8 billion to date, primarily attributable to spending on public hospitals ($19.8 billion).

Deloitte Access Economics also explored the potential financial impact of the rollout of some of these reforms, such as the establishment of Super Clinics and Medicare Locals that aim to alleviate pressure on hospitals by providing alternative care options. In particular, it considered the impact on spending if patients classified as non-urgent or semi-urgent (triage categories 4 and 5) in the emergency department could be seen at a GP surgery instead. This is a possible long-term outcome of the GP Super Clinics being established around the country, although it is too soon to discern any actual impacts. To demonstrate the potential effects of treating all triage category 4 and 5 patients in the community (an extreme scenario), the estimated impact would save the Australian Government approximately $600 million per annum and the states and territories (combined) $850 million per annum. Despite these considerable savings, the proportion of total expenditure going to health care would remain at above 21 per cent for the Australian Government and 9 per cent for the states and territories, which is approximately the same as in the absence of this initiative.

The overwhelming message is that even the large dollar savings that potential efficiency reforms could realise do not turn around the fiscal sustainability issues that are emerging as health care expenditure continues to burgeon. The Australian Government will spend some $60 billion in 2011-12 and the states and territories (combined) a further $55 billion on health care. Thus, even a $1 billion annual reduction in spending has little proportional impact on the budget impost. Tackling the high costs in 2049-50, therefore, will require very significant efficiencies together with a rethinking of financing and strategic models. To some extent, we may need to accept that the public costs of health care will rise if we wish to maintain the same degree of access and quality in Australia’s health system that we currently enjoy, and therefore we may need to accept higher associated taxation levels. However, voters are unlikely to welcome the higher taxes required to finance the full extent of the projected increases, necessitating increasing reliance on the private health care sector in the future.

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For too long, we have assumed that frailty is an inevitable consequence of ageing.

Handbooks on diabetes management are voluminous. There are chapters on diagnosis, classification and the metabolic syndrome; monitoring diabetes control; multi-faceted approaches to management; types of insulin; hypoglycemia; diabetic complications; co-morbidities such as hypertension, obesity and sleep apnea that may develop in patients; and the list goes on.

Not surprisingly, there is a lot of ground to cover in patient consultation sessions, with considerable time devoted to looking for early warning signs of known complications such as eye and kidney disease. In many instances, it will take laboratory tests to be able to indicate a patient’s future risk of such complications. A few red dots at the back of a patient’s eyes, for example, indicate that retinopathy has developed, but the patient is often completely symptom-free and unaware of this.

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Certainly, these are serious, evidence-based issues for a diabetes physician to consider, but for many patients grappling with diabetes, the here and now is often far more important.

Patient concerns such as loss of strength and mobility, which make it difficult for them to get around the house independently, to go walking or to climb stairs, are likely to add further anxiety. These concerns, however, don’t tend to elicit the same attention from physicians – particularly when it comes to older patients, where increasingly frailty may be viewed with a certain inevitability. To be fair, there hasn’t been a large body of scientific evidence to date to warrant more attention. However, with researchers starting to turn their focus to physical functioning, doctors are now watching and waiting with interest.

Is diabetes completely asymptomatic until a patient is diagnosed with one or more of the known complications or does it exact a burden earlier on in the disease? If we deconstruct this complex and potentially debilitating condition, which parts of this disease might be strongly linked to physical dysfunction?

At a broader level, this in turn sparks some interesting questions about what health professionals can learn by listening more closely to their patients. It’s not a novel approach by any means, and one only has to look to history for many examples. Sir William Osler, a physician and pathologist described as one of the founding fathers of modern medicine, revolutionised medical teaching in the late 19th century by urging young physicians to listen to their patients instead of relying on textbooks alone. “Care more particularly for the individual patient than for the special features of the disease,” he said. In line with this philosophy, it may well turn out that one avenue of scientific exploration to help better understand type 2 diabetes has been right under our nose all this time. Maybe understanding frailty will finally make us sit up and take notice of what our patients have been telling us.

Through the introduction of a muscle strength and physical functioning test in the third round of the Australian Diabetes and Obesity and Lifestyle (AusDiab) Study, we hope to learn more about the burden and impact of frailty in a wide range of conditions including diabetes. The introduction of the ‘up and go’ test to measure mobility in more than 6000 Australians participating in this longitudinal study aims to contribute to the body of research, which spans laboratory to wide-scale community studies, currently being undertaken to understand more about potential links between frailty and conditions like diabetes. The mobility test includes a number of tasks such as standing from a seated position, walking, turning, stopping and sitting down, all of which are important tasks needed for a person to be independently mobile.

While a great deal more research is needed in this area, overseas studies are already drawing important links. Ryerson et al (2003) found that people with diabetes are more likely to have a physical limitation than those without diabetes. In this study, tasks involving mobility or lower extremity function, such as stooping, standing, walking, pushing and climbing, tended to be the most problematic for people with diabetes. The implications of such findings on a health system facing an ageing population and a rapidly increasing burden of type 2 diabetes are enormous. But, more importantly, the impact on an individual’s quality of life is likely to be profound. At present, we incorporate a range of health professionals in the management of people with type 2 diabetes, including dietitians, ophthalmologists and renal specialists. But scientific research might one day demonstrate that the biggest burden facing people with type 2 diabetes is physical functioning and frailty and that there is a need for specific interventions. Such interventions might involve the introduction of strength training sessions or the addition of physical educators in the diabetes management team. While it is premature to speculate too much, it is clear that if we can understand more about the underlying disease, it is likely to influence prevention and management strategies.

Physical activity researchers are also exploring hypotheses about links between advancing age and declining muscle mass or frailty, which is exacerbated by inactivity. The links between inactivity and the development of chronic disease are increasingly being documented, but more research is needed to understand if there are links between the degenerative loss of skeletal

Tasks involving mobility or lower extremity function … tended to be the most problematic for people with diabetes.
Understanding the mechanisms of ageing.

Ageing is the sum of many processes acting in concert to produce the signs and symptoms we know as ‘getting old’. Understanding the different mechanisms of ageing can help us slow the process and enjoy better health as the years advance. However, individually none of these mechanisms provide all the answers, and it is very likely that some, or all, are acting to a greater or lesser extent in different people, organs or cells.

PROFESSOR MERLIN THOMAS
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Perhaps one of the most easily recognisable features of ageing is that of loss – whether loss of memory or a full head of hair. When we look in the mirror, many of the features we identify as ‘old’ are simply a threshold. Although the time that it takes to reach any arbitrary threshold can be considered ‘ageing’, many other factors can shorten or extend this time. In effect, it is not just time that determines our physical decline but also proximity to the edge. And this is also partly how we age.

Take, for example, the greying of ageing hair. This comes about as the cells that pigment the hair become damaged and lost with time. By the age of 50, half of all hair follicles in half of all men have lost their pigment. Ageing is not the only factor involved. Smoking, sunlight exposure, inflammation, stress and other factors all act on the hair to shorten the time it takes for the grey to take over. This is how we can appear to get older faster, because it takes less ageing time to reach a point when all the dark hairs have gone. More importantly, by preventing or reducing these modifiable lifestyle factors, we can appear to age more slowly, even if we never change our ageing speed. Consequently, slowing ageing does not mean stopping time, but stepping away from the edge so that time is no longer the enemy.

Ageing is also the accrual of injury. Indiana Jones once quipped about his lack of stamina, “it’s not the years, honey, it’s the mileage”. With the ravages of time there is accrual of injury and the legacy of its effects. The human body accumulates a lot of ‘natural shocks’ over a lifetime, which ultimately threatens its integrity and underlies many of the phenomena we recognise as ageing. A good example is damage to the genetic code, which is known as ‘mutations’. These errors become more common and more significant the more times a sequence has been copied and recopied, and eventually they can change the way cells function.

For too long, we have assumed that frailty is an inevitable consequence of ageing and haven’t paid enough attention to this very troubling issue. As Sir William Osler said, we can learn a lot from listening closely to our patients, which in turn can help us to ask the right questions. Hopefully one day, we can also provide our patients with some answers to issues, such as declining mobility, that really matter to them.

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Muscle mass associated with ageing known as sarcopenia, inactivity and type 2 diabetes. In findings from the third US National Health and Nutrition Examination Survey, Srikanthan and Karlamangla (2011) found that sarcopenia is associated with adverse glucose metabolism. The association was strongest in individuals under 60 years of age, which suggests that low muscle mass may be an early predictor of diabetes susceptibility. However, there is a long way to go before we understand if and how diabetes might be linked to physical dysfunction and to conditions such as sarcopenia.

So why has it taken so long to focus on frailty? It is said that the hardest thing about research is to come up with a good question, and lots of questions seem so obvious afterwards.
But while overuse may be an important factor, atrophy from lack of use is another contributor to ageing. All cells require stimulation for healthy growth and activity. One example is what can happen with hearing or visual loss, where being deprived of stimulation seems to speed up the cognitive changes normally associated with ageing. By contrast, those who continue to be active physically, mentally, socially and spiritually not only retain the greatest quality of life, but find the impacts of ageing seem to slow.

However, damage may also accumulate when defence, repair and maintenance mechanisms are inadequate. Some parts of the body may be more susceptible to ageing because they have limited abilities for repair. Other parts defend stoutly, at least initially. But as we age, these repair mechanisms can become less effective, so that any stress potentially becomes more injurious.

As we get older there are a number of ways to compensate, to keep things ticking over normally. The appearance of ageing can be the physical manifestation of these compensations, like a walking stick or hearing aid. These compensations may also be evident in the ageing body. For example, the ageing heart adapts, getting bigger and contracting longer to maintain function despite the extra demands of stiff vessels. The atria also work harder and faster to fill the heart. This augmented atrial contraction can sometimes be heard as a fourth heart sound (called a ‘gallop’ rhythm) if you listen with a stethoscope in an elderly patient.

Our design is incompatible with indefinite survival. As is the case with a toaster, lifespan is limited. Given reliability of components, some toasters will survive longer than others, although they do roughly the same job. However, eventually, one morning your toast will not pop. Similarly in humans, some parts simply can’t be replaced. For example, we have a complement of specialised (post-mitotic) cells that have very limited or no capacity to divide. These include the neurons of the brain, the beating muscle of the heart and the insulin-producing cells of the pancreas. They cannot be replaced, which is why the effects of ageing may be more important and more obvious in these cells and the functions that they serve. This is also why a poor pre-natal environment leading to a reduced endowment can mean a head start toward ageing and disease.

Interestingly, in most people’s minds, ageing is synonymous with being disease-ridden. Ageing occurs as a manifestation of disease much as disease occurs as a manifestation of ageing. For example, from about 20 years of age our bones get progressively thinner. At some point, bone loss becomes so significant that its integrity is compromised, leading to an increased risk of fractures. This point (or disease) is called osteoporosis. But while it is not separate from ageing, it is not the same thing. A number of other factors (smoking and inactivity, for example) can also contribute to bone loss and therefore osteoporosis (disease). Ageing just moves you closer to the edge in a way that makes it easier for other factors to push you over and initiate disease. Equally, preventing disease can slow the impacts of ageing.

Ultimately, ageing is not one factor but the sum of many: some damaging, some protective. In youth, these forces are kept in balance. But with the passage of time there is an accrual of injury and the memories of its effects. Although our design is incompatible with indefinite survival, it does not mean that we can’t shift the odds in our favour with smarter choices in our diet and lifestyle. Plan to take the long way home.

Merlin (Christopher) Thomas is co-author of the bestselling book Fast Living, Slow Ageing (www.slowageingbook.com).