LIVING LONGER, BETTER

The Oxford Longevity Project's First Age-less Report

with contributions by: Sir Christopher Ball. Sir Muir Gray, Dr Paul Ch'en, Leslie Kenny & Prof Denis Noble

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Executive Summary

The provision of an Executive Summary implies that the writer(s) of a Report such as this expect others to take note and, after due consideration of the findings, take action to implement the recommendations: we do, and hope you will. We address all adults, both young and old, both parents and the childless, in the UK and (indeed) across the world, and propose that they should learn to take *primary responsibility* for their own health (and for the health of those in their care), just as most people do in securing the wealth they need, to live the life of their choice. We also address all doctors, the GPs, the specialists, and those who are responsible for the training of doctors of the future, and propose that they should review their 'duty of care', to ensure that *the prevention of disease* is their first responsibility, before they address the tasks of diagnosis, treatment and cure. And we address all those responsible for guiding the public understanding of science and medicine, the government and its agencies, professional bodies, the world of education, and the media, and propose that they should be both honest and fearless in *telling the public the truth* about issues of health and disease.

These are not small matters. We have come to understand that the so-called developed world has created for itself a toxic environment and a toxic lifestyle; we wish to replace this 'new normal' of human culture, with something better. The first step, we think, is the promotion of a culture where everyone, having taken appropriate responsibility for their own health, learns to practise a lifestyle and adopt a mind-set, summed up in the formula, 'Remember to take your S-MEDs', where S stands for sustained regular sleep, M is a positive mind-set, E a daily regime of physical and mental exercise, D a vegan(-ish) minimally processed diet, and the small 's' reminds us of the importance of reducing stress in our lives, together with supplements as advised (after consultation with the doctor) and, of course, avoiding smoking and 'recreational' drugs and avoiding or minimising alcohol… The rest is detail, but not trivial detail.

Our conclusions and recommendations are founded upon the recognition that healthy ageing and the prevention of disease, for most conditions and for most people, depend substantially more upon the factors affecting epi-genetics (environment and the lifestyle that results from it and our mind-set), than on our genetic make-up. This fundamental argument is set out authoritatively in Chapter 2. Which may come as a nasty shock to some, who like to say, when they fall ill, 'I guess it's all the fault of my genes', or 'I'm just one of the unlucky ones'; but we hope that, on reflection, most readers will come to realise that this is good news, since it enables them to take responsibility for their own health and well-being and, if they choose to do so, live a longer and better life and, in addition, contribute even more to the health and well-being of their communities.

Chapter 1: Introduction by Sir Christopher Ball

As they approach the age of 70, many people find themselves thinking about their own hopes for longevity: how they might best prepare to live in reasonably good health until they reach 90, or even for several years beyond that milestone, as I am doing (so far, so good!). This Report is for them – and also for their advisers, GPs, and other health-care professionals, and *their* advisers and trainers, for those who offer guidance to the public on best practice in the quest for enduring good health, for the media, and for the government. It also has relevance for younger adults, and for parents. We hope it will receive thorough critical attention, and thereby enable us to correct, extend and improve it, before we start work on a second Report towards the end of the decade, or (in some cases, maybe) pre-decease it – in which case, others must carry on the work. But, above all, we hope it might change behaviour, and improve the lives of older people in the U.K., and indeed worldwide.

Who are we? The Oxford Longevity Project (OLP) began shortly after the Covid crisis of 2020-22, when a group of half a dozen medical and scientific professionals (and informed lay persons) came together, to meet and discuss the question: how may we best prepare to *live longer, better…* In reverse alphabetical order, we are: Professor Denis Noble, Ms. Leslie Kenny, Professor Sir Muir Gray, Dr Paul Ch'en, and Sir Christopher Ball. Our qualifications and short bios may be found in Appendix I. As the reader will see, we are an interestingly varied group, in terms of age, experience, expertise, and background. We have therefore decided that the Report should exemplify the voice and ideas of each of us in turn, though the reader will be struck by the remarkable consensus it demonstrates.

As we began to find our voice as a group, we created a series of Oxford 'Summer Summits' from 2023 to 2026, day-long events in different attractive locations in that great City, the Colleges and Rhodes House. These have been well

received, encouraging us to continue our quest for better answers to the question: how may we all best prepare ourselves to *live longer, better* – and *age-less*: less painfully, less miserably, less carelessly, less ignorantly – and less irresponsibly.

The Report contains seven chapters, five of them provided by each of the members of the OLP, together with this introductory account, and a concluding chapter presenting our findings and recommendations, for which the whole group is responsible, following intense critical discussion of initial drafts of chapters 1 and 7. We begin by outlining some of the tools available to the reader, who wishes to understand enough about the health (and ill-health) of the elderly, to make an informed evaluation of the Report, without being overwhelmed by technical terms, and complex detail. And then, perhaps, choose to transform their own mind-set, life-style and environment.

First, *the rule of three*: we suggest that all complex subjects may be reduced to no more than three key ideas, to provide an overview of the topic. For example, Politics is about freedom, equality, and community; Physics is concerned with mass, energy, and light; the study of language involves sounds, grammar, and vocabulary; Education comprises knowledge, skills, and attitude – though you might prefer to reverse that formula, since we need a positive attitude to develop skills (like the three Rs), which in turn are needed to acquire knowledge, and ASK is a suggestive acronym, reminding us that we learn from questioning; Parenthood demands acceptance, care, and trust (the three parts of what is - or should be - meant by the word *love).* And a good life requires a foundation of *health, wealth,* and *happiness.* Health comes first, since it is essential for ensuring wealth and happiness; and wealth second, because few can be really happy without adequate resources.

More to the point, ill health is due to one (or more) of these three causative factors: *infection* (like measles or Covid), our *genetic inheritance* (for example, the colour of our skin, hair and eyes), and our *life-style and mind-set* (which experts like to call the 'epi-genetic factors' in our lives: note this new technical term, which readers will need to learn to help them understand this Report: it means 'the way we live our lives', like choosing to smoke and drink – or not, for example).* Another example of the rule of three, drawn from the world of medicine, is provided by the trio of *diagnosis* (identifying the problem), *treatment* and *cure*. But probably the most important one, at least for this Report, is the trio of factors which underlie healthy ageing, namely *mind-set, exercise* and *diet*.

As for smoking, that filthy habit is perhaps the most important causative factor of unhealthy ageing. Of course, some catch Covid, or flu, in old age – and sadly die as a result; and some have a 'genetic predisposition' to one or other of the major diseases of longevity (namely, heart failure, cancer, auto-immune conditions, dementia, 'diabesity' – a delightful American term for the often fatal combination of diabetes and obesity – and falls and accidents); but it is now becoming clear that what determines our longevity and health in old age largely depends on how we live our lives – in childhood (choose your parents carefully!), throughout adult-life, both in our working years and, especially, after retirement. Our 'epigenetics' far outweighs infection or genetics in determining whether we will achieve the goal of *living longer, better*. What matters most is the quality, length and depth of our *Sleep*, a positive *Mind-set* ('love your life, and choose the life you love'), regular *Exercise* (walk, or run a mile a day!), and a vegan-ish *Diet* (plant-based, avoiding shop-bought processed foods). Note 'the rule of three (plus one)!' Remember to 'take your S-MEDs!' – where the small 's' reminds you to reduce (as best you can) all forms of Stress in your life, since stress is, like smoking, arguably one of the most serious threats to healthy ageing. Read on, especially if you want to learn how we may reduce the stress in our lives.

Secondly, look for examples of critical distinctions, like space and time, life and death, or night and day. We learn by distinguishing things from one another. In health and medicine, it is important to distinguish between *prevention* and *cure.* Or *causes* and *symptoms*: those spots are not the cause of measles; but they are its typical symptoms. Likewise, the tumours are not the cancer – they are symptoms of an underlying problem at the cellular level. Of course, we often need treatment for both, balm for the spots and medicine – or, even better, vaccine – to safeguard us from the measles infection. But the diseases of longevity, all substantially caused by the way we live our lives, require a preventative treatment summed up in the simple guidance to 'remember to take your S-MEDs', alongside alleviation of the painful symptoms of the six major diseases of old age, which (I repeat) are heart attacks, tumours, auto-immune problems, forgetfulness (presaging dementia), over-weight, and broken bones. And the truth is that, for most of us, most of these are largely preventable at least until we reach the age of 100 – *provided we take our S-MEDs*. Of course, some people develop, or inherit, disabilities, which they carry forward throughout their lives, managing as best they can. We salute them, and commend their courage and determination. But we hope that even the most seriously disabled among us may find something of value for them in what follows.

This Report is concerned primarily with *healthy ageing*, not the *diseases of longevity*. That fundamental (if obvious) distinction between health and ill-health invites the question: whether our subject is the pursuit of good health, or defeating the threat of disease in old age? Both, of course; but I wonder whether we, our doctors – and indeed the NHS as a whole – get the balance right between *prevention* and *cure*? We think not. Health in old age is like a pension: we need to prepare, invest, and conserve our resources of good health, as we (mostly) do with that essential pension pot. And, as with our investment in an adequate pension, it is never too soon to start. This Report is primarily designed for the ageing adults (70 to 100+), but it is also intended to alert adults in mid-life (30 to 70, let us say), and indeed the parents of the young, and youngsters themselves, of the formula for healthy ageing, in the hope that future generations may avoid the fatal diseases, and unnecessarily shortened and painful lives, of so many today.

And consequently, thirdly, we have become attached to 'instructive acronyms', like 'take your S-MEDs'. So, we will end this chapter with yet another instructive acronym: *Age-Less*! Remember the critical importance of *Attitude* (how we choose to feel), *Grub* (what we eat and drink), *Exercising* (walk at least a mile a day…), *Love* (your family and friends, your neighbours, and especially yourself!), the *Environment* (the air we breathe, the water we drink, the contents of the garden shed, cleaning cupboard and bathroom cabinet…), regular *Sleep*, and healthy *Supplements.* Several of the items in this Age-less list are missing from the S-MEDs acronym, but they too are very important: consider air-conditioning indoors, purifying the tap water you consume, removing dangerous chemicals from the home and garden – and seek expert medical advice on supplements.

These are the seven secrets of healthy ageing, and they are all freely available to us – without a prescription. (My favourite, of course, is love!) But *Age-less* offers another useful mnemonic, namely a list of things we must strive to avoid throughout our lives, but especially in old age, like *alcohol and anger*, *griping and gloom*, *envy and excess* (moderation in all things!), *loneliness and laziness, eating meat and dairy products* – and indeed too much of anything – *a sedentary life-style and sugar*, and, above all, *stress and smoking*… To give ourselves the best hope of *living longer, better* we must all learn how to adapt our lives to the first of these *age-less* lists and renounce the second one. And we must *choose* to do so! Try it for yourself….

*My brother tells me that *epigenetics* is a slippery word: the Dictionary and scientists use it to name 'the science that studies the causes at work in the development of living matter'. In medicine it seems to be used, more specifically, for the causes at work above and beyond the control of the genes. We like to use it for life-style and mind-set – human behaviour, including body, mind and feelings. Apparently, we have Aristotle to thank for the term.

Chapter 2: 21st Century Biology and the Restoration of Human Agency by Prof Denis Noble

The 20th Century witnessed the triumph of genetics in understanding living organisms. At the turn of the 19th into the 20th Century, Mendel's mid-19th Century experiments on pea plants in his monastery in Brno in the Czech Republic were integrated into biology to become a foundation stone of the most widely accepted theory of Evolutionary Biology, the Modern Synthesis.

However, we now know that many assumptions in that synthesis have not been borne out by further research. It assumed that living organisms are gene machines, that organisms could not possibly influence their genetic make-up. Yet, it was obvious during the pandemic that our immune systems were doing precisely that: finding new shapes of the proteins that protect us against lethal viruses and bacteria by altering just a part of the genome sequence responsible.

It is also assumed that life has no purpose. There is no room for human (or animal) choice in evolution. Yet it is what humans choose to do that is now creating the greatest threat to the future of our species: climate and ecological change. At a recent conference in Oxford, I and others identified many other errors in gene-centric biology. This is why I argue that 21st century biology restores your sense and power to take control. Genes are not the blueprint for life.

Mendel's work showed that properties like colour, shape and size of plants, their flowers and seeds depend on the inheritance of discrete factors within the plants. Those factors came to be called genes. By the middle of the 20th Century, those genes were identified as parts of threads of DNA in the nucleus of all cells. During the 1960s and 70s, Francis Crick introduced his "Central Dogma" on how genes enable proteins to be made. The foundational story of

biology became a one-way process from the self-replicating genes to proteins, which then organize to form the living organism.

But this is not the full story. I have shown, along with many others, that causation in biology is not one-way. Organisms do not simply follow genetic instructions; they also influence gene expression. Changes in environment and lifestyle act through epigenetic processes, modifying how genes function.

In 1976, Richard Dawkins popularized this incorrect one-way process in his best-selling book, *The Selfish Gene*. Since then, in our education systems, and in popular media, we have been persuaded to believe that our fate lies in our genes. We just inherit those from our parents and there is nothing we can do about that. "It's in his DNA" or "my genes made me do it," have become popular expressions.

21st century biology is correcting those errors. Discoveries in molecular biology show that DNA does not replicate itself independently—it does so only inside a living cell. That fact alone destroys a central assumption of gene-centric biology. We have also found that, except for mono-genetic diseases, your genome does not accurately predict the diseases you may suffer, nor has it provided the cures for the multifaceted diseases of old age. I explore these ideas in *Understanding Living Systems* (published by Cambridge University Press in 2023), written with my brother Raymond Noble, where we present these concepts in accessible language. For those seeking deeper technical detail, I describe the shift from reductionism to systems biology in *The Pacemaker Channels of the Heart* (2025). My own work began with the first mathematical model of heart rhythm, published in *Nature* in 1960, which helped lay the foundations of systems biology.

The social implications of these discoveries are profound. We have the power to control and even change our genetics. That is precisely what was happening during the COVID pandemic. Our immune systems were experimenting with many new DNA sequences to find proteins that could neutralize the virus. Similar adaptive processes occur in plants and bacteria under stress, where genomes are actively restructured.

This leads to a fundamentally different view of health and longevity. Through epigenetic responses to our environment and life-style, we are not merely passengers of our biology—we are participants in shaping it.

Looking ahead, the promise of 21st century biology lies in embracing this dynamic, systems-based understanding of life. By aligning our behaviours, environments, and technologies with these principles, we can move beyond deterministic thinking and toward a future in which individuals and societies actively shape healthier, longer lives. The challenge now is not simply to understand these mechanisms, but to apply them—responsibly, equitably, and with foresight—for the benefit of current and future generations.

Chapter 3: The Scientific and Evidence Base of Living Longer Better by Sir Muir Gray

Living longer is a very complex process for both the individual and the population, as we face a significant increase in people in their 60s, 70s, 80s and 90s. I first became interested when being taught Geriatric Medicine by the charismatic Sir Ferguson Anderson, one of the creators of the specialty. He taught us not only that we should not automatically refuse a test or treatment to anyone solely on account of their chronological age; he also taught us that many of the problems blamed on ageing and disease were the result of inactivity, both before and after diagnosis.

This was brought home to me when I became a student on the wards, led by a classic old school physician with a Bentley and a huge private practice. My school gym teacher was admitted with a heart attack; his 'treatment' was two weeks bed rest – even being shaved by one of the nursing staff! This was not what I had learned from the famous 'Fergie', who taught us not to ignore ageing, but to diagnose disease accurately and treat it effectively – and to start rehabilitation as soon as possible, to minimise further loss of fitness. He also emphasised the need to change beliefs and attitudes of both clinicians and the public. One of his disciples – Bernard Isaacs who became Professor of Geriatric Medicine at Birmingham – used to say, "*we should investigate care homes where there were NO fractures, because almost certainly the residents were being kept too immobile*".

So, that is where it started. When I arrived in Oxford and asked my boss, the Medical Officer of Health, what he wanted me to do, he gave me a very good reply that I have often used since, "What do you think needs to be done to improve the health of the people of Oxford?" My reply was that all the public-health staff spent their time looking at

healthy children, but no-one even knew how many people there were over 60 in the City – my interest having been stimulated by the reading in my Diploma of Public Health course, notably the work of the radical researchers in Essex and London like Brian Abel-Smith and Peter Townsend.

Over the next ten years I had a range of duties – obviously being on call for infectious disease outbreaks – and I was a school doctor; but my abiding interest was in population ageing. I did not do research on disease, because many other people were doing that very well; one of my principles is to be where the action isn't.

I focused on fitness, and published on the concept of the fitness gap[1], which opens up between the best possible rate of decline and the actual rate of decline and on social factors such as ageism, the negative beliefs about, and pessimistic attitudes towards ageing, that sustain a culture in which it is assumed that older people should not be challenged and should just have things done for them. This is often expressed as 'care'; sympathy is certainly very important but it needs to be recognised that these beliefs and attitudes spring not only from compassion but also from ignorance, for example, about the benefits of struggling to do things for oneself, and, to a degree from guilt, recognising that many of the problems of older people stem from deprivation[2].

With the District Nursing service, we also studied the effects of isolation in an era in which many older people were still wary of the telephone and we found significant isolation, sufficient to cause severe mental issues if young people were locked in a room for 'brainwashing'[3].

In 1985, I published the first book on prevention of the problems of older people[4], but I was aghast when I saw the cover because it contained that sweeping, ageist generalisation, the term 'the elderly', a figure of speech called metonymy, which we had been warned never to use by my English teacher. (I did separately write to *The Guardian* about the term, but there it was in the title of a book saying every individual needed to understand what was happening to them as they lived longer, and prepare a plan.)

In the Oxford Longevity Project, our interpretation of the science is that the biological process of ageing is not a cause of major problems till the late 90s, although you need a bit of luck to avoid the diseases we cannot prevent or delay, like Parkinson's disease. I never knew a grandparent—and neither did my brother, who is seven years older than me; their average lifespan was only 64. However, I am not depressed by the thought that I had inherited their genes because I could imagine how tough their environment must have been.

I did not dismiss the importance of the genome at the level of the population; in fact, I was greatly impressed by the analysis of Daniel Lieberman who described in *The Story of the Human Body* how the human genome has evolved over hundreds of generations in an environment in which constant movement was required, and in which it was advantageous to be able to put on fat quickly, if calories were found or captured, but which is completely unsuited to our modern environment, in which sitting is the dominant behaviour and calories are ubiquitously available[5]. Here is his bottom line:

> *On the one hand, many relatively recent developments have been beneficial: farming led to more food, and modern sanitation and scientific medicine led to lower infant mortality and increased longevity. On the other hand, numerous cultural changes have altered interactions between our genes and our environments in ways that contribute to a wide range of health problems. These illnesses are mismatch diseases, defined as diseases that result from our Palaeolithic bodies being poorly or inadequately adapted to certain modern behaviours and conditions.*

So, there is no point in simply blaming people for their 'lifestyle'; we have to enable individuals to understand the cumulative effect of their exposure to their particular physical and social environment, their exposome, and enable them to adapt to it, and ideally to change it. The relative unimportance of the particular set of genes that a person has inherited from their parents, which are stored on their chromosomes, became much clearer when reading Denis Noble's deconstruction of the dominant paradigm created by Richard Dawkin's 1976 book, *The Selfish Gene.* In the 2023 book best describing the new paradigm – *Understanding Living Systems*[6]– Denis Noble, with his brother Raymond, highlighted the need for a paradigm shift:

The gene centred dogma derives from at least five erroneous assumptions

- *The concept of the gene as a precise self-replicator*
- *The view of the organism as simply a vehicle to transfer genes with no agency*
- *That natural selection is a passive process in which organisms have no active part*

- *That changes in organisms cannot be transferred across generations*
- *That DNA is a code or blueprint instructing the organism on its function and behaviour.*

None of these contentions is true.

They also emphasize that: *The Modern Synthesis led to the view that organisms are passive living systems, which experience environmental changes, but play no active role in the process of evolution... On the contrary, we show that organisms are active agents in evolution.*

Their work has emphasized the importance of what is now called the Exposome, the sum total of our experiences, present and past, of the social and physical environment which a person has experienced; and that, for most common diseases, the Exposome is much more important than the Chromosome.

Over the next thirty years, I was given other responsibilities – so I had to spend less time on population ageing, although I was still thinking about older people a lot, for example when deciding the upper age limit for national screening programmes. But, when I became 70 in 2015, my interest was renewed – principally as a result of being asked many times, "How does it feel to be seventy?" To which, I often replied, "F*** 70!"

I then decided to change beliefs about what was happening as we lived longer. So, I wrote a book titled *Sod 70* and I set up the Optimal Ageing Programme at Oxford. After 10 years of work, some results can be observed. The NHS has now adopted nationally www.livelongerbetter.uk and the House of Commons Select Committee has launched an enquiry into Ageing Well.

Since becoming a member of the Oxford Longevity Project, my thinking of the interactions between ageing, fitness, disease and the environment has been clarified by the interactions with the other members, one of whom is Denis Noble. The others are:

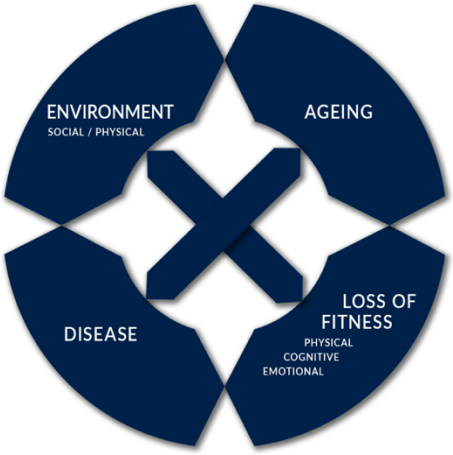
- Sir Christopher Ball, who epitomizes the proposition that normal biological ageing is not necessarily a cause of major problems at 90, providing you develop a clear philosophy, described in his chapter in the Report, and keep fit, in his case being able to run 10K on his 90th Birthday.
- Dr Paul Ch'en, who has developed a new model of clinical practice making the best use of clinical technology and a range of other interventions designed to re-establish the patient's confidence and ability to adapt to and, if necessary, change their environment.
- Leslie Kenny, whose understanding of immunology and nutrition and, very importantly, how big business is managed – because business and governments create the physical and social environment – are of great value. With her leadership, the Oxford Longevity Project has developed a new approach to living longer better, enabling individuals to prepare a personalized plan based on an understanding of the four key factors that determine how well we live in the decades after 60.

The New Four Factor Paradigm

Based on these ideas, here is the new paradigm for *living longer, better,* based on our understanding of, adapting to, and modifying four factors.

The first factor is the normal biological ageing process which affects everyone from about forty onwards, but by itself does not cause major problems until the late nineties. But we now know that there are three inter-related causes of the problems that occur more frequently as people live longer:

- Loss of fitness, physical and mental;
- Disease, much of which is preventable: the disability that results is usually complicated by accelerated loss of fitness. These two processes are caused by:
- Social factors, notably deprivation, and negative beliefs and attitudes – ageism.



To the left is a picture which summarises the knowledge about what is happening to us as we live longer.

Millions of dollars are being invested to find a drug that can slow the ageing process, an elixir of life, but so far without success. It remains a moot question just how much demand there would be for a drug that would help you live till 142 or even 118, just two of the ambitions reported. What most people want, however, is not an increase in life expectancy – but an increase in healthy life expectancy, and a reduction in the period of time at the end of life when one is dependent on others for the most basic tasks, such as getting to the toilet on time. Fortunately, there is evidence that the other three factors can be influenced. This proves that life expectancy, and healthy life expectancy, can be increased, even though the ageing process itself cannot be influenced. The key is to maintain and increase physical, cognitive, and emotional activity. Summarised in a picture below is how we can influence what is happening to us, as we live longer.

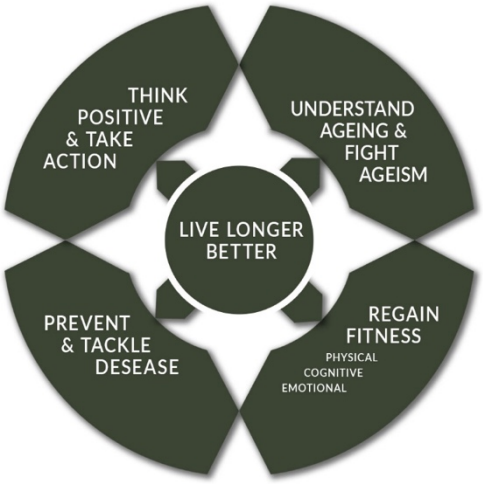
Tied into this is the need to use clear and consistent language. This, in itself, is very important in bringing about culture change: namely, a change in our culture from assuming that older people simply need more things done for them, rather than being enabled to do more for themselves, and for other people. It is important to emphasise that it is not only self-care that needs to be supported, but also care in and by the community or communities to which people belong. Moreover, individuals need to be enabled to make an even greater contribution to their community – for their own wellbeing, as well as for the wellbeing of others.

Recommendations for Action

For individuals – what you do for yourself, and for others, is an important determinant of your healthy life expectancy, how long you live well.

For clinicians, and those who teach them – remember that people seeking help need empathy as well as sympathy, so try to imagine what they are thinking, and ensure they have the most appropriate knowledge, as well as the most appropriate clinical interventions.

For policy makers – focus on health-span and inequity; promote, and enable, physical, cognitive and emotional activity.



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Chapter 4: From Survival to Flourishing by Leslie Kenny

When we founded the Oxford Longevity Project, we set out not only to extend lifespan, but to demonstrate that healthspan can be extended, and to show people how to do it. Our shared ambition was, and remains, to increase the number of years lived with vitality, agency, curiosity, and contribution. Longevity is not about adding years to life at any cost, but about adding life to years — and showing people how to do it. It is about living well for as long as possible, and preparing wisely and realistically for the later chapters of life.

My own journey into longevity science was not academic, but existential. In 2004, at the age of 39, I was diagnosed with Rheumatoid Arthritis and lupus, and told to use immune suppressing drugs for my RA but to expect continual worsening of my lupus with a 5-year prognosis, as there were not treatments available at that time. My recovery only began when I was able to access a pioneering therapy, intravenous immunoglobulin (IVIg), at a time when it was not widely available, and when I fundamentally transformed the way I lived: my diet, movement, sleep, stress, relationships, and mindset. This experience shaped a conviction that has guided my work ever since. While medicine is indispensable, it is not always sufficient, especially with chronic disease. The greatest gains in human health lie upstream, in prevention, lifestyle, social structures, and meaning, as well as vital, novel treatments.

The Oxford Longevity Project exists because the prevailing model of healthcare, built for acute care, is no longer fit for a world in which people routinely live into their eighties and nineties, usually with chronic disease treated with polypharmacy. We have built, in effect, a National Sickness Service that intervenes late and expensively, when what we need is a system designed to create health early and sustain it over a lifetime. We are living longer, but not necessarily better. The burden of chronic disease, polypharmacy, frailty, and cognitive decline is rising. It is neither inevitable nor acceptable.

What follows are three sets of recommendations addressed to individuals and responsible patients, to doctors and those who educate them, and to government and public health leadership. They are grounded in science, informed by lived experience, and aligned with OLP's core philosophy that longevity is a systems challenge requiring personal responsibility, professional reform, and political courage.

Recommendations for Individuals and Responsible Patients

First, individuals must become the chief executives of their own health. Health is not something that happens to us, delivered by professionals only at moments of crisis. Health is something we co-create every day through thousands of small decisions that compound over time. We are, in effect, microdosing either benefit or harm each time we eat, move, or fail to move. This does not mean rejecting medicine, but using it wisely and partnering with our practioners to improve our outcomes and reduce the burden on them and the NHS as our population ages.

Responsible patients understand their lab numbers in the way they understand the dashboard of a car. They ask informed questions and seek to prevent problems before they arise. They invest time in understanding how their bodies work and commit to consistent preventive practices. They recognise that the returns on these daily investments accumulate quietly but powerfully over time, much like contributions to a pension compound. Longevity requires a shift in mindset from passivity to agency, and from rescue to prevention.

Second, individuals should prioritise the non-negotiables of movement, nutrition, sleep, stress regulation, and social connection. Across cultures and centuries, the same foundations recur and modern science now explains why. Movement should be understood not as punishment, but as nourishment. Strength, balance, and aerobic capacity are powerful predictors of independence, cognition, and survival.

Sleep remains the most undervalued performance-enhancing and disease-preventing intervention available to us. Chronic psychological stress accelerates ageing at the cellular level, while connection and purpose are biological needs rather than optional extras. These domains deserve the same seriousness as financial planning, because they ultimately determine whether longer lives are lived well.

Nutrition should focus on real food that is minimally processed, largely plant-forward, and appropriately protein-rich, particularly as we age. The evidence is now clear that protein requirements increase over time in order to preserve muscle mass, strength, and metabolic resilience, all of which are critical determinants of independence and survival. Ultra-processed foods represent a modern experiment, often to the benefit of food preservation and shelf life, as opposed to our own, with severe metabolic consequences.

Third, individuals must redefine ageing itself. One of the most toxic forces in modern society is ageism, both internalised and external. We expect to become frail, forgetful, and dependent, and then we do. Evidence from healthy centenarian populations and longitudinal studies shows that much of what we attribute to age is, in fact, the cumulative effect of behaviour, environment, and expectation.

Responsible patients should not ask which disease they are destined to develop, but rather what kind of older person they wish to become, and what actions today will support that future self. Rather than seeing the years after 60 as a period of decline, we should recognise them as a new prime, when the obligations of family and work often recede, allowing us to engage more deeply in what gives life meaning.

Recommendations for Doctors and Those Who Train Them

For clinicians, the first priority must be to shift the focus from treating disease to creating health. Today's medical system is largely reactive. It waits for illness to appear and then intervenes. This approach is no longer aligned with the long-term conditions that now dominate morbidity and mortality.

Doctors must be supported and incentivised to practise a more anticipatory form of medicine, one that identifies risk early, addresses underlying causes, and partners with patients over decades rather than episodes. This requires longer consultations, better continuity of care, and a rebalancing of what the profession values. Preventing disease and supporting behaviour change should be seen as just as important, and as respected, as performing complex procedures once disease is established.

Second, lifestyle medicine and complexity science must be embedded as core components of medical education rather than optional extras. Future clinicians need fluency in nutrition science, exercise physiology across the lifespan, sleep and circadian biology, stress and psycho-neuroimmunology, behaviour change, basic endocrinology, and systems thinking. As Denis Noble has long argued, reductionism alone cannot explain living systems. Human health emerges from interactions between genetic, environmental, social, and psychological factors: the exposome. Our training systems must reflect this reality.

Third, clinicians must tell the truth kindly, clearly, and courageously. Doctors occupy a position of extraordinary trust, and with that comes responsibility. It is not compassionate to collude with denial, nor is it ethical to medicalise conditions whose primary drivers are behavioural and social while ignoring those drivers. This includes speaking plainly about alcohol, smoking, ultra-processed food, physical inactivity, and chronic stress. Truth, delivered with empathy, remains one of the most powerful therapeutic tools available.

Recommendations for Government and Public Health Leadership

Longevity is not only a moral and social good, but also an extraordinary economic opportunity. Work by Professor Andrew Scott and Professor Martin Ellison shows that even modest progress in slowing the biological rate of ageing would generate unprecedented returns. Slowing ageing by just one year across the United States population has been estimated to be worth approximately $37 trillion per annum in additional economic value. This reframes longevity as one of the highest-return public investments available to modern societies.

First, we must build a true National Health Service rather than a National Sickness Service. Our current system intervenes late and expensively. A longevity-focused society would invert this logic by supporting routine health assessments across adulthood, regular blood tests and functional measures, and annual consultations focused explicitly on maintaining health. This is not utopian; it is economically rational. Prevention is cheaper than cure, and independence is cheaper than dependency.

Second, governments must create environments in which healthy choices are the easy choices. Personal responsibility matters, but it operates within a context shaped by policy, which add or subtract friction. Governments influence food systems, urban design, education, advertising, and social norms. We have allowed a toxic food environment and an unhealthy cultural relationship with alcohol to develop largely unchecked. The result is entirely predictable. Policy should support human biology rather than undermine it.

Third, longevity should be treated as a cross-departmental strategic priority. It affects pensions, housing, employment, education, and social cohesion. A whole-of-government approach is required: one that recognises longer lives as an opportunity rather than a burden, provided those lives are lived in good health.

Women's Health: An Opportunity in Plain Sight

If we are serious about extending healthspan, we must confront one of the most overlooked gaps in modern medicine: the management of women's hormonal health across the life course.

Women live longer than men, but spend more of those additional years in poor health. This is not inevitable - it is a systems failure hiding in plain sight. In England, women can expect to spend more than two decades in poor health, placing a significant and growing burden on both individuals and the NHS.

The demographic implications are particularly evident in later life. Women already constitute the majority of the older population, accounting for more than half of those aged 65 and over, and approximately four in five centenarians. As a result, the burden of age-related disease falls disproportionately on women.

Hormones are a central organising system of human biology, shaping bone density, cardiovascular health, metabolism, cognition, mental health, and immune function. Yet this remains under-recognised and inconsistently managed.

Hormonal health must be acknowledged as a core pillar of longevity medicine. When appropriately assessed and prescribed, body-identical hormone therapies, including estradiol, progesterone, and testosterone, alongside optimised thyroid treatment where indicated, have the potential to improve symptoms and influence long-term outcomes.

There is also a growing appreciation of the role hormones play in immune regulation. Autoimmune conditions such as rheumatoid arthritis, multiple sclerosis, and psoriasis disproportionately affect women and often fluctuate in line with hormonal changes. It has long been observed that some women experience a marked improvement in symptoms during pregnancy, when oestrogen and progesterone levels are at their peak. While this does not translate into a simple treatment pathway, it highlights a powerful interaction between the endocrine and immune systems that remains underexplored.

Public and practitioner understanding of hormone therapy urgently needs updating. Concerns that hormone therapy raises breast cancer risk became widespread among both the public and healthcare professionals after the 2002 Women's Health Initiative findings were sensationalised in the press, but these fears were publicised without careful consideration of what the study actually examined: women with an average age in their early 60s, many years beyond menopause, taking oral conjugated equine oestrogen together with a synthetic progestin, medroxyprogesterone acetate, rather than the body-identical formulations more commonly discussed today, and at much higher doses.

Much of the data that continues to inform practice draws on heterogeneous populations exposed to a wide range of hormone types, doses, and routes over time. These studies rarely distinguish clearly between older synthetic progestins and the body-identical formulations now more commonly used, nor between oral and transdermal delivery. These are not small technical differences, but clinically meaningful ones.

We have, at times, mistaken context-specific findings for universal truths. As a result, access to potentially beneficial treatments may be more limited than the underlying evidence would warrant.

We have mistaken outdated data for timeless truth, and in doing so have denied millions of women access to treatments that could materially improve their healthspan.

The question is no longer whether hormone therapy is "safe" or "unsafe", but which hormones, at what dose, by which route, and for which individual woman.

Every woman should have the right to discuss her hormonal health with a trained healthcare practitioner who understands this field and is able to prescribe when clinically appropriate.

Earlier intervention also matters. Conditions such as premenstrual syndrome and premenstrual dysphoric disorder can significantly affect education, relationships, and mental health. Yet these are often managed narrowly, with antidepressants, antipsychotics, or contraceptives prescribed without addressing underlying drivers.

A more sophisticated approach would treat the menstrual cycle as a vital sign of health and equip young women to understand their physiology.

Finally, where effective treatments exist, they must be made accessible. This includes ensuring access to therapies such as liothyronine (T3) where clinically indicated. Denying access on economic grounds risks being both clinically short-sighted and economically inefficient.

Conclusion: Living Longer, Better, Together

The science of longevity is advancing rapidly, but science alone will not save us. What is required is wisdom: the integration of knowledge with values, institutions, and lived reality. The Oxford Longevity Project exists to convene this wisdom across disciplines and generations.

Our work is not about perfection or immortality. It is about dignity, vitality, and choice. If we succeed, fewer people will fear ageing, and more will approach it as a phase of continued growth, contribution, and meaning.

Chapter 5: What Doctors Should Know and Teach their Patients, and the Reform of Medical Education

by Dr Paul Ch'en

In some ancient cultures, it used to be that a *healer,* broadly having the status of the *doctor*, could be rewarded for keeping its people well as opposed to treating the ill. In modern times, however, healthcare has been generally set up to focus on treating the ill, and disease. While this model of care makes sense in an ageing population where diseases are rife (and there is an expectation for it), maybe we have somewhat lost sight of the goal of what it means to be truly healthy, but also the role which we need to play as individuals, and in relation to society. Should we not be encouraging people to be well?

Doctors spend years of their time in medical school learning about the sciences (e.g. physiology, biochemistry, immunology, pathology, genetics, pharmacology, anatomy, etc.), and then applying this knowledge later in their clinical practice. Trying to understand the operations and functions of the whole body, both in the healthy and diseased states, from all these different angles and how they interconnect on a system-level is hard to appreciate and master. Then, having to make clinical decisions based on this can undoubtably be challenging at times, as medicine is never quite as black and white as the textbooks make it out to be. And, needless to say, this can have a huge impact on the care and treatment offered to a patient.

In the clinical years, a lot of emphasis is placed on communication skills, the ability to perform an examination and do various procedures, making a formal diagnosis, coming up with a suitable management plan – but also the science of *medication*: knowing what, when and how to prescribe. With yet further training, junior doctors then decide to pursue a medical specialty (e.g. cardiology, respiratory medicine, gastro-enterology, surgery, psychiatry, paediatrics, general practice, etc.), which requires even more learning and the acquisition of specialist knowledge. Sadly, the focus is still on treating *illnesses*, as opposed to helping people optimise their well-ness.

Unfortunately, it is all too common to find that topics such as nutrition, diet, habit formation, human behaviour, cognitive health, health coaching, personal growth and development (that could perhaps come under lifestyle / holistic / integrative / functional medicine or even be a completely new genre) hardly feature at all in an already crammed medical curriculum that takes years of study and training. One might say that these subjects, in conjunction to the more well-taught sciences early on in a doctor's career, would be pivotal in helping clinicians empower their patients better, and ultimately, shift the balance of healthcare to one more focused on prevention and wellbeing.

To achieve this, there should be a rethink of the broader aspects of healthcare in terms of: (a) what doctors offer in their scope of practice; (b) what the future doctors of tomorrow should be taught, and (c) the role of the patient, in terms of what they can do to help themselves.

What have I learnt from the Oxford Longevity Project (OLP)?

The pursuit of good health and the response to ill health could (and should) be perceived as two ends of a spectrum where, unfortunately, in our modern society a disproportionate amount of time, effort, and money are spent in treating the latter end – the *far right*. We all know that, if we had the choice, prevention is a better option than enduring the

treatment of a particular condition – the *far left*. As Benjamin Franklin said, 'An ounce of prevention is worth a pound of cure'.

The fundamental problem, however, is that in youth we tend to have health on our side, and bounce right back without necessarily ascribing the right level of appreciation to what it means to be healthy in the now, and equally (or perhaps more importantly) in the future. Say, you have a cold. It may take you a few days to recover. You may think to yourself you should have eaten better, slept more, reduced your stress levels, taken measures to improve your immune system. You then fight it off without any serious repercussions, and you're more or less back to baseline in no time. For most, the hardship endured quickly becomes a distant memory – unless it really had a negative impact. Yet, had you taken the right measures to optimise your good habits, acquired better habits, and (hardest of all) reduced your bad habits, you might not have had the illness to begin with – or at least, it wouldn't have been as severe.

But, of course, it's difficult to know what you don't know, and comprehend how you would have felt about something you didn't experience. Furthermore, your proactive positive choices may come at a cost, if you perceive them to be a task and a chore – but also likely to provide delayed gratification (i.e. you will only reap the benefit, and understand the advantage, at a later date). This is why prevention is a hard sell, particularly for the unmotivated, since, not only does it take a certain level of discipline to make those necessary changes and put your thoughts into action, but also human behaviour often gets in the way – when bad habits can easily creep back in, since you can't see the immediate effects.

From a healthcare perspective, it's not as easy to obtain concrete metrics in relation to something that didn't happen: prevention is not as tangible, compared to treating an illness with medication, with clearly defined outcomes. Highlighting the potential cost-savings is also meaningless for those individuals who want a reactive service, for they may consider it the role of the NHS to treat their problems (perceived to be free) without realising that it should in fact be they who should be taking on a greater role in their own care and making healthier choices, as part of their healing journey.

OLP, which aims to serve the public by offering guidance, and empowering patients with smarter ways of living longer and in better health, has helped me realise more clearly the importance of what we could (and should) do as individuals to achieve healthy ageing. Since my involvement, I have placed more of my focus on how, as a doctor, I can help patients take greater responsibility in a way that empowers them but also sought to motivate them in a way that feels acceptable to them (i.e. so that they *want* to change their behaviour).

Having that sense of agency really matters, with studies showing that self-care in itself can prevent around 16% of people coming to see their GP[1]. And, interestingly, for many of the patients I see, a substantial number seem to have problems that are directly or indirectly linked to stress and poor choices in some shape or form. In the Smart Ageing Summit of 2025, I gave a talk on self-care; but it highlighted to me, as well as the listeners, the importance of the very nature of self-care, self-reliance, and self-help (all under the umbrella of *responsibility*) and how my role as a doctor must be in partnership with the patient.

By extension, I also feel the workings of the OLP have made me a better, well-rounded, doctor – seeking not just to treat the immediate problem (e.g. the chest infection in the asthmatic patient) but also taking the time to discuss the possible causes (e.g. a dusty house, poor ventilation, pets, hygiene, work conditions, stress, etc.) and getting patients to realise they can take some level of responsibility to prevent some of their symptoms, or even possibly tackle the root cause(s) themselves. As doctors, we can treat many of the chronic diseases of the ageing with medications and other forms of treatments, but as one takes a deeper dive, it becomes apparent that there is so much more to be gained from better lifestyle choices. Sometimes, medications can be reduced or not even feature at all in the management plan. Again, the focus really needs to be upon prevention, being proactive, and making good choices.

Taking the time to think and, more importantly, to reflect has also been an eye-opener for me, both professional and personally. As a general practitioner, with a specialist interest in cancer care, I feel privileged to be able to help patients and offer medical advice that directly impacts their lives and wellbeing. On a personal note, it is widely believed that providing service to others brings a level of happiness to the donor; the OLP has given me the platform to re-think the importance of what I do, and why I do it, particularly from the angle of health-optimisation and longevity, but it has also provided me with an opportunity to tackle some of the *whys* and *hows* of problems commonly faced in modern-day medicine, where I've continued to try to go above and beyond for my patients.

What should the doctors of today strive to achieve?

As readers will no doubt appreciate, the field of medicine is vast; training is long and, with the advances in modern medicine, it is impossible to know everything. Medical information is doubling at an unbelievable pace and generative AI, machine learning, and big data are changing the landscape of how knowledge itself is acquired, assimilated and

analysed. We are now living in a world where there is information overload. It is said that in 1950, medical information doubled every 50 years. By 1980, this reduced to seven years. In 2021, it was predicted that medical information would double every 73 days by 2022; and this was not even taking into consideration how much of an impact artificial intelligence would have[2].

With information now literally at one's fingertips, for both doctors and patients, what is essential is the human touch that comes with, and from, using the *right* information. When teaching medical students and junior doctors, I often mention that they still need to do the bookwork, learn the facts, and pass the exams, but what really makes a good doctor (in my humble opinion) comes from being able to communicate well with patients, together with the ability to make good decisions and act in the best interests of the patient. 'Stick to this', (I liked to say) 'and you will definitely be a safe pair of hands, as you continue your journey of lifelong learning; it is the balance of acquiring the skills and knowledge of both the science and the art of medicine'. Also, looking to the future, it is important to have a vision of the type of doctor one wants to become – so I would often tell my junior colleagues, sitting in with me, to see what worked well, and what didn't work well, in a meeting with a patient, and try to imagine themselves conducting the consultation.

I firmly believe that doctors should at least try to 'talk the talk and walk the walk', when it comes to giving medical advice – particularly when we are talking about lifestyle choices and habit formation. Medicine tends to be very drug-focused, but I think the real skill of the practitioner comes from being able to take a holistic view, and trying to treat the patient as an individual, taking into consideration their unique set of ideas, concerns, and expectations. Ideally, drugs should only form part of the management plan (if they have to feature at all) – wrapped around self-care, self-reliance, and self-help, with the individual taking responsibility for their own health, and the doctor-patient relationship being a real partnership.

The idea here is not necessarily to go against the grain of established conventional medicine, but to open up the field to newer ways of thinking in a clearly overstretched system. This is not only about focusing more on prevention, but also includes healthcare and social care services, placing greater emphasis on connecting people to non-medical activities, and support groups in their community, to meet their social, emotional, and practical needs. Also, as the view that our genes are not the blueprint for life soon becomes mainstream knowledge, and more data emerges from the Human Exposome Project [3] (which measures the complex exposures we face as humans and their impact on health), the benefit of these findings are that individuals can indeed take control over their own destiny.

Looking to the future, it may well be that we need new and better healthcare models that cater to the unique aspects of this so-called *spectrum of health,* with the emphasis particularly on the far left, enabling us to oversee the seamless transition of the various types of care that cater specifically to wellbeing, prevention, diagnosis, treatment, post-treatment and death itself – one that is truly holistic for the individual. Of course, it's one thing to wish for such a model of care, but we ultimately end up with the question of how…? And whilst the newly published 10-Year Health Plan for England[4] (a 171-page long document) is well-intended and attempts to place the focus on prevention by establishing a so-called *Neighbourhood Health Service*, unfortunately it lacks the answer to the *how* question, especially when faced with the stark realities of a failing system with issues surrounding staff retention, recruitment, and lack of funding within the NHS.

The other big problem is that despite the complexities of life with its ups and downs, societal pressures and norms, cultural differences and the uniqueness of the individual, healthcare is governed by guidelines, often tailored to suit a 'one-size-fits-all' model. Not enough emphasis is placed on truly personalised care in medical practice. The patient is not just another statistic. With an ever-increasing reliance on science, providing a reductionist model with drugs designed to treat conditions based on a gene-centric view of illnesses, one wonders if we are limiting our scope of care and missing out on the potentially greater gains from addressing lifestyle choices and optimising the environment of life.

At the OLP, we are hopeful that we may one day live in a world in which all adults understand how they can best affect, and improve, their health-span. We aim to share the latest breakthroughs in longevity lifestyle-science, and guide our patients in Oxford and beyond, to encourage them to take steps towards the goal of living longer – and better.

My Own Personal Take

Striving to be a responsible individual myself, it has recently dawned upon me that I am fast approaching the age of 50 – not that I've ever been really worried about my (chronological) age *per se*, but I've been made more aware of it by:

- the nature of the work I do with caring for patients of all ages, but increasingly noticing that I am starting to treat people of my own age group;

- with fewer senior colleagues around me, I need to take on greater responsibility, including helping to teach the next generation of doctors and medics;
- seeing my own daughter grow up – she will soon start university;
- recently attending an Oxford graduation ceremony (and remembering my own graduation years ago – but also feeling the passage of time) with parents, family and friends celebrating their loved ones finally graduating, and the graduate taking the moment to enjoy their great achievement, but also looking into the future;
- attending a couple of funerals – one was someone in their 80s, the other was just in their teens – each compelling me to think about the sanctity of life, but also the need to be grateful to what we experience in our own lives.

These observations have prompted me to appreciate the value of time, the importance of reflection and how health and wellbeing are so intertwined with happiness. This 'grounding in gratitude' has allowed me to enjoy and cherish each moment. If I were to give advice to my younger self at age 20, I would say, 'Keep on going, enjoy university life (as I remember it), study hard, play hard, and chase your dreams. Life should be about having fun and making the most of each day as it comes…' Importantly, I would tell my younger self this: 'You're going about it in the right way but be patient – all in good time'. And looking into the future (and with the work carried out by the OLP so far), if I can play a small part in managing to shift the culture of healthcare to one where the focus is on wellbeing and prevention, and where the true responsibility of health lies with the individual, I would consider this a massive win.

Returning to the present moment, I can report that I have greatly enjoyed the company of my OLP colleagues, not only for the intellectual stimulation, but also for their wisdom, the out-of-the-box thinking (especially concerning the challenges we face as a team), and indeed for their friendship and for treating me as their equal, with warmth and kindness. This, I feel, has been a privilege in the true sense of the meaning of the word; after all, there is a considerable age gap between myself and most of my other colleagues. Why do I share these sentiments with you? Well, there is a saying that we are perhaps the average of the five closest friends we spend most time with. While compatibility and chemistry also matter, I firmly believe it is crucial to make efforts to surround yourself with people who will bring out the best in you, and ideally those that are like-minded and positive, so that you may thrive to become a higher version of yourself.

Recommendations

For the Responsible Patient ('Individual')—there is always a doctor in you, so take charge (responsibility) of your health. Mindset, Exercise, Diet, (less) Stress, Sleep, Social Connection and learn to be your happiest you. And to do this, you need to optimise your good habits, acquire new and better habits, and reduce your bad habits.

> 'Life is the sum of all our choices.' (Albert Camus)

For the Doctor—We are all professional students of life but being in a privileged position of serving and caring for others, we have a duty to keep learning and to use that knowledge for the best interest of our patients. Be open to new ways of thinking, don't be afraid to think out-of-the-box, and at times, challenge the *status quo* especially when you feel something's not quite right. And importantly, empower your patients and give them back control, especially as we now know that our genes are not the blueprint for life.

> 'The doctor of the future will give no medication but will interest the patient in the care of the human frame, diet and in the cause and prevention of disease.' (Thomas Edison)

And for yourselves, trust in your gut instinct and be kind to yourself when things are tough.

> 'You cannot save the world, but you can make a difference to one person – and that is enough.' (Anonymous)

For the government —There is too much information and noise; strip away the rhetoric, seek truths and educate the population well by providing information that holds maximum value particularly at the level of the individual. Streamline new scientific discoveries and advances into modern medicine, be open to innovations and translate them into clinical practice in a timely fashion. Most importantly, accept failings, learn from mistakes and see them as opportunities.

> 'You can't connect the dots looking forward. You can only connect them looking backwards.' (Steve Jobs)

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Chapter 6: Responsible Ageing by Sir Christopher Ball

I have learned a lot over the five years since the formation of the OLP in the wake of the Covid epidemic. My three addresses to our Summits of 2023-25 conveniently summarise that process, and demonstrate the progress of my understanding of health in old age, and (above all) our own individual responsibility for achieving the goal of *living longer, better*. I will begin my own personal contribution to this Report by summarising them.

The first, entitled *The Responsible Patient,* started by asking three questions: do we, both patients and doctors, clearly distinguish between the symptoms and the causes of the ailments of old age? In their management, how may we best balance our desire for treatment of them with the need for guidance in their prevention? And which matters more: our search for a cure – or learning how best to prevent, or at least delay the onset of, the (often fatal) diseases of the aged, like cancer, dementia or heart disease? I believe there is much to be done to improve the public understanding of medical science, and especially the challenge of sustaining a healthy longevity, before we can all hope to live longer, better. Medical care should seek to change its focus towards the prevention of disease, to reduce the demand for treatments and cures. The NHS belies its name: our 'national sickness service' needs to transform into a truly National Health Service.

I then suggested that the 'winning formula' for healthy ageing might be summarised in the awkward acronym S-MELD, where the S reminds us to eliminate bad stress from our lives (note that 'good stress', defined as challenges you choose to address, like drafting this Report, is healthy – provided you don't take on too much!); M emphasises the importance of a positive Mindset (love your life); E invites us to do our programme of daily Exercise; L underlines the value of our Loving relationships; and D directs us to eat a responsible (vegan-ish, plant-based) Diet. If that is our aim, as it should be, then we need to create an equal partnership between the 'responsible patient' and the expert doctors, where the former takes the leading role in ensuring high-quality self-care. A good life is one where we enjoy health, wealth and happiness; health comes first in that old formulation. It is never too soon to start practising responsible self-care, since good health (like a decent pension) is a pre-requisite for contentment in old age – and requires thoughtful investment throughout our lives.

We need to understand the differences between childhood ailments, like measles and chickenpox – which are typically infectious in origin – and the diseases of old age, like cancer, dementia or heart problems, which are caused by a complicated mix of factors: genetic inheritance, nurture and upbringing, education and environment, but above all by our own choices and life-styles. I find it so sad that so many of us still die before the biblical age of 70, and never experience the joy of living longer, better. The acronym 'S-SO S-SAD' should help to remind us of the major causes of the diseases of ageing, namely Smoking, Stress, Obesity, a Sedentary life-style, strong direct Sunlight, Alcohol and Diabetes. They form a kind of 'social pandemic' of modern life. They are infectious; we catch them from our family and friends… The Standard American Diet (steaks and burgers) also provides the informative abbreviation S.A.D.

I used the first five letters of the alphabet to remind us how to live longer, better: Avoidance (of smoking, drinking, sun-burn, red meat – and stress), Breath (slow nasal breathing outdoors each morning, and taping one's lips together at night), Cold showers (every morning for a minute, or two in summer), a plant-based Diet (avoiding all shop-bought processed foods), and, of course, our daily Exercise routine. I have no doubt that this regime promotes physical good health and longer (and better) lives for us all. And we each need to take responsibility for practising it.

But our mental health is even more important. Be Active and Aware; Brighten someone else's life; Connect with others, and Challenge yourself; Do a good Deed each day, and De-clutter your life; our Emotional health is sustained by Engagement with nature, ideas and other people… And never forget the A-E of life itself: Ancestry, Birth, Choices, Death and Extinction (or Eternity, if you prefer!). Our lives are the C that comes between Birth and Death: our

Choices. We must learn to sustain our own well-being and positive mind-set. And *choose* to do so. These practices are essential for those who wish to be responsible patients, and live longer and better, avoiding (or at least deferring) the degenerative conditions of maturity.

Why don't we do so? Most people's lives are governed, I believe, by the three (H)aitches: our Habits (what we 'always do'), the 'Herd' we belong to (family, friends and colleagues) and our endless search for trivial pleasure (the next 'High'). We find it hard to change our habitual behaviour (those second helpings), resist the example of our social group (drinks in the pub every Friday), or avoid that extra glass of wine, or piece of chocolate, or fix! Choosing to do so requires courage and determination. The secret of success in any enterprise is *practice*: follow the JDI rule – Just Do It! (My daughter calls it the JFDI rule: don't ask me why!). And that requires strong motivation and self-belief. Which are learnable qualities. Start today by following the two A-E routines set out above: Aim to live to be 100 in good enough health; eat Broccoli (to delay the onset of cancer) and adopt a regular Bedtime routine; respect your Circadian rhythm (rise with the sun, and rest when it sets) and Climb the stairs; don't Drive (walk instead, or run for the bus); Eliminate bad stress, and Enjoy a good life (live into the future, without looking back).

I ended my talk with the letter F – for Fasting and Friendship. Try giving up the evening meal, for example, and cherishing your Family and Friends (when it's needed, practice Forgiveness…). And remember S-MELD: Stress, Mind-set, Exercise, Love, and Diet. (Observe how my acronyms change as I learn more!) We need to attend to both our attitude and behaviour – and our thoughts and feelings – to protect our health. And never forget what the doctors tell us: genetics may load the gun, but it is our choices that fire the bullets!

A year later, in 2024, I gave a second talk, developing these themes. It was entitled, 'The Responsible Individual'. I began by reviewing the three major causative factors for disease, namely infection (Covid, for example), our genetic inheritance (like the colour of our hair, eyes and skin), and life-choices (mind-set and life-style). The focus of medical science was upon infection in the 19th century, and genetics in the 20th, but in the 21st century the focus is moving towards the third, the choices we make in our lives. (About time, too!) The five major killers of the elderly are heart disease in its various forms, cancer, dementia, 'diabesity' (the fatal combination of obesity and type 2 diabetes) and some form of auto-immune disease…together with disabling falls, of course. None are caused by infection by germs – though 'social infection' is a dangerous influence, of course; they may, to an extent, run in families; but it is our life-style and mind-set that are critically important – especially for the elderly. We are largely responsible for our own health, or sickness.

Cancer provides a salutary example of this, once we learn to distinguish the symptoms (tumours, usually treated by invasive surgery or radiation) from causes (faulty metabolism at the cellular level). And while that underlying cause may be partly genetic, it is a good deal more likely to be the result of an inappropriate life-style (smoking, drinking, gluttony…) and mind-set (stress, anxiety and depression). We live in a toxic culture and environment, and indulge in a poor-quality life-style, while adopting a miserable mind-set! (And we call this 'progress'.) The good news is that we can choose to change that. The evidence of the so-called Blue Zones is instructive, where healthy longevity is widely shared by people who live simple and contented lives often with shared community values and support. The American Seventh Day Adventists do the same in an otherwise dangerously toxic culture.

People ask, 'what should I avoid, and what should I embrace?' Avoid stress, complaint, smoking, alcohol, obesity, strong sunlight (unless protected), meat, asbestos, shop-bought processed foods. Embrace acceptance, balance and cherishing – and eat a plant-based diet, exercise, enjoy nature, live a regular life, foster your loving relationships, be grateful… (Accept the universe, where 'Every prospect pleases, and only man is vile…', as the bishop-poet once wrote.) Regular sleep is important. Live into the future, not out of the past. Set yourself new goals (like drafting this Report!) and review your habits: reject the bad ones (fault-finding, moaning, drinking, driving, and – of course – smoking), and develop new (and healthy) ones, like eating slowly and attentively, and smiling at strangers. I am also advised to take a range of supplements (ask your doctor) – and I do; and I practise intermittent fasting. I have a strict bedtime routine, and carefully avoid toxins. And I ask my GP to arrange regular blood tests, while I observe the discipline of S-MELD (see above).

Our emotional health is critically important (at any age – but especially for the elderly): learn that happiness is a choice. So, we must *choose*…to be positive, meditate and reflect, listen to music and watch films that inspire us, focus on the present day, foster our families and friendships, be grateful, and select inspirational goals. We must also learn to deal with those three major threats: the influence of our 'herd', our ingrained habits, and the seductive effect of an immediate 'high' (trivial pleasure). Instead, discover for yourself the sources of true happiness…which are: the

service of others, the pursuit of mastery, and the creation of something good and new (like painting a picture or cooking a meal for the family or friends!). But the key ideas are *responsibility* and *choice.*

So, we should seek to avoid the threats of heart disease, cancer, dementia, 'diabesity', auto-immune disease – and accidents and falls – and use the formula of SMELD (remember Stress, Mind-set, Exercise, Life-style, and Diet) in order to avoid them. You might read Dr. Peter Attia's remarkable book, *Outlive – the Science and Art of Longevity*, and learn his clever acronym HEED – to remind us that our Health is founded upon Emotional balance, regular Exercise, and a careful Diet. (Heed it.) How may we strengthen our motivation to enjoy a healthy longevity of health, wealth, and happiness, and create a lasting commitment to the life-style and mind-set needed to secure it? The responsibility is ours, and we have the tools available for the job. Use them!

My third talk, written for the Summit in 2025, was accordingly entitled 'Responsible Ageing'. (I think it was the best of the three, but it only came second in the audience's evaluation, while the earlier ones had each come first… Angela Rippon defeated me: her topic was the value of dance – it's good exercise, of course; her high kicks enchanted those present, and I couldn't beat that). I began by speaking about the importance of Reconciliation – reconciling ourselves to the inevitability of our own death – and, indeed, the death of those we love. I believe it is essential for healthy longevity.

My 'second R' was Responsibility. We must, I suggest, take personal responsibility for our own health in old age (and, indeed, sooner); but we need to work in partnership with the doctor, who is our coach and consultant in the quest to live longer, better. The third R is, of course, the Regime (or routine) we choose to adopt (our way of life) in order to live longer, better. My plan is to aim to live until 2046, when I shall reach the age of 111. (Set your own target!) My winning formula is summed up in the acronym S-MELD, where the S reminds me to eliminate (bad) Stress, the M refers to the importance of a positive Mind-set, the E stands for Exercise, the L for my Loved ones, and the D for a responsible plant-based Diet. So far, it is working for me.

I then discussed the difficult topics of love, loss and loneliness, the three Ls, which we must prevent from becoming 'the three hells' of longevity. Learning to love is as important to a good life as learning to learn, a fundamental life-skill, of course. The word 'love' (when it is not being misused to refer to sexual attraction) means 'Acceptance, Care and Trust' (the real 'ACT' of love). True love requires us to accept, care for, and trust the other person (and, indeed, ourselves) – even when it is hard to do so. That is what love means: it is a tough discipline. And disabling grief so often results from not fully loving the other person during their lives. We need to recognise that, if we really seek to live longer, better, we need to be prepared for the loss of several of those we love. Get your loving right before it is too late. As for loneliness, after the loss of dear ones, my answer is simple: make new friends, care for the young, talk to strangers, love your God and get a pet – as my sister recommends.

I then reminded my patient audience of the importance of our Regime, the pattern of life we adopt (life-style and mind-set) to protect us from the major threats to a healthy longevity, namely heart disease, cancer, dementia, 'diabesity', auto-immune conditions – and, of course, accidents and falls. While our genes may play a part in pre-disposing us to one or other of these conditions, our pattern of life is considerably more influential – and that is something we can change, if we choose to do so. Responsible Ageing requires us to review (and perhaps revise) our habits, our herd (of family and friends) and our addiction to pleasure, like that third glass of wine. We act like irresponsible people. It seems to be a regrettable truth that our lives are like a continuous 'Marshmallow test' – which requires children to sit on the floor with a marshmallow for ten minutes, without eating it, with the promise that the examiner will give them a second one, if they succeed. It appears that those who fail the test, not only lose the second marshmallow, but grow up to form a disproportionate number of young criminals, drug-addicts and suicides. But it is not only the young who find it hard to postpone simple, but ultimately harmful, pleasures. We all do.

So, we must learn to 'take our MEDs', where M stands for a positive Mind-set, E is Exercise, and D Diet; while the little s reminds me to reduce (even eliminate) the Stress in my life. We need to create an ordered life, with positive goals, enjoy a rich and varied social life, and remember the three keys to living well at any age, namely self-reliance, the support of a strong family, and a (lifelong) learning habit. But we also need to attend to the quality of our environment, the importance of regular sleep, and regularly consult the doctor about supplements, blood-tests, scans and inoculations. I ended by re-emphasising my concern that we live in a toxic culture, and a toxic environment: unsurprisingly many of us suffer from stress and anxiety as a result. The developed nations of the west do not offer us helpful role-models: but the Blue Zones do. I seek to emulate them, at least at home.

These three talks are available in full by application to the Oxford Longevity Project (contact@oxfordlongevityproject.org). But we are taught that mere advice is inferior to lived example. Don't just ask people what they think; try to find out what they actually do. So, I understand that I should share with readers the relevant features of my own pattern of life, both life-style and mind-set, which I follow on a daily basis. We (my precious wife and I) wake at about 7.00 am; I go downstairs to make two cups of tea for us to enjoy in bed. But before I do that, I have my 'sauna shower' (one minute under the hottest water I can comfortably bear, followed by a second minute – two in summer – with the control turned to its coldest setting). After a vigorous towelling I go out into our lovely garden, barefoot and without my glasses, to walk round the lawn, study the twenty trees I can see (I count them!), admire the sky, the plants and creatures I meet, and return to the kitchen, smiling. Nature and the universe are wonderful! (But, with a sigh, I often sadly recall those lines written by Bishop Heber: '…where every prospect pleases, but only man is vile…') And then, having laid the breakfast tray, I carry the tea upstairs for us to enjoy together, accompanied by daily medications and supplements. My wife makes the breakfast: fruit-juice, muesli with dried fruit, nuts and seeds; coffee and toast (marmite on weekdays, my own home-made marmalade at weekends), which we also enjoy in bed.

Dressed and groomed, we start our active day at about 9.00. Her focus is the garden, mine (at present) this Report. Nonetheless, I hope to grow more vegetables next year… I take regular exercise, walk/run (three miles or so) on alternate days, with a half-hour indoor exercise routine (stretching, lifting, and so on, together with a session on my new exercise bike) on the non-running days, and a rest on Sundays, when I pick up the litter in the lane by our home (and greet neighbours). We entertain family and friends, probably about twice a week, for whom I cook (vegan meals, of course). But I have now (almost) given up the evening meal altogether (unless we have guests), and 'almost-fast' from 2.00 pm until the next morning, except for a cup of green tea at about 4.00 pm, and a light snack-supper at 6.00. It works for me. My BMI (Body-Mass Index) is now respectable.

Our evenings start with the TV weather and news at 6.00 pm; we do a large jig-saw together (in turn) and watch some of our favourite programmes, or a film, until 10.00, avoiding the late news. Then, it's bed-time; we read for about an hour (no blue light in the bedroom!); then lie down to sleep. I do some gentle exercise, tapping, foot-stretching, nasal breathing; then tape my lips together, turn over into my sleeping posture, while meditating on my 'gratitude exercise' by making an alphabetical list of reasons to be thankful – 'Andrew (my brother), air, avocados; babies, bay trees, broccoli; children, cherries, carrots' – until I fall asleep, usually well before 'Wendy (my wife), water, weather'. If we wake in the night, we find a spoonful of Nytol (available from chemists) sends us off to sleep again. As you see, we take our S-MEDs, without fail. Sundays are special days: I wear my watch on the right wrist to stimulate my brain, and do the weekly chores (sharpen the kitchen knives, pick up litter). I firmly believe we need to combine routine with change.

I will end this chapter by seeking to look forward, and consider 'what next?', both for the OLP, and my own exploration of the best way to reach the goal of *living longer, better*. My own current agenda follows the 'rule of three' (of course!) and involves a deeper study of (and personal experimentation with) (i) *hormesis,* another useful technical term, defined by the dictionary as 'a phenomenon whereby substances that are toxic in large doses have a beneficial effect when absorbed in very small doses' (like most of the vaccines we receive, for example); (ii) *placebos* (procedures that do us good, even though there is no good evidence of direct causation) – my sister recommends 'God and dog' for healthy ageing…) – and *nocebos* (harmless substances that nevertheless cause harm because we expect them to, like many toadstools – but not all; do be careful, if you collect your own; the key point is the brain's astonishing capacity to use our ideas and beliefs to affect our health, for better or for worse); and (iii) more extensive 'environmental scanning' (on the internet, for example) to identify new ideas and approaches to the challenge of 'living longer, better' – for example, the advice to grow your own vegetables at home (my next project!) and to chop them before cooking, ideally by steaming them – or eating them raw in a salad; and the interesting suggestion that 'walking in woodland', which I now do regularly, is especially beneficial for our health. I have just finished reading a remarkable book on diet, *Foods that Fight Cancer*, by Richard Beliveau and Denis Gingras, and warmly recommend it to any readers who are still unconvinced about the value of a plant-based (vegan-ish) diet.

And lastly, I will provide a summary of what I have learned from the privilege of being invited to be a member of the OLP some years ago: I think of these conclusions as my 'seven lessons of healthy longevity', as follows:

The Seven Lessons of Healthy Longevity

1. The first explains the nature and causation of the major diseases of longevity, which may prevent us from 'living longer, better'. We must, above all, try to avoid heart disease, cancer, dementia, 'diabesity' (obesity, typically accompanied by type 2 diabetes), falls & accidents, and auto-immune breakdown. These are not primarily, or normally, caused by infection or our genetic inheritance (or just bad luck!) as many believe: the main cause of the diseases of longevity is our own behaviour, our mindset and lifestyle. At least 80% of the responsibility for ill health in old age lies in how we choose to live our lives. Choose wisely!
2. Consequently, we all need to take personal responsibility for our health, especially in old age, just as we are expected to be responsible for earning an adequate pension to carry us through the later years of life. The formula for living longer, better, which I find helpful is 'remember to take your S-MEDs', where the S stands for regular, sustained Sleep (no blue light in the bedroom!), M is a positive Mindset (care for family, friends and neighbours; live for today and tomorrow, don't dwell on yesterday; love the universe and life; resist the temptation to criticise and feel gloomy; avoid the news!), E is exercise (walk a mile a day, if you can; climb the stairs; sell the car!), and D is Diet (learn to eat a vegan(-ish) diet, and enjoy it!; avoid shop-bought processed foods; resist second helpings, and food after 6.30 pm!), while the small 's' at the end reminds us to minimise the stress in our lives: stress, together with smoking, alcohol, sugar (and meat!) are all slow and silent killers.
3. The third lesson demands a transformation of medical practice (and medical training). Doctors are bound by the Hippocratic Oath ('First, do no harm'). We can cause harm in two ways: by action, and by inaction. All doctors strive to do no active harm, but most of them fail to explain the implications of lessons 1 and 2 (above), which is (above all) the need to *prevent* disease and ill health, to reduce the need for their skills in diagnosis, treatment and (sometimes) cure. Prevention is better than cure. And, to a considerable extent, it is in the power of each one of us to do it. It should be the primary duty of the doctor to explain (probably more than once) to every registered patient the essence of lesson 1, and its consequence, set out in lesson 2.
4. Likewise, the government, its agencies, and the media, have a duty to 'tell us the truth' about public health and the well-being of the individual. The Canadian guidelines on alcohol today teach us that there is no safe level for drinking alcohol, but (if you *must* drink) limit your indulgence to no more than two moderate glasses of wine a week. We all need to be constantly reminded about our own role as 'responsible patients', and learn to understand that, if you want to blame someone for your ill health, you have only yourself to blame! The National Curriculum should include the requirement that all schools teach the fundamental principles of personal health-care, perhaps leading to a new GCSE and A-level qualification.
5. It seems to be growing clearer by the day that humanity has (at least in the affluent west) created for itself a toxic culture (and, indeed, with global warming, an increasingly toxic environment) – which we like to call 'development'! The Standard American Diet is, indeed, SAD. We have gradually become addicted to habitual behaviours that are not healthy: the sedentary life-style, the drinking culture, a diet of ultra-processed foods, social media, a pandemic of despondency, gloom and complaint. This is the 'new normal' of human life, and it is toxic! Our behaviour is typically controlled by our habits (what we always do), our herd (what others always do), and our compulsion to seek the next 'high', another drink, or sweet, or biscuit, or fix…
6. We find it hard to resist the weight of these three '(h)aitches', but, if we want to live longer, better, we must learn to do so, by taking control of our feelings and choices, just as (most of us) learn to take control of our words and actions. Ask yourself: who is in control of your life – you, or your feelings…? Healthy longevity requires both *avoidance* of toxic choices and *commitment* to healthy ones: remember 'S-MEDs' (lesson 2 above). Don't try to do it all at once; select some 'easy wins', like climbing the stairs, and adopting a 'dry January', before committing to selling the car or becoming a vegan.
7. Which means that we must learn to take responsibility for our feelings and choices, and gradually become exemplars of 'best practice' to those around us, our family and friends. Ask them to help you, for example by inviting your partner to serve you at meals, and to think about portion control, never offering you a second helping. Study the Blue Zones and the American Seventh Day Adventists…and try to emulate them! Grow your own vegetables in the garden or window boxes: start with tomatoes. Live a simpler life. Use public transport or taxis. Buy a vegan cookbook, and learn some new recipes. Cherish and care for your family and friends. Live for today – and tomorrow, not in the past. Choose some goals, and then choose 'a goal beyond the goal'. Aim to live, in good health, until you reach (at least) your century. I offer all those who read these words my very best wishes. Fare well.

Chapter 7: Conclusions and Recommendations

Our first conclusion is that there is widespread, and serious, public confusion, misapprehension and ignorance about the causation, nature and treatment of disease, especially (perhaps) the ones that affect older people, namely heart disease, cancer, dementia, 'diabesity', falls and accidents – and auto-immune conditions. These are neither infectious diseases, nor the result of 'genetic pre-disposition', though for some forms of them, and some people, infection and genetic inheritance may also play a part. Nonetheless, for most of us, the causes of the diseases which threaten healthy ageing mainly arise from our environment and the impact on our behaviour, life-style, and our attitudes and mind-set. The need for a new approach is highlighted by the dramatic fall in healthy life expectancy despite record spend on the NHS.

Members of the public may feel that this is bad news, since it seems that we are largely responsible for our own ill-health, and possibly premature death; and cannot take refuge in remarks like 'it's all the fault of my genes', and 'it's just a matter of luck!'. But it is also good news, since we may learn how to prevent, defer, or even reverse the onset of the common diseases of old age. The remedy lies in our own hands. This is the key message of this Report; readers are invited to note the strong consensus of views presented in chapters 2-6, which we have decided to present as the authors drafted them, with minimal editorial adjustment.

Our second conclusion is that, unless this thesis can be shown to be wrong, there needs to be a significant alteration in human behaviour ('take your S-MEDs'), medical practice and training (prioritising prevention, before providing diagnosis and cure), and in the guidance offered to the public by the government and its agencies, and, indeed, in the media: in short, we are recommending a significant shift in our shared culture to create a 'new normal'. This will require the courage to tell the truth plainly; for example, alongside messages like 'smoking kills' we need to be told that 'too much alcohol shortens lives': if you hope to 'live longer, better', reduce your intake or abstain. There is no 'safe' level of drinking (alcohol), indeed there is really no 'safe' level of anything, it's all to do with reducing risk. And, perhaps for some, an even harder challenge – to choose to be positive.

Our third conclusion, is that society needs responsible leadership: those in positions of authority in government, the medical and the educational professions, for example, should 'walk the talk', and adopt the attitudes and behaviours which are required for healthy ageing. There is an interesting problem in human ethics (called 'the normalisation problem'), best expressed by the question whether it is ethical, to do something which, when you do it, will cause no harm, since you are a sensible and careful person – when you know your behaviour will encourage others, who are less responsible than you are, to indulge in something which will harm them, and (indeed) other people. Responsible leadership requires us to lead by example.

And so, summarising the proposals set out in earlier sections of this Report, our key recommendations are:

1. That all adults should learn to take responsibility for their own health, just as we are expected to be responsible for earning sufficient wealth, and an adequate pension, to provide the funds required for the lifestyle we choose.
2. Consequently, we should all 'take our S-MEDs', ensure sound sleep, sustain a positive mind-set, adopt a regime of regular exercise, eat a vegan-ish diet, minimising shop-bought ultra-processed foods, while reducing harmful stress to the minimum (and, of course, fostering our social relationships with family, friends and neighbours, and guarding ourselves against the toxins present in the environment).
3. That our doctors (and those who train them), and indeed the NHS as a whole, should re-learn the 'silver rule'*, and observe it: 'First, do no harm', remembering that we can cause harm in two ways, namely: by wrongful actions, and by harmful inaction. Belying its name, the National Health Service seeks to provide a 'sickness service' (of diagnosis, treatment and, it is hoped, cure), without taking proactive steps to guide those in its care how best to prevent the onset of disease, most especially the diseases which frustrate our desire to 'live longer, better'. This is harmful inaction, and contravenes the Hippocratic Oath.
4. That our leaders, in government and its agencies, and in the responsible professions of science, medicine and education, should tell the truth, without fear or favour, so that the public and the media are clearly informed about what to do, and what to avoid, to promote healthy ageing, while recognising that this will require a campaign to promote a 'new normal' for human behaviour in the developed world.
5. Everyone should prepare a plan for living longer, better and the Oxford Longevity Project has developed a template to facilitate the process.

THE PLAN FOR LIVING BETTER FOR LONGER		
STRATEGY	PERSONAL ACTION	COMMUNITY ACTION
Understanding Ageing		
Getting fitter, physically, cognitively and emotionally (and get younger by regaining lost ability - drop a decade)		
Preventing and, if necessary, managing disease better		
Improving your environment		
This is the plan prepared by ..... Date ..... Witnessed by		

*The three rules which should guide our lives are: (i) the Silver Rule ('first do no harm'); (ii) the Golden Rule ('love your neighbour, as yourself…'); (iii) the Diamond Rule ('do the right thing'). Fully understanding them, and learning to observe them, requires a lifetime of study and reflection.

Appendix I: Contributors and Biographical Notes

Sir Christopher Ball is a teacher, philanthropist and poet. He has been a Fellow, Tutor and Bursar of Lincoln College, and Warden of Keble College, Oxford, Director of Learning at the RSA, and Chancellor of the University of Derby; and is now a patron of the National Campaign for Learning, Vice-President of Autistica, and adviser to a number of charitable organizations in health, education and development. Following a long career at Oxford University, and in public life, and consultancy in the UK and overseas, his current interests include 'early learning', core skills, disability, brain science, motivation and self-esteem – and now also healthy longevity (the OLP), and climate change (he was selected as Oxford's 'Climate Action Champion in 2025). He also runs marathons, writes poetry, teaches the art of fundraising, and gives lectures on land and at sea. He is married (to Wendy), with six (adult) children (one, now deceased, on the autistic spectrum), eight grandchildren, and four (step) great-grandchildren. He was the author of More Means Different (RSA, 1990) and 'Start Right: The Importance of Early Learning' (RSA, 1994), and has recently co-authored 'Early Childhood Education Redefined' (Routledge, 2018), and (as John Elinger) 'Marriage: A Sonnet Sequence', and 'Parenthood' (Signal Books, 2018 and 2023). He is proud to be the lay member of the OLP, and wrote the first draft of this Report. However, he believes that home and family outweigh in value and importance whatever one may achieve in one's career and public life.

Dr. Paul Ch'en is a GP Partner at the Observatory Medical Practice in Oxford, College Doctor for Keble and Somerville Colleges, and a Common Room Member at Green Templeton College, University of Oxford. While he enjoys all aspects of General Practice, he has a particular interest in cancer care, lifestyle medicine, and wellbeing.

With his background in cancer immunology as a former research scientist, an understanding of chronic illnesses gained through his work as a general practitioner, and unique cultural and educational experiences, he has a broad knowledge base that enables him to practice holistic medicine. He is keen to launch a wellbeing programme and establish a cancer wellbeing centre that brings together the latest advances and expertise across different fields of medicine.

Paul is passionate about driving changes in healthcare, emphasising prevention, the importance of self-care, and fostering a partnership between the doctor and the individual. He has recently launched a podcast series called Perflow.

Sir Muir Gray began his career in the NHS in 1972 and since then has made an indelible mark on it, developing screening programmes in the NHS for pregnant women, children, adults and older people. He has published numerous books and articles and was the first to identify the 'fitness gap' in the British Medical Journal. Sir Muir has held a number of NHS regional and national roles, latterly as the NHS's Chief Knowledge Officer, and he was the principal

expert adviser to the European Union in the production of their report on Value Based Healthcare in 2019. His mission, of 50 years, is how to help people live longer better. He has authored or co-authored the popular health books, *Sod70!* and *Sod60!*, *Sod Sitting*, *Get Moving and Sod It*, *Eat Well!* Sir Muir has developed a new model to help people Live Longer and Better. In his model, morbidity at the end of life is compressed and the incidence of dementia and frailty and, therefore, the need for social care is reduced.

Leslie Kenny is an autoimmune disease survivor, certified health coach, and founder of Oxford Healthspan, an Oxford, England based nutraceutical company bringing healthspan promoting molecules to market. She previously worked as a fundraiser for Oxford University regenerative medicine spinouts. Through her personal brand Leslie's New Prime, she shares her expertise via a comprehensive health and longevity guide, drawing from both her personal journey and professional knowledge. Her health journey and longevity expertise are often featured in print, including The Times and The Guardian, and she was a speaker at TEDx Oxford in February 2025.

Leslie has a Harvard MBA and a BA from Berkeley.

Professor Denis Noble is a British biologist who held the Burdon Sanderson Chair of Cardiovascular Physiology at the University of Oxford from 1984 to 2004, and was later appointed Professor Emeritus and Co-Director of Computational Physiology.

He is a pioneer of systems biology and one of its founders. In 1960, he developed the first mathematical model of cardiac cells and published the first mathematical model of heart rhythm in the journal *Nature*, work for which he is now internationally recognised.

He is also internationally known as a critic of standard theories of evolutionary biology, and in 2022 he debated these ideas with the world-famous author of *The Selfish Gene*. The 21st century discoveries concerning the molecular biology of DNA and its control by living cells formed the centrepiece of this debate.

Among his many international honours is the Lomonosov Grand Gold Medal, the highest award of the Russian Academy of Sciences, which he received in 2022.

Age-Less

by Sir Christopher Ball

Remember the essential pillars of living well: **Attitude** (how we choose to feel), **Grub** (what we eat and drink), **Exercise** (aim for at least a mile's walk each day), **Love** (family, friends, neighbours—and importantly, yourself), **Environment** (the air we breathe, the water we drink, and the chemicals we keep in our homes and gardens), **Sleep**, and sensible use of **Supplements**.

These are the seven foundations of healthy ageing—accessible to all, without prescription. (And perhaps the most powerful of all is love.)

But *Age-Less* also serves as a reminder of what to avoid, particularly as we grow older: alcohol and anger; complaining and negativity; envy and excess (moderation in all things); loneliness and inactivity; overconsumption; a sedentary lifestyle; and, above all, stress and smoking.

To give ourselves the best chance of living longer, better, we must actively embrace the first list and consciously reject the second. The choice, ultimately, is ours.

Why not begin today?

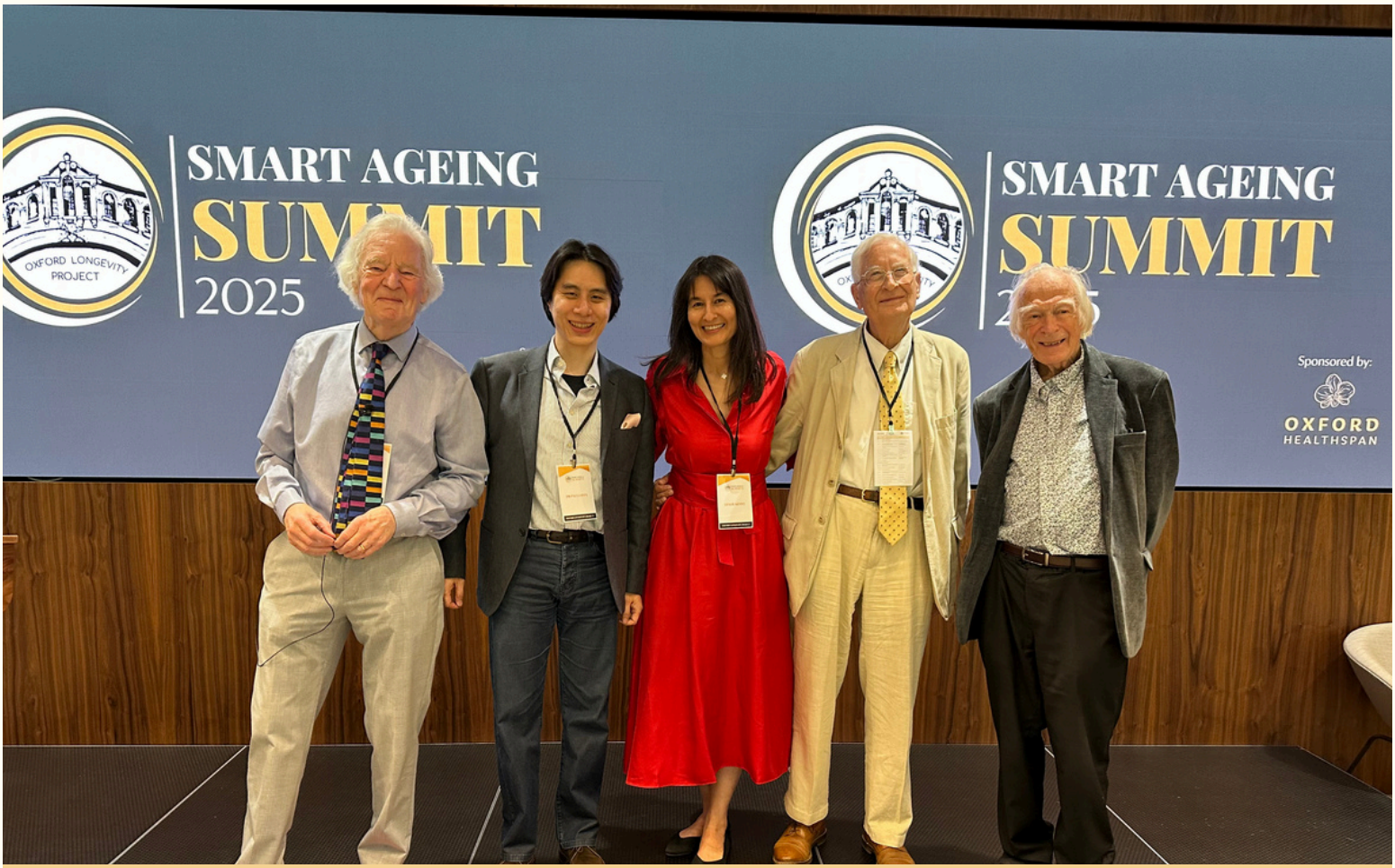

Photo (left to right): Sir Muir Gray, Dr Paul Ch'en, Leslie Kenny, Sir Christopher Ball & Prof Denis Noble

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