Paul Willis (00:00:00):

Ladies and gentlemen, welcome to the Adelaide festival ideas and today's session immortality. Really, my name is Paul Willis. I'm the director of the Royal institution of Australia just across Pirie street here. And it's my pleasure to be your host for this session. Few housekeeping rules. Before we start, if you have a mobile phone, please switch it to silent. If it does go off during a performance that I host, I do insist that you buy a beer for everybody. So if you're feeling rich, leave it on. You're most welcome to tweet through this particular performance. And the, the tweet name that you need to include is at ideas Adelaide, one word and hashtag is hash a F O I all. Uppercase, there are some evaluation forms. If there's not one, an evaluation form on your seat, there are evaluation forms outside on a table, and I would appreciate it.

Paul Willis (00:01:05):

If you were to take the time at the conclusion of this session to fill out an evaluation form, it makes life a lot easier for us when it comes to organizing future events. And I'd like to put a quick plug in for the Royal institution of Australia. I've only been the director since may, and it inspires me that Adelaide has such a wonderful institution at its disposal for engaging the Australian population with science. If you want somewhere to come along and think and meet inspiring people and discuss inspiring ideas, then I would strongly suggest you come and visit us at the Royal institution of Australia. As I said, just opposite prams ZOS. Everyone knows where prance is. No one knows where the Royal institution is. So immortality. It said that there really is only one certainty in life and that's death. The idea that taxes are inevitable has been shown to be wrong by several rich people and death itself may lo longer be inevitable.

Paul Willis (00:02:13):

And it will probably be those same rich people who will be leading the way using new technologies to extend life, not just on biblical proportions of hundreds of years, but perhaps to a thousand years, perhaps today, people will be able to have been born today will be living to 150 to 200 years. And within our lifetimes, someone will be born who may live to a thousand years of age. Is that not an inspiring and refined thought? What would it actually be likely for a thousand years, more effect, will it have on the unborn? What rights do we have to live for a thousand years? There are so many questions that arise out of this, and we have a wonderful panel to discuss these matters. Please. Would you welcome professor Fiona wood, Dr. Brad Partridge and professor Julian Savulescu.

Paul Willis (00:03:18):

[Inaudible] [inaudible] To start the discussions Professor Fiona Wood, would be familiar to you all from many stages, not least as the 2005 Australian of the year, largely in recognition for her work with burns victims from the Bali bombings and other tragedies, but also as a judge from the new inventors on the ABC. And of course, as the reader's digest, voted most trusted Australian. I understand that that's since been revised, but she's still right up there. Ladies and gentlemen, so much so that I left my car keys with her at the beginning of the event. Would you please welcome professor Fiona wood?

Fiona Wood (00:04:09):

Thank you very much, Paul, and thank you. Rirs for asking me to come along today and to be part of this extremely challenging discussion. And as you heard, I'm from the medical end of the spectrum and what is it that I can put on the table today? And so when I think back and look back at the changes that have brought us to sort of 20, 2011 and the changes in our quality of life and our, the environment that we

enjoy from a health perspective, I think the vast changes have come really around population health, clean water, clean food, infection control around vaccinations. All those things have changed our longevity over history and over time. But when you look down the sort of the other direction into the crystal ball and try and think about what's it going to be like in our future?

Fiona Wood (00:05:02):

I think we've got some, some ideas and snippets of sort of sniffs of what it could be like. Understanding our genetics will understand will give us opportunities to tailor health care in such a way that maybe we could change the outcomes considerably from things that we know today are so devastating and in particular cancer and injury. And so can we understand how some people who are injured are predisposed to infection and a much worse outcome, and therefore change that? I think the work in the HIV has demonstrated that very clearly, that if you understand the genetic predisposition, you could treat much more appropriately with less side effects and better quality outcomes. So how can this go forward? The 20 years of my life, I've been looking at regeneration skin regeneration. I see scarring everyday. I see people's bodies changed devastatingly every day. And I just think, whoa, we've got to be able to do this something better than that.

Fiona Wood (00:06:03):

And lizards can grow new tails, but why can't we, maybe we just don't want to tail, but yeah. And lizards, even though regenerate don't, we don't live to be a thousand, but is there some way that we can look at our understanding of self-organization and tissue regeneration, such that we could change the way we age such that we can use that technology in repairing ourselves and repair ourselves against normal wear and tear. Every day we get knocks and bumps in the way of aging on our day joints or whatever, by understanding how we can treat pathology, will we change the way we can treat, we can live? And I think that's really what's on the table today and the responsibility that, that with every, every opportunity there's responsibility. And I was in the three minute thesis competition from our university students across Australia last week.

Fiona Wood (00:07:04):

And in one of the presentations, one PhD student had demonstrated quite categorically that in an animal model, preconception nutrition, both excessive and starvation influenced the offspring's health in terms of diabetic rates in terms of heart disease rates. So the responsibility we have goes way beyond our personal responsibility to the responsibility, I think of the whole. So there's one thing for certain, for me, I think in a thousand years, those beings of the time we'll enjoy looking at that our lack of knowledge and sophistication and say the equivalent of Merkel, they thought the world was flat. Wha what will they say about us? Are we at a crossroads? And as those clouds part, and we see there's opportunities become apparent. Are we going to work on a solution collectively with equal responsibility? Oh, we're just going to walk away and blame them, whoever they are for making the wrong decisions. I'm here today, because I'm interested in this. I'm interested in it for my children, my grandchildren, those behind I'm interested in because of our planet. I hope that you are too. Thank you.

Paul Willis (00:08:27):

Next up, Dr. Brad Partridge with a background in psychology, that's led him into research in public attitudes towards a range of new areas of research and technology, as well as public health and bioethical implications of those developments from the national health and medical research center.

He's a postgraduate research fellow in public health at the university of Queensland. Please. Would you welcome Dr. Brad Partridge?

Dr. Brad Partridge (00:08:59):

Thanks Paul. Firstly, I want to say when we're talking about immortality, we could probably make a distinction between immortality in the sense that you could never die of anything. You're invulnerable talk all kinds of things that could put you out of existence versus life extension. Now we don't have to be immortal, but we could have lifespans that are very long indeed. And the idea that we could live to 150 or perhaps a thousand years or beyond is an interesting one to look at, I think 150 is going to be a little bit more doable than a thousand. But there are a lot of very enthusiastic people in the life extension debate who would say look a thousand years. That's just around the corner. And the idea that the first person to live to a thousand might be alive today.

Dr. Brad Partridge (00:09:53):

Well that just depends on how quickly we can develop these technologies. Now, it all depends on how we can develop things that are going to help us slow the aging process. Now, the quest for a technology that's going to do that. It has a pretty old history. I think one of the most interesting things to look at is if you want to mention some technologies around rejuvenation, well, what about something like calorie restriction? Now there've been a lot of studies that show that putting animals on a calorie, restricted diet actually helps them age slower and live a lot longer. And we've known this since about the 1930s. This actually happens with a whole host of species when you feed them about 50%, fewer calories, still with all the nutritional requirements that they need, they actually live a lot longer.

Dr. Brad Partridge (00:10:44):

So the question is, could this actually work with humans? Now, some people voluntarily put themselves on a calorie restricted diet know, you might not be surprised to know that a lot of these people are in America. That part of the caloric restriction society of America, they voluntarily very, very small amount of food in the hope that this is going to produce these calorie restriction life extending effect. Unfortunately some of the side effects of this calorie restricted diet, a very lean muscle that have very bony bumps. These people, this is no muscle. It kind of hurts to sit down. And it also also sort of does funny tricks with their libido. They tend to sort of not be so interested in that kind of thing anymore. So maybe a calorie restricted diet isn't going to be for everybody. And the idea that you're going to have to eat a lot less though, you know, in today's modern world, that's not that appealing, but the good news is that there's a lot of research going on in developing a pharmaceutical pill that could actually mimic the life extending effects of calorie restriction without you actually having to eat any less.

Dr. Brad Partridge (00:11:54):

So this is the kind of ultimate has your cake and eat it too, kind of technology. Maybe we'll develop pharmaceuticals that they call calorie restriction, the medics that we could just sort of take and this'll help us slow aging. Now, this sounds a little bit funny, but there are pharmaceutical companies at the moment who are trying to develop these calorie restriction. Memetics one of them called Sirtris pharmaceuticals was purchased a couple of years ago by GlaxoSmithKline for about $750 million. So big biggies here, they're quite serious about developing this kind of thing. And there are some researchers that said that an effective calorie restriction memetic might be able to extend their life span to 140, 150 years, and maybe produce 90 year olds that look like 50 year olds. So what we thought would be a good idea to do is ask people what they would actually think about living to 150 slide aging.

Dr. Brad Partridge (00:12:51):

So some of the research we did at university of Queensland was doing just that we did some surveys with people, did some interviews and focus groups of different people that we thought might have different perspectives on this and ask them, would you want to live to 150 with slight aging? The results of kind of interesting, we got about 65% of people say that they'd support that kind of research only about 35% of people saying that they take the pharmaceutical pill that could help them live to 150. And interestingly men were much more in favor of this kind of thing than women. So I don't read really into that, what you will. But you know, th this kind of runs against a few assumptions that people in the ethical debate have about life extension. And there are very, very strong pro and con viewpoints on this.

Dr. Brad Partridge (00:13:44):

Some people say that this is really going against nature. Other people say, look, we really need a war on aging. This is just a barbaric that, that people would would still say, it's okay for you to dive aging, but not of other causes. Now the thing is in the bioethical debate, people have assumptions about what the public is going to think about this. Some people say, well, everyone's going to be horrified. And other people say, well, look, everybody's going to jump at this first chance they get, and what's interesting about public attitudes towards this kind of thing is they're actually seen as one of the major impediments to developing potential life extension technologies. And that's because people who are enthusiastic about life extension, think that everybody's really against this and that if it's going to actually progress, if we're actually going to get the technologies, we need to get public support on board. So I might just finish up there.

Paul Willis (00:14:42):

I don't know about you, but the thought of living for 150 years without cheese, good food and libido. That's a new definition of hell. Surely we'll explore that in just a moment, but please, the next speaker that we have is the director of the Oxford center of neuro ethics and the Institute for science and ethics. He's practical at the pro professor of practical ethics at the U hero chair in practical ethics at the university of Oxford and the sir Louis Madison distinguished professor at Monash university with a he's recognized as a leading commentator in the media regarding ethical issues, arising from the creation of the first living cell from synthetic materials. So with a very strong background on the ethical issues, would you please welcome professor Julian Savulescu.

Audience clapping (00:15:43):

[Inaudible]

Julian Savulescu (00:15:44):

So it's, let's go forward to the future. It's 2013, we've had bird flu and swine flu but now a very rare form of flu emerges from the Tasmanian devil from Australia. And this is an extremely contagious and lethal flu. And in the next year, it kills 13 million people. Now, just to put that into perspective, the great Spanish flu of 1918 killed 20 million people. Now, what should we do with a Tasmanian devil flu? Should we just allow nature to take its course because we'd spend billions trillions of dollars in attempt to, to deal with a pandemic that was killing 30 million people per year. Look how much money we spend on Tamiflu. And there was no epidemic at all. Now there is at the moment, no Tasmanian devil flu, but aging kills 30 million people per year. A hundred thousand people die every day from aging, 150 and further 50,000 people die from other causes.

Julian Savulescu (00:16:48):

Aging is by far the biggest killer of people. The diseases that you will all die of are actually the symptoms of aging, cardiovascular disease, cancer Parkinson's disease type, two diabetes. All of these diseases are actually the symptoms of an underlying disease. And that is the disease of aging. Why don't 10 year old children die? Of course, they do develops very rare forms of childhood malignancies, but they don't have heart attacks. And don't, don't develop the common forms of cancer because their body hasn't started to age yet. You've heard this figure of a thousand years. That's what the projected lifespan of somebody would be if they had the aging of a 10 year old child and they didn't die of an accident or war or some other injury. So the big picture on this perspective is why don't we care about aging? Why don't we invest the sorts of resources that we invest on treating or treating cancer or heart disease?

Julian Savulescu (00:17:52):

Why don't we recognize that the we're really treating the symptoms of the underlying disease of aging that affects the human condition, because there is no reason that humans have to wage. We've seen already in other species organisms that donate there's a jellyfish called [inaudible], which is immortal. Turtles lived for 150 years because they have very effective anti-aging mechanisms. We've been able to genetically engineer mice to live twice as long as normal mice. There's no reason in principle, why, in addition to using regenerative medicine and stem cell therapy, we couldn't understand the basic biology of aging and attack the disease at its root. Cause. In fact, we spend very little money on aging research, and I think this is the greatest scandal of modern medical research. A number of years ago, someone surveyed in the national institutes of health, the most prestigious research body in the world. It spent 0.02% of its budget on fundamental anti-aging research. There are a number of reasons for this, which I don't want to go into, but ethically it's an outrage. It's a scandal it's it's as if letting the Tasmanian devil flu continue to kill 30 million people per year, every year. That's far more people that die in any war, far more people that died in either of the major world conflicts last century.

Julian Savulescu (00:19:24):

So the first point of I want to say is that the, the big ethical issue is why we don't have a war on aging. As we've had a war on terror and cancer. Now people raise philosophical objections. One of them would be life would become mundane or boring if we were old. There's in fact, no empirical evidence to support this survey. After survey of people across the ages, show that if anything, life satisfaction and happiness, slightly increase as people get older, the things that cause people to be unhappy or dissatisfied with their lives are diseases, illnesses, and disabilities, not the mere fact that they're 80, 90 or a hundred. In fact, the, the, if you look at the surveys of happiness and life satisfaction, there are, there are a U shaped curve with, with a low point at about in the forties. And then they increase as you get older. So there's no evidence that people find life boring or uninteresting that they find disease and disability painful and want to be rid of it.

Julian Savulescu (00:20:31):

Another issue is, is how long, how long each generation should live and how, how, what obligations we owed a future generations, whatever these obligations are. They must be fairly weak when compared to the interests of our generation, because none of us thinks we have an obligation to have children. Now, Brad mentioned the, the the attitudes of the public. Imagine that I develop a pill that slows down the aging process. So you no longer age, but die at a certain point. So you can pick exactly at what point you want to just die quickly of so-called natural causes. Once the pill stops having its effect. So you could, you could choose to dial up an age of a hundred, 150 200 or more. How many people would choose to

leave a hundred years or less show of hands. How many people would choose between a hundred and 150? How many people would choose 150 to 200, more than 200?

Julian Savulescu (00:21:37):

Okay, well, as you said, there's a distribution, but the important point is how many of you think that your view should determine what other people do with that pill? And that surely is the most fundamental point to start with in this ethical discussion. Surely it's up to us to decide how long each of us lives. The only good objection to this is somehow we consume more than our fair share of resources. When we have too big, a carbon footprint, it's a kind of common kind of concern when we're chewing up too much of the world's limited resources. Those are reasons to limit people's age, but we don't yet know at what point at what, what level of population, what size of population and what length of life is ethically most optimal until we find that point, surely it's not, we don't have an obligation to die or to impose death and other people. And that's precisely what we do when we fail to prosecutor, war on aging. So I've mentioned I've finished by saying that we have within us the capacity to defeat aging by fundamental, basic research on the processes that causes cells to age through regenerative medicine and so on. And I think it's an urgent, ethical priority that we pursue this. Thank you.

Paul Willis (00:22:58):

Perhaps in the discussion let's start from the most basic question. Why do we age? I mean, ourselves, as long as we're alive, continue to divide and renew. So why do we wear out, why do we age? What, what's the science of aging Fiona?

Fiona Wood (00:23:19):

Well, I be stepping outside of my area of expertise here. And I see that for me, trauma repeated trauma is associated with a secondary Sequoia that in repairing that trauma, the quality of the repair is downgraded. If you like. And I know that in our, in our data linkage research that we can see, there's an increased incidence of cancer associated with trauma. We see that with central Alma and melanoma. So we see that trauma part of that sort of the external wear and tear has an impact on the cellular function as the cells are stressed. So is the aging response, a response to our environment, those stressors of the environment, that's one way of looking at it, but I think there's others that would certainly look at it from a cell having a D a defined lifespan and beyond which it cannot continue to replicate. And I think that's sort of, that's a really interesting question because there's a lot of evidence now of cells in culture going on forever,

Paul Willis (00:24:26):

Because surely even if you wrap yourself up in cotton wool and made sure you didn't have any serious injury during your life, and that you minimize the incidental injury you get from every day, even in those situations, you're still going to grow old.

Dr. Brad Partridge (00:24:40):

Yeah, that's right. And I think might also be the case too, that you know, through natural selection and evolution, I mean, we have genes that are very good at getting us to reproductive age and making sure that we're able to have offspring, but then probably don't care so much about what happens to us, you know many decades after that. So, you know, that might also contribute to this process whereby we eventually just deteriorate

Paul Willis (00:25:08):

Because he died, the situation of telomeres don't use like the ends of the shoelace song, string strands of DNA, which get progressively shorter. And when they wear out your DNA's knackered, I think that's

Fiona Wood (00:25:20):

It's like a fuse, isn't it? And it's two goes, it's smoking away. So sure. I not so sure.

Paul Willis (00:25:27):

What are some of these technologies that are looking to be implemented to extend life extension is, well coming back to telomeres, there's research into just gluing new bits of telomere on isn't there?

Dr. Brad Partridge (00:25:41):

That's right. And when, when cells replicate, they lose a little bit, the little caps of DNA at the end of the crime of silence. And if we can, well, there was an enzyme, telomerase is actually the enzyme that might be able to replace the DNA at the end. And there's the thinking that maybe if we can sort of find again, pharmaceutical or pharmacological interventions that could perhaps do that then we might be able to stall the aging process that way.

Paul Willis (00:26:12):

And then there's stem cell technologies, what sort of stem cell technologies can be introduced to make us live forever?

Fiona Wood (00:26:20):

I think there's I mean stem cell technologies. That's really interesting. And the whole, a whole, opens a whole another whole can of worms. I remember not long ago, my mother who is already ringing me, he says, do you do stem cell research? And I was clear from the tone of her voice all the way from Yorkshire that she'd been talking to somebody on the street, you know, and I said, well, it doesn't, it depends what you mean by stem cell research. Mum, do you mean, you know, umbilical stem cells, adult stem cells, embryonic stem cells. She's if you're going to be smart with me, I'll put the phone down.

Fiona Wood (00:26:53):

I think there lies the issue. You know, we don't understand a lot of what we talking about and, and we'd need to be able to articulate what we're talking about. I think the other work around cloning is interesting, and we can learn a lot from it. I think work around transfer of a cell lineage from a skin cell to a muscle cell or to a cartilage cell is fascinating from a scientific intellectual point of view, but it also may give us the the clues to how these cells can then be used in replication. If we have, if we consider our skin, our skin turns over, oh yeah, between six and eight weeks, it sheds, and it's continually replaced clearly that there is a stress on the system just doing that. Where does the stem cells from the bone marrow coming into the skin and replenishing that, and that sort of wears out over time, does that can we boost that? Can we boost the bone marrow? Can we do stem cell research without getting ethically compromised by going to an embryo? Can we actually just boost our own bone marrow things that are happening, as I mentioned earlier with the HIV guy? So you, the, the stem cell research question, I think is something that we can use it in is an enormous engine of opportunity for understanding with that. And we can do that without going near the ethically compromised area, I think

Paul Willis (00:28:14):

But there's a potential,

Julian Savulescu (00:28:16):

Just add one thing on that. So you're talking about the current prospects for stopping aging. There are diseases where people prematurely age. So at the age of 20, these individuals look like they're 80 and they die by the age of 24. And there are effective treatments now and understanding the biology of these conditions there's know, work on telomerase, there's work on helping to improve DNA repair. So you don't get the mutations, the changes that lead to, to aging. And there's the prospect of various kinds of stem cell research, for example, treating Alzheimer's disease in the long-term or other age-related generation, the brain. But the, but the important point to realize is that we haven't really scratched the surface in terms of the manpower and the ability to marshal the scientific resources that we have in the same way as we've done with other animals, where we've been able to double lifespan. So calorie restriction, these, these sorts of this is just a very premature foray into what could be a very productive line of research, but we just don't spend the money.

Paul Willis (00:29:23):

Because Arlene we're theoretically on the frontier at the moment where we're not far off being able to grow new organs from your own stem cells, which would theoretically deal deal, do away with the ethical questions of where the stem cells came from. So you need a new kidney, you can go in there and have a kidney transplant with a kidney grown from your own somatic material, wonderful stuff. But you're saying that there's the research dollars aren't being put into those sorts of things

Julian Savulescu (00:29:56):

Well to be honest with you, the politicians don't want us to live to 150.

Paul Willis (00:30:02):

I'm not sure we want them to be honest?

Julian Savulescu (00:30:08):

Okay. People are struggling with every, you know, life expectancy in the west is continuing to increase and people are already struggling with what to do with an aging population in terms of social support and so on. And it's, we struggle even to increase or remove the retirement age. So we're completely politically and socially, you're prepared for radical advances in, in the area of this science. So, you know, we, we need two things we need, we need the money put into the research, but we also need to think through what kind of society, what sort of social institutions do we want, not just for people who live to a hundred, which is what they're likely to leave to, you know, a number of decades, but to 150 and so on.

Fiona Wood (00:30:53):

Okay. Sorry. It was just interesting. Just are we running the risk actually now over for the first time, the life expectancy actually turning around, you know, people making poor choices on a daily basis. That's what I see the results of around drugs, alcohol and obesity. I mean, if you have obesity or you're obese and you have an injury, your outcomes will be extraordinarily compromised. So, and your offspring is going to be compromised. So are we actually by taking this sidestep almost and avoiding the issue, as

you've said, and spending all our research and sort of tinkering around the edges of malignancy or research and Alzheimer's and things, and not really taking it sort of head on, and we are actually running this running the risk of it started to actually turn around and decrease because there are certainly a significant group in our population that will not enjoy living into a hundred right here right now.

Dr. Brad Partridge (00:31:54):

Can I just say something on the funding aspect here too? And I wonder if some of it has to do with the fact that we don't generally consider aging to be a disease, and that maybe if we actually rethought things and classified aging as a disease with all the hallmarks of other common diseases that it might garner more funding support you know, for politicians that I guess their constituents you know, die of things like cancer and heart disease and Alzheimer's and things like that, but they don't necessarily see themselves as dying of aging. And so maybe that, you know, policy and funding decisions could, could, could change in that way. Let's move the discussion on, in from,

Paul Willis (00:32:36):

Could we too, should we, because I was quite interested in the response from the audience to the straw poll that you ran there, Julian, as to who would want to live for more than a hundred years or 200 years. And I was actually surprised how many people don't want really want to live for a thousand years. And I, and I can identify with that, particularly if it's student calorie restricted diets, that does sound like a nightmare.

Paul Willis (00:33:09):

There's to me, I, I can think of two problems with life extension. And that is one is the question of the quality of life, which I'd like to come back to in a moment. But the other one is the productivity in that, what's the point. If people are going to be able to live for 200 years, if for a hundred of those, they are not able to make a significant contribution to their own welfare and to the welfare of the community that they live in. Isn't there being alive is one thing, but actually being a functional part of the society is an important part of life.

Julian Savulescu (00:33:48):

Well, so fortunately the answer is there's very few problems in, in, in life where the answer is simple. And this one, the answer is simple because if you, if you slow down aging, not only do you delay death, but you delay disability and illness, and there's no evidence to suggest that older people are inherently less productive. What reduces productivity, creativity is decline in capacities and capability. So if you turn off the decline in intellectual capacity, if you retain the flexibility and ability to learn of a 10 year old child, but you also accumulated experience wisdom, et cetera, if anything would go the other way, and you would expect people to be even more productive and the world to be a much better place. It's just that we have this prejudice against aging, that we see people who are older as necessarily infirm, incapable incompetent, but that's, that's caused by the aging process. It's not caused by being a human being

Paul Willis (00:34:52):

Well, coming back to the quality of life, then kind of question

Julian Savulescu (00:34:56):

Should increase. Should increase.

Paul Willis (00:34:59):

Well, surely the biggest question on the quality of life as you get older is, is degeneration of the brain. And that's the tricky one. I mean, kidneys livers, most of the other organs of the body, it looks like we're going to be able to regenerate them, but the brain itself looks like it's going to be a tricky beast to deal with, but that's a function of aging.

Julian Savulescu (00:35:23):

That's, that's just you know, every organ shows the symptoms of aging in a different way. You know, the kidney stops filtering Uranus effectively. The brain stops functioning as effectively that's, but that's something special to the brain. It's just how the brain manifests aging. You turn off aging, you turn off that sort of decline.

Fiona Wood (00:35:41):

Sorry. It's all intertwined as well in that your brain functions better with exercise, you know, you're capable of doing exercise. You know, we know that there are certain things, certain aspects of you will be able to engage better if you're actually more functionally capable. Yeah. There's a whole wealth of evidence that with certainly an animal models where you're exercising and stimulating and may, you may actually increase the DNA within the brain. So there's an element of regeneration is certain aspect, is that in areas in certain Bazell nuclei. So it's actually not going to go down if you're actually physically capable and it may be something that we can actually look at beyond the sort of single organ replay replacement issue, and just look at the whole and so say, well, okay, we've learned a lot from this organ replacement stuff, but how does that fit to the whole how does that fit with this whole person slowing down that the impact of the wear and tear on them everyday, such that you don't need those replacements.

Paul Willis (00:36:40):

So we're looking at a generation of centenarian gym junkies who can do Sudoku, some cryptic crosswords on the treadmill. Is that how it works?

Dr. Brad Partridge (00:36:52):

Centenarians are actually the fastest growing segment of the population at the moment, I think, closely followed by those 85 to 99. So we're already living longer. I think the challenge is to avoid this global nursing home situation whereby we, we live a lot longer, but the quality of life is just not there for you know, for the last several years or so. And I think the Brian is, is going to be, I think it's going to be a tricky one to deal with because even if we can regenerate things like livers and kidneys and, and still going to joints from stiffening up I'm not so sure about the brain.

Paul Willis (00:37:28):

What about the argument of equity in resources? Because the longer that people live, the more resources that they're using and those resources in a world where people politely die before, they're a hundred in that world, those resources go to the next generation. Are we going to see some kind of limit in, in that, well,

Julian Savulescu (00:37:55):

You know, why did Bismarck choose 65 as the retirement age? Because people on average at that time died at 66. And so you didn't have to pay huge. So, you know, a hundred years ago people had a life expectancy of 50. Yet we think that it's okay that they now live to 80. And that the, that the amount of resources that they draw is, or 85 is, is acceptable. Why, why, why not turn it back to 50 or 40? In fact, through most of human history, people live too into, into their twenties. So what we actually happen to have at the moment is just a function of where we are on a trajectory of scientific development and social development. So we need to make an active choice about what share of resources, how long people should live and why choose 80, just because that's what we happen to have.

Julian Savulescu (00:38:43):

Are we at the local optimum ethical optimum, you know, I, I can't see any good reason for that. I think you need to, to, to face that question strategically and say, what size of population do we want to have? How many people, how long should they leave? And of course, you know, if you do have adequate anti-aging technologies, that you can also have, you know, policies that enable people to die when they want, you can couple them with euthanasia so that you can choose when and under what conditions you die. Instead of having to spend 30 years in a, in a state that you don't want to die and then, and then die.

Paul Willis (00:39:15):

But doesn't the question of living longer enter into the bigger question of population growth on the earth. China's population has continued to increase despite the one child policy, largely because the older people are living longer. And so the, the population keeps growing that way. So do we need to consider aging as part of the cold question of global population?

Dr. Brad Partridge (00:39:42):

Well, maybe, actually just with all the news over the last couple of days of Steve Steve jobs is diff I was reminded of a quote of his, that said that death is life's greatest gift because it gets rid of the old, my wife for the new, and I think it's got an interesting looking at those kinds of questions in the context of some like his life where we saw such a celebration of the innovation that he was able to offer the world. And but within such a short lifespan too. And I guess people that'd be one of those prime examples whereby people say, well, look, wouldn't it have been great if we could have Steve jobs around for 150 or 200 years, rather than just 56 or so, but I guess, you know, he was one who really embraced his own mortality in that way. But you know, in thinking about innovations, maybe if we have life extension technologies, we're also going to need innovations in other areas of research, because maybe if we do have these large increases in population we're going to have to find out, you know, ways of being able to use resources a lot more efficiently as well.

Paul Willis (00:40:51):

Time for some questions from the audience. If you have a question, we have a, an audience microphone in the aisle here, please make your way to that. I think there's one up the back even further. So if you want to remain hidden, you could use the back one, but we have a question from the floor here.

Audience member (00:41:09):

Yes, I'm 70. I quite like being old. My back is stuffed and my brain is wearing out, but what really worries me is in differences, the speaker on the end, we have already exceeded the population that this planet can, can hold. And we had an earlier panel today arguing about how we would find better ways to create clean energy was not what I mean from my grandchildren on. I appreciate growing older. I don't appreciate my brain wearing out if I'm going to be old and senile or worse than I am. I'd rather have euthanasia this and aren't we going to interfere with natural selection? Or have you answered that by saying we're going to be smarter?

Paul Willis (00:41:56):

So should we take, let, let's take the natural selection question. First of all, I would have thought that we actually, as a species managed to sidestep natural selection when we started manipulating the environment, rather than, than it manipulate us, am I naive?

Fiona Wood (00:42:17):

I think we've developed our society to a point where natural selection is in our hands. By the way we look at where we've developed a level of altruism where we look after those that are weaker and vulnerable, and we do so increasingly. So I think certainly natural selection is a whole heap different from Darwin's survival of the fittest. Yes. Yeah. So we've certainly manipulated that. When did you start to think if we actually gone beyond the capacity of the planet right here right now? I think if we can there's there's behaviors, which would indicate that yes, if we can continue in this with these behaviors. Yes. But there's enough. You could argue there's enough food on the planet. It's just in the wrong place at the wrong time. And, and that could go with the same for a lot of other aspects of, you know, the basic resources we need. We need to be innovative in getting them at the right place at the right time, rather than being too much in one area and not enough in the others. So there's a lot of problems that we have to consider it when we consider this, this issue. And it can't be done in isolation, but natural selection, we've, we've manipulated that long time ago.

Julian Savulescu (00:43:39):

Can I say one thing on something you said, which I think is exactly the most important issue here today. It's the size of a population is the function of two things. How long people live and how, how much we reproduce. So you can control a population by restricting reproduction or by restricting lifespan. And what we do at the moment is we let nature take its course. And what nature does, is it inflicts disease and disability. So even if you thought people shouldn't live any longer, there's still reason to pursue anti-aging research because you'll compress morbidity so that people don't have to be disabled seek and suffering for the last 5, 10, 15 years of their life. So even if you think that immortality, isn't a reasonable goal, you should still think that anti-aging research is a goal and people can then commit suicide for the sake of the next generation. Thankfully...

Fiona Wood (00:44:33):

Can I just clarify what you're saying is right now, we spend the vast majority of the amount you spend on health on for the individual is spent in the last six months of life. What we're saying is we should flip that around, spend it up front. So we enjoy life quality better.

Paul Willis (00:44:49):

Let's push through the questions. Cause we've got quite a queue of people ready to ask questions.

Audience member (00:44:55):

The only comment that was relevant to what I, I take objection to the comment that was made about productivity. You're not in paid work. You're not productive. I'm 17. I've been retired 10 years. In that time, I've done a degree. I've studied all kinds of things. It is the best time of my life. It's been a, it's a great time and a great opportunity. Yes, I am aging knees and then various things, but I think productivity needs clarifying what you mean. If like me, you worked in, I worked in various admin jobs that weren't really very satisfying. I've always thought it must be you. Panel can probably tell me it must be great if you've got a job that you love going to, and you would almost go and be paid nothing, but I didn't have that luxury. So I hope that they put that pill out because I'll certainly be taking it.

Paul Willis (00:45:53):

So, so the question of productivity just to revisit that what I was getting at there was that within the context of the society if, if people and not in a fit and healthy state in this extended age, such that their, their contribution to society is less than what they're taking out, then that becomes a, a societal question. Does it not?

Julian Savulescu (00:46:19):

But that lack of productivity is to say it again is a function of two things. One is, it's a function of aging. So if you, if you cure aging, you give people the opportunity to be productive. And the second thing that stops people being productive is a mandatory retirement age. So if you get rid of that and people can be as productive as, and for as long as they weren't divided check that you haven't got a superannuation plan. Unfortunately there is this country called the United States where you can go and work until you die. So I'll be [inaudible].

Dr. Brad Partridge (00:46:49):

Maybe if we live to 200, we could actually have several retirements. Maybe you retire at 65 from, you know, 10 or 20 years or something. And then go back for your second career study again, do some work for another 30 or 40 years, then have your second retirement with all the superannuation that you'd save then, and then move to the rest of life.

Fiona Wood (00:47:09):

I think that has some merit. I think it's a privilege to get up in the morning and enjoy what you do. I think it is a real privilege and my father worked in the coal mine, and they drummed that into us cause he hated it. And yeah, but when I was in the UK many years ago, I heard that surgeons, if you retired at 60, you had a 12 year life expectancy. This is some years ago. And if you retired at 65 year life expectancy as a surgeon was 13 months. So I'm going for the early retirement and rejigging the reboot in the hard drive. I think that's a good solution.

Paul Willis (00:47:41):

Another question from the floor, please,

Audience member (00:47:44):

There seems to be general agreement amongst you, that more funding is needed in the area of research, Chantal aging. And you seem to indicate that the bond should be pointed at politicians, but my question is on no different slant, the pharmaceutical companies make obscene profits and sort of

scarcity in their interest on indeed in the interests of the sickness industry. Genuinely, if you were to cure a major killer diseases, it'd be all not in business. So I would think that the fact that you're looking now at ever narrower specialisms in the sickness industry, that great numbers of people would be able to business, not only the pharmaceutical companies, but a lot of the people working in the industry.

Paul Willis (00:48:54):

It's an, it's an interesting point. Thank you. So that you know, if there is a pill waiting to be developed, someone's going to make a lot of money. So why are the companies who make pills pouring money into this research?

Julian Savulescu (00:49:10):

I think the gentleman gave the answer it's much better to be a pharmaceutical company, lowering people's cholesterol with very little effect and providing another treatment for treating cancer, treating, having lots of different treatments for all of these, you know, chipping away at the edges. If you were able to stop aging, there wouldn't be all of that industry. Yes, people would take that one pill or that one intervention, but it will, it's vastly more attractive to a pharmaceutical company, you know, not to, to bite the hand that feeds it and let the underlying disease progress and develop all these little manifestations and provide little treatments for those without actually doing the it. But the pharmaceutical industry, isn't a charity there they're there to make money. So they can, they're very smart. This is why you need government to push these initiatives or individuals, because it's not going to be the pharmaceutical industry that wants to delay aging. Otherwise they would have spent a lot of money on it.

Paul Willis (00:50:04):

So essentially it's the theory of planned obsolescence, but for the human body, what keeps the industry going is that we do keep getting sick so that we didn't get cured. And if we cure it ourselves indefinitely. Okay. Right. Next question, please.

Audience member (00:50:19):

Well, on the statement of the second retirement, I think that some of us, and I want to also preface this by saying that a lot in the world do have the luxury that those of us in this room have. But many of us already are in our second adulthood. I'm 55. I expect I'll be able to live another 30 years. So I think that we actually do have the opportunity to already have second lives compared to a few generations ago. My question though is if anyone on the panel would like to comment about the benefits of mortality, as opposed to immortality if you've ever had a life-threatening disease which I've had it causes you to look rethink your life completely again. And mortality makes every choice. We make matter in a way that I think if we were immortal those choices wouldn't have the same meaning for us. So do you think there's actually benefit for human beings being mortal? Does it change the quality of our lives?

Julian Savulescu (00:51:21):

Well yeah, again, fortunately, we don't have to answer that profound question because if you think that it has a benefit, we'll program it in and decide at what point you want to be mortal you work. I can tell you right now, it's not going to be, bring a huge amount of meaning to your life. If you're told you're going to die tomorrow. Maybe if you're told you're going to, you've got 10 years to live. Maybe it would be better for you than living for 20 years, but decide what it is and realize it without having disease and disability, sapping, what benefit you have got in your life through the process of aging. So, you know, in

a lot of these questions that the power is in our hands, you can be killed. You can decide to put in place structures that build in mortality, but don't have aging.

Julian Savulescu (00:52:11):

I personally don't believe for myself, that mortality brings meaning to life. What brings meaning to life is the choices that you make. The goals. What mortality does is force people to set themselves goals. And I spoke to Daniel Carnahan, who's the Nobel Laureate in economics in psychology. And I said, how could you make people's lives better based on your research in psychology. He said, there's two things that people don't understand. One is that what brings them life is not possessing material objects, but engaging in constantly rewarding relationships that require attraction or projects that require their intention and attention and give them rewards. So engaging in that, the second thing is they think their lives are unending and I never set themselves goals. So they never set themselves finite into their life. So what matters is really setting yourself a goal and working towards that, it's not having to die.

Paul Willis (00:53:03):

So we should all establish a bucket list as soon as possible, just to make sure we get through it.

Julian Savulescu (00:53:08):

I mean, you work at the moment, you will die. So you, you better plan for that resource now.

Dr. Brad Partridge (00:53:13):

It's interesting. We did a group of we did some interviews with a group of people called transhumanists to very enthusiastic about all sorts of enhancement technologies that could make us smarter run faster, stronger, and live longer. And one of the ladies that we spoke to said that she's already writing her first thousand year plan, she's got a diary and she's actually writing down all the things she wants to do in a first century, second century things I need to have done by the time I'm 500 and things like that. So thousand years, well, I mean, that's a long time, but yeah, obviously when Julian talks about goal setting, that's a, that's a pretty big example.

Paul Willis (00:53:55):

Let's get another question from the floor. Okay.

Audience member (00:53:57):

You talked about the quality of life of the older generations. What about for the younger generations? I'm just about to finish my uni degree and there's not many jobs available and I have blamed my dad for that. He's just now at retirement age and he's not retiring. And so were all finishing uni and we have to continue with our part-time jobs. We started in high school because there's no jobs because the older people are still working and there's kind of no pathway where we have to study for the first, like 40 years of our lives before we can then start a career and like kind of develop that way. Does it then sit back the kind of the growing up?

Paul Willis (00:54:41):

I think w w what you're saying is that this life extension idea means that we need a serious restructuring of societal ideals, such as the creation of work and how long you hold a job.

Dr. Brad Partridge (00:54:57):

Can you imagine the generation wars too, if we live to 152...

Paul Willis (00:55:01):

Sure I mean, you've already got the baby boomers, gen Y at each other's throats. Is this an intergenerational thing that or calamity that we're, we're not preparing for when we just talk about living longer?

Julian Savulescu (00:55:16):

Well, it is in part, but I'm not sure that this is the cause of the lack of jobs in Australia. First of all, we, we have had a retirement age. Secondly, you know, there's the problem of, of a lot of labor going outside of Australia, nature of jobs changing and so on. But in principle, I agree with you, there will, at some point be this question of how much work is there, how many resources are there for, for people who leave, how long and how many people. So, as I said, you need to cover it with a, with a program on reproduction, and you can encourage people to have certain number of children. If you have less children, there are less need for jobs. You might have more children, people living shorter, but these are all choices that we can make. And we have to think about the kinds of lives that people have and whether they have jobs. But we don't think about that when we form policies on opening up markets and so on, you know, we, we just fly by the seat of FM.

Fiona Wood (00:56:10):

Oh, sorry. Interesting. Because I hear often that the job that you'll, you will have at my age, that hasn't been invented yet. And so maybe this is an opportunity to actually say, well, you know, what, what is the, what, what are innovative different ways that we can actually use this planet? You know, maybe our pharmaceutical industry and when you're my age, or it be an interplanetary researchers, you know, looking for the, you know, looking for the next phone, who knows, but it's, it's an opportunity to look and engage and say, well, we know we don't want to go to WWI up, no fly in, fly out, cause there's tons of jobs on the minds at the moment, but we want to actually do something creative and, and create something else for this planet that really could be

Dr. Brad Partridge (00:56:54):

Jobs like cryonics technician or something. People have to man, the freezers,

Paul Willis (00:56:59):

It was Walt Disney everyday. I have been given the wine up. So I'll take one last question from the floor.

Audience member (00:57:06):

I think the the young lady who just asked a question would not be happy with the Leopold Stokowski, that conductor, who I believe at the age of 96, insisted on a 10 year and knew all of his contract. But I have a direct question for professor [inaudible] and that is I wasn't able to see who was putting up their hands in your little Paul. And I'm just wondering where the w in your opinion, was it the young people who were opting for the very extended life and perhaps the older people who are opting to cut it shorter? And if so what conclusions could be drawn from that?

Julian Savulescu (00:57:50):

Well, I didn't see. So let's, let's just do it again and you can see, and so let's just do it. Who wants to live less than 150 years hands up, and who wants to live more than 150 years? I can't see any real age distribution there. And I think these are very much individual choices. In fact, I don't think anyone really wants to die. My father was 88 when he died 87. What people don't want is to be incontinent, to be unable, to be independent, to do the sorts of things they enjoy. That's what they don't want, but I've never met somebody who, well, maybe there are very few small number of individuals who really just want to die when they've got a good life, but I've never met one.

Dr. Brad Partridge (00:58:31):

Just on that. When we asked people about that, and we tried to compare answers in terms of age, we found that a lot of the young people said, oh, old people they'll all want to live forever because it's so close to the end anyway, that they'll just want to keep hanging on. The whole people said, oh, young people they'll be the ones who want to live forever because they think there are immortal anyway. So in truth, they didn't, they didn't actually vary that much.

Paul Willis (00:58:56):

By way of rounding out the discussion, a quick hypothetical going around a little bit, the panel there is a pill developed. It will double your life expectancy. Would you take it, Julian?

Julian Savulescu (00:59:09):

Yeah.

Paul Willis (00:59:12):

You just hungry for that extra 70 years, 80 years.

Julian Savulescu (00:59:15):

I think it's also, I personally think it's a mistake in advance of being in confronting death to make predictions that you would want to die at an earlier point. Because again, my experiences working as a doctor is that once people really confront it it's it's they don't want to die. It's this, it's the sort of suffering and the kind of loss of continued life evolves. But so I can't see any rational reason not to take the pill. Brad, would you pop the pill? Well, if it's the calorie restriction fuel and I can eat whatever I like, absolutely. I'll be taking two. Why for me, I mean, if I'm enjoying my life I can't see a reason for it to end and I think that's going to be the, the critical thing. You know, if we can have technologies that can maintain quality of life, then you know, Hey, it's worth, it's worth living. There's too much cricket before Fiona.

Fiona Wood (01:00:14):

I'm feeling very vulnerable here with the mother of six children. So can I have a few of these tablets because guys, I'd take it. Yeah. I think there is a bit of a no-brainer, but I wouldn't want to take it in isolation. Yeah. I I, I'd want everybody to come with me.

Paul Willis (01:00:33):

So an anti-aging pill popping party. Yes.

Fiona Wood (01:00:37):

Yeah absolutely. Much more interesting than Botox.

Paul Willis (01:00:43):

I think for the sake of the record, I'd have to pop that pill too, because I've got a model railway to finish it. It's coming along very slowly. Ladies and gentlemen, we've shared some incredible minds today. Would you please put your hands together, for Fiona, Brad and Julian. Couple of quick things before you go, please don't forget the evaluation forms. If you would kindly fill one out before you leave the building, don't forget the [inaudible] would love to see your happy smiling faces in our building. And the balcony bar is open. So those of you who think that alcohol will preserve you a little bit longer you, your poison is available. We need to clear the auditorium to prepare for the next session, which is in here at three o'clock with how do you get good decisions, ladies and gentlemen? Can I get one last round of applause for our panel? Thank you very much.